Klondike Source Ltd
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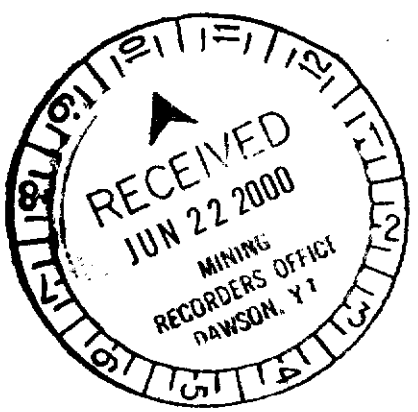
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ASSESSMENT REPORT

Klondike and Wedge Claim Blocks, Dawson Mining District

May, 2000

R.G. Adamson, MSc., MIMM
and
C.M. Thomas, BSc., Hons.
with an Appendix by
R.W. Marjoribanks, PhD.



Prepared for
The Dawson Mining Recorder,
DAWSON CITY
YUKON TERRITORY

C/- RobSearch Australia Pty Limited
11th Floor, 80 Arthur Street, North Sydney, NSW 2060, Australia
Telephone: (02) 9957 3199 Facsimile: (02) 9954 4011
E.Mail: ksl@robsearch.com.au

This report has been examined by the Geological Evaluation Unit under Section 53 (4) Yukon Quartz Mining Act and is allowed as representation work in the amount of $ 70,400 .

M. Burke

for Regional Manager, Exploration and Geological Services for Commissioner of Yukon Territory.

Klondike Source Ltd

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Klondike Source Ltd

ASSESSMENT REPORT

Klondike and Wedge Claim Blocks, Dawson Mining District

May, 2000

CORRIGENDA

p. 16 Second paragraph, last sentence reworded to read:

It is thought that the major placer gold production has largely been derived from the SW-flowing consequent streams of this drainage system.

p. 31 Section 6.2 GRAVITY, paragraphs 3 and 4 are the last two paragraphs of the previous section 6.1 MAGNETICS, with the final dot point to read :

..... but not the spectacular arc of the Sixty Mile River and the cross-cutting (superimposed) nature of the middle reaches of the Stewart River.

p. 32 Figure 9: The right hand side definition of the 63° 30' parallel is 15' too far north.

QUALIFICATIONS

B.Sc. (Hons) Geology, University of St. Andrews, Scotland (1960).

SPECIALIZATIONS IN THE FIRM

Specialist in interpretation of remote sensing data in exploration for precious and base metals, diamond and gem stones; regional geology and structure; assessment and valuation of uranium, precious and base metal exploration properties.

KEY QUALIFICATIONS

Significant experience of epithermal gold exploration and property assessments includes:

- field visits to the major deposits of the Bengkulu and Bukitingi districts (Sumatra), Mirah and Ringas (Kalimantan), several prospects in Northland and Central Taupo (New Zealand), Nevada (USA) and Gold Ridge (Solomon Islands),
- data assessments and valuations of several other southwest Pacific gold properties, and
- background in Middle East regional geology from work in Iran, Egypt and the Sudan.

CAREER HISTORY

1979 - PRESENT ROBESEARCH AUSTRALIA, SYDNEY

Executive Director - Minerals. Supervision of field exploration programmes, regional exploration studies (photogeology, Landsat and remote sensing interpretation), property assessments and valuations for gold, platinum group metals, diamonds, base metals (copper, lead, zinc) and uranium; regional geological (remote sensing) studies for coal and petroleum.

In 1988-89 spent 6 months in India supervising major exploration geology segment of consulting contract with Hindustan Copper Limited. Other major overseas assignments have been undertaken in North Africa, Indonesia and New Zealand.

Major recent emphasis has been gold: property assessments, valuations and regional studies have been carried out on properties in Australia (N.S.W., Qld., Vic., N.T., W.A., S.A.), USA, Papua New Guinea, Indonesia, Fiji and New Zealand. Also copper property assessments in India, Chile and Australia (NSW, Qld, SA, WA); and diamonds in NSW. Many major mines and prospects have been visited in India, Sumatra, Kalimantan, Chile, New Zealand and throughout Australia.

1976 - 1979 ROBERTSON RESEARCH GROUP

1977-1979 Consultant, Uranium Exploration, URIRAN (Atomic Energy Organisation of Iran), Tehran. Seconded to lead a 16 man group of experience uranium explorationists (geologists, geochemists, geophysicists, mineralogists) recruited by the Robertson Research Group for the AEOI.

1976-77 Exploration Consultant, Khartoum, Sudan. Exploration for gold, asbestos, chromite and uranium, government exploration planning (12 months). Exploration consultant, Asian Development Bank, Manila, 2 month assignment to assist review of South Korea geoscience institutions.

1970 - 1976 ROBERTSON RESEARCH (AUSTRALIA) PTY. LIMITED

Senior Geologist, Perth. Established and managed small (2-4 geologists) consultancy office. Supervision of field exploration programmes for nickel, copper-zinc, alluvial tin; regional geological studies, based on photogeology, of the Archaean Pilbara Block, Lower Proterozoic of the Gascoyne Province and East Pilbara-Telfer-Rudall region; Mt. Isa district, Queensland, Queensland coal basins, porphyry copper terrain in Indonesia and Pacific Islands; 4 month field mapping project for oil exploration in Irian Jaya using radar imagery.

1967 - 1970 GEOLOGICAL SURVEY, BOTSWANA

Senior Regional Geologist. Regional mapping of Precambrian terrain covering major copper-nickel, copper and diamond prospects.

1961 - 1967 **MINERAL RESOURCES DIVISION, TANZANIA**

Regional Mapping Geologist. Field mapping of Archaean, Proterozoic and Rift Valley terrain, including historic and active gold mines.

1960 - 1961 **UNIVERSITY OF ST. ANDREWS**

Research Student - petrology of picritic rocks.

Certificate of Author Competency and Qualifications

I, Colin Maguire THOMAS, of 36 Glover Street, Mosman, New South Wales, Australia, having graduated with a Second Class (Division I) Honours Degree in GEOLOGY from the University of St. Andrews, Scotland, in 1960, have practised continuously as a geologist for 40 years.

Signed

Colin Thomas

.....

Colin Maguire THOMAS

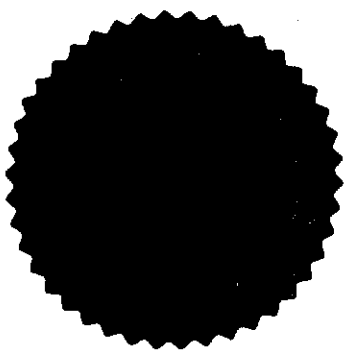
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Witness signature

TIMOTHY DONALD SOMERVILLE
Notary Public

.....

Witness name



Robert G Adamson *MSc(Hons) MAusIMM MMICA CPGeo*

Consulting Economic Geologist
NSW Business Registration No: T9382710

95 Fox Valley Road, Wahroonga NSW 2076, Australia
Telephone +61 2 9489 8217 Facsimile +61 2 9489 0914
Cellphone & Voicemail +61 411 553310 E-mail adamsonr@ozemail.com.au

INDEPENDENT CONSULTANT TO THE MINERAL INDUSTRY

PROVIDING SERVICES IN

MINERAL RESOURCE EVALUATION, MINERAL EXPLORATION AND MINING GEOLOGY

PARTICULAR COMPETENCE IN:

- Exploration, appraisal and valuation of mineral deposits
- Management of mineral exploration, mine geological services and small mining projects
- Valuation, acquisition, joint venture and sale of mineral tenements
- Wide experience of the following types of mineral deposits:

Mesothermal-epithermal gold-silver	Nickel-copper sulphides
Polymetallic basemetal sulphides	Placer gold
Stratabound/stockwork gold-copper	Diamonds
Stratiform copper-silver	Semi-precious stones

- Extensive work experience in:

Australia (most States & Territories)	New Zealand
Africa (Namibia, Zimbabwe, South Africa, Botswana)	South Korea

Parts of North and Central America, PR China, Europe, the CIS, Papua New Guinea and South East Asia have been visited on short-term assignments

SPECIALISING IN:

- Appraisals of potential for economic mineralisation (from regional to prospect scale) utilising integrated geological, geophysical and geochemical data
- Development of cost-effective exploration strategies; training and development of geological teams
- Drilling, logging and sampling best practice to achieve appropriate and satisfactory levels of confidence in resource/reserve estimates and in production grade control
- Assessment of geological factors relating to bulk sampling and grade control procedures, and to metallurgical processes and recoveries - essential to the optimisation of mining and extraction profitability
- Geological modelling (3 dimensional) of ore deposits - the basis for competent resource/reserve estimation and for cost-effective local exploration
- Mineral resource and ore reserve estimations, and audits
- Mineral deposit valuations; pre-feasibility economic studies.
- Independent Technical Reports to ASC and ASX requirements; Resource/ Reserve Statements to conform with JORC Code and ASX Listing Rules

THIRTY YEARS OF MINERAL DEPOSIT EXPERIENCE, INCLUDING:

GOLD
Telfer (Western Australia)
Lake Cowal (New South Wales)
Dicks Reward (New South Wales)
Wellington & West Wyalong tailings retreatment (New South Wales)
Macquarie River placer (New South Wales)
Bendigo Goldfield (Victoria)
Wattle Gully-Castlemaine Goldfield (Victoria)
Central Victorian placers; shallow & deep leads
Hodgkinson Goldfield (Queensland)
Chillagoe District (Queensland)
Pine Creek and Cosmo Howley districts (Northern Territory)

Martha Hill (New Zealand)
Coromandel Goldfield (New Zealand)
Macraes Goldfield (New Zealand)
Grey River & Arahura River placers (New Zealand)

Lebong Tandai (Indonesia)

Ondundo (Namibia)
Freda-Rebecca (Zimbabwe)
Royal Family (Zimbabwe)
Peach (Zimbabwe)

various in Shaanxi & Henan Provinces (P R China)
Deogum, Sang Eun, Dogcheon, Haksan (South Korea)

BASEMETALS
Kambalda-style nickel/copper (Western Australia)
Woodlawn zinc/lead/copper (New South Wales)
Lewis Ponds zinc/copper/gold/silver (New South Wales)
CSA copper/zinc/lead (New South Wales)
Thalanga copper/zinc/lead (Queensland)
Mount Lyell copper/gold (Tasmania)

Tsumeb copper/lead (Namibia)
Kombat/Asis copper/lead (Namibia)
Tschudi copper/silver (Namibia)
Otjihase copper/silver/pyrite (Namibia)
Matchless copper/pyrite (Namibia)
Ngamiland copper/silver (Botswana)

DIAMONDS
Copeton-Bingara (New South Wales)
Capertee (New South Wales)
Argyle pipe & alluvials (Western Australia)
Arnhemland (Northern Territory)
Far North Queensland (regional)

Lomonosov (northern Russia)

Colossus (Zimbabwe)

NON METALLICS
Magnesite (Kunwarara, Queensland)
Chrysoprase (Marlborough, Queensland)

QUALIFICATIONS

PhD, Australian National University (1974)

BSc, 1st Class Honours Geology (Class Medallist), University of Glasgow, Scotland (1966)

MAIG, MGSA, MSEcGeol

CAREER HISTORY

APRIL 1994 -PRESENT — INDEPENDENT CONSULTANT

Gold and base metal exploration in Indonesia, Malaysia, Vietnam, Western Australia and the Northern Territory. Contracts involved geological mapping at all scales, interpretation of satellite and aeromagnetic imagery, structural analysis of outcrop and drill core, property assessment, literature search, advice on new project generation. Preparation of Independent Expert Reports. Presentation of 1-3 day in-house workshop training courses on structural geology, geological mapping, air photo interpretation and exploration techniques.

1986 - 1994 — RGC EXPLORATION

1991-1994 Chief Geologist - Reporting to Exploration Manager. Duties included:

- Promotion and initiation of new project development.
- Assessment of properties for acquisition.
- Advice to management on budget prioritisation.
- Maintaining technical field standards through example, field review and organising training courses.

Areas of operation: - Australia, PNG, Indonesia, Malaysia, Vietnam, Laos, Greece.

Commodities Sought: - Gold, copper, zinc, tin.

Principal Achievements: - Significant contributions to the acquisition of quality exploration projects.

1986-1991 Principal Geologist (Research) - Internal Consultant. Reporting to the Manager, Research and Services. Duties included:

- Technical support to project teams in areas of geological mapping, structural geology, interpretation of remote sensed imagery and the design of exploration programs
- New project generation.

Areas of Operation - Australia, Indonesia, Malaysia, PNG.

Commodities Sought - Gold, copper, zinc, tin.

Principal Achievements - Significant contributions to the acquisition and exploration of quality exploration projects.

1984 - 1986 INDEPENDENT CONSULTANT

Contracts involved:

- regional and detailed geological mapping,
- new project generation,
- structural analysis at scales from drill core to mineral province, and
- design and control of exploration programs.

Areas of Operation - West Australian Archaean, Proterozoic of Northern Territory and Queensland, Kalimantan, Sumatra, Sarawak.

Commodities Sough - Gold

Principal Achievements - Conceptual discovery of the Greenfield Gold Mine (Coolgardie area). Resolution of the structure of the Granites Gold Camp, Tanami Complex, (NT).

1976 - 1984 ANACONDA AUSTRALIA INC.

1984 Senior Regional Geologist (SW Pacific)

Management responsibility for developing new gold projects in Indonesia, Malaysia and PNG. Supervision of project geologists. (This position terminated with the demise of the Anaconda Company.)

1981-1983 Senior Geologist (Special Projects)

Generation of new projects for gold and base metals throughout Australia and the SW Pacific. Identification and assessment of acquisition opportunities. Based in Perth, WA.

Areas of Operation - All Australian States, Kalimantan, PNG, Sarawak, Sabah.

Commodities Sough - Gold, base metals.

Principal Achievements - Initiation of gold exploration programs in Indonesia and Malaysia; identification and acquisition of gold projects in Proterozoic Iron Formations; identification and assessment of sediment hosted base metal targets in the Proterozoic terrains of WA, SA, NT and Qld.

1978-1981 Senior Regional Geologist

Management responsibility for base and precious metals exploration in Eastern Australia and supervision of annual budgets to $3.0 million (1980 dollars) and seven geologists. Based in Townsville, Queensland and reporting to exploration Manager.

Principal Achievements - Setting up of regional exploration offices in Townsville and Mount Isa; discovery and drill testing of significant sediment hosted base metal prospect in Cape York; initiation of gold exploration programs in the Northern Tasman Orogenic Belt; conceptual discovery and testing of Zn-Pb mineralisation in the Broken Hill Province.

1976-1978 Project Geologist

Exploration for nickel and massive sulphide in the West Australian Archaean. Based in Kalgoorlie, WA.

1974 - 1976 THE UNIVERSITY OF ADELAIDE

Post Doctoral Research Fellow

Research position funded by the Broken Hill Mining companies (Rio Tinto and North) to elucidate structure of the Broken Hill orebodies and structure and tectonics of the Willyama Province.

Principal achievements in academic applied economic research were the resolution of the 100 year old problem of the structure of the Broken Hill Mine area and the formulation of new exploration ideas for the region surrounding Broken Hill.

1974 BUREAU OF MINERAL RESOURCES (NOW AGSO)

Contract Geologist

Preparation of the Hermannsburg 1:100,000 geological map sheet, Central Australia. (Based on mapping undertaken as part of PhD studies).

1971 - 1974 AUSTRALIAN NATIONAL UNIVERSITY, CANBERRA

Post Graduate Student

Field-based PhD studies into the structure, tectonics and metamorphism of the Proterozoic Arunta Complex and overlying Palaeozoic fold/thrust complex along the northern margin of the Amadeus Basin in Central Australia.

1969 - 1971 CONWEST AUSTRALIA NL

Geologist

Based variously in Kalgoorlie, Meekatharra and Nullagine, Western Australia. Engaged in all phases of field exploration for nickel, copper and zinc massive sulphide deposits in the Yilgarn and Pilbara Archaean shield areas.

1966 - 1969 CRA EXPLORATION

Geologist
Based variously in the Northern Territory, Queensland, PNG and the exploration ship MV *Craestar*. Involved in all field exploration stages in the search for uranium, sediment hosted base metal, porphyry copper, porphyry molybdenum, and coal.

1964 CRA EXPLORATION

Field Assistant

For a three-month field season during University vacation. Assisting in iron ore search in the Hamersley Range and manganese search in the East Pilbara.

PUBLICATIONS:

Geological Methods in Mineral Exploration and Mining Chapman & Hall, 115p, 997, ISBN 0412800101 (hardback). See reviews in: ***Economic Geology,*** Vol 92 p 636 and ***The Australian Geologist.*** No 107 (1998) p 36.

The Structure and Tectonic Evolution of the Broken Hill Region, Australia. (with Laing, Glen & Rutland). **Precambrian Research,** 1980 (v 13) pp. 209-240.

Structure of the Broken Hill Mine Area and its Significance for the Genesis of the Ore Bodies. (with Laing & Rutland) **Economic Geology,** 1978 (v74) pp. 1112-1136.

Basement and Cover Relations on the Northern Margin of the Amadeus Basin, Central Australia. **Tectonophysics,** 1976 (v 33) pp. 15-32.

The relation between microfabric and strain in a progressively deformed quartzite sequence. **Tectonophysics,** 1976 (v 32) pp. 269-293.

Hermannsburg (Northern Territory) 1;100,000 Geological Map Sheet. Published by the **Bureau of Mineral Resources (AGSO)** 1975.

The Geology and Geochronology of the Arunta Complex, North of Ormiston Gorge, Central Australia. (with L.P. Black). **Australian Journal of Earth Sciences,** 1974 (v 31) pp. 291-300

An Instrument for measuring dip isogons and Fold Layer Shape Parameters. **Journal of Geological Education.** 1974 pp. 62-64.

Robert G Adamson ***MSc(Hons) MAusIMM MMICA CPGeo***
Consulting Economic Geologist
NSW Business Registration No: T9382710

95 Fox Valley Road, Wahroonga NSW 2076, Australia
Telephone +61 2 9489 8217 Facsimile +61 2 9489 0914
Cellphone & Voicemail +61 402 073 609 E-mail adamsonr@ozemail.com.au

I, **Robert Gerard Adamson** declare that I am co-author of the report entitled "Assessment Report – Klondike and Wedge Claim Blocks, Dawson Mining District" dated May, 2000.

My professional experience comprises some thirty years in the practice of economic geology in a range of precious and base metal deposit types. I have worked primarily in Australia, New Zealand and southern Africa in a variety of senior professional and management positions with major mining houses and stock exchange listed companies. Since 1994 I have been practising as an independent consultant in economic geology.

I hold the degrees of BSc and MSc (First Class Honours in Geology).
I am a Member of the Australasian Institute of Mining & Metallurgy (30 years) and of the Mining Industry Consultants Association (Australia) (6 years).
I gained the status of Chartered Practising Geologist in February 2000.

A copy of my professional services summary is attached.



22 June, 2000

Klondike Source Ltd

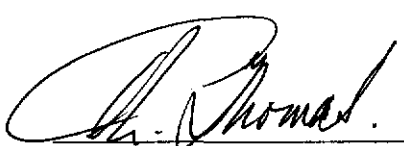
Expenditure Statement
for
WEDGE and KLONDIKE CLAIMS
re Assessment Report, 1999 – 2000

WEDGE CLAIMS (167)		$CAN
Geological fieldwork	6.5 person-days	4,550.00
Structural mapping from fieldwork, airphotos, satellite images and airborne geophysics	8.0 person-days	5,600.00
Vehicles and field accommodation in Yukon		1,578.00
Consumable supplies and communications		1,395.00
Other costs, etc. for maps and reports		1,370.00
		14,493.00
Average expenditure per claim		86.78

KLONDIKE CLAIMS (579)		$CAN
Geological fieldwork	30.0 person-days	21,000.00
Structural mapping from fieldwork, airphotos, satellite images and airborne geophysics	30.5 person-days	21,350.00
Vehicles and field accommodation in Yukon		7,917.00
Consumable supplies and communications		7,010.00
Other costs, etc. for maps and reports		5,845.00
		63,122.00
Average expenditure per claim		109.02

This is a certified statement of proper account.

Signed



Date: 25 August 2000

C. M. Thomas
Klondike Source Ltd
as operator for the Klondike Source JV
and agent for Barramundi Gold Ltd., registered holder of WEDGE and KLONDIKE CLAIMS.

1. INTRODUCTION

This report covers exploration of the two large KLONDIKE and WEDGE Claim blocks (Enclosure 1, Appendix 1, and Figure 3) in the northern Klondike Goldfield within the Dawson Mining District (Figure 1). Substantial detailed geological and photogeological work on the Claim blocks is to be found in Appendix VIII with 7 Attachments. Subsequent revision of this detailed work and additional district structural studies centred on the Claim blocks covers a wider area (Figure 1, Enclosures 3 to 6 and Appendix II).

1.1 KLONDIKE SOURCE LIMITED (KSL)

1.1.1 Foundation and Objective

Klondike Source Limited (KSL) was founded as an unlisted Australian public company in May, 1999. Initial funding was provided by the founding directors, Colin Thomas and Ray Soper. The primary objective of the company was to explore for hardrock gold resources in the Klondike Goldfield.

1.1.2 Initial Reasons for the Exploration Play

Barramundi Gold Ltd (BAM), a Canadian public (Alberta-listed) company provided, in their annual reports, information on their Hunker Dome (Klondike) project which led to the following initial conclusions:

- The Klondike goldfield is arguably the largest stream sediment gold anomaly in the world, with recorded placer gold production of 12.2 million troy ounces (Moz) (Kennecott, Figure 2) and only in the order of 1,000 oz gold recovered from hardrock, largely from the Lone Star locality.

- 59% of the recorded production came from the Bonanza Creek drainage basin which covers less than 20% (140 km2) of the total goldfield area (750 km2) suggesting that there are one or more major sources of the placer gold in this relatively small area.

- Explanations for the hardrock source of the gold were either spurious (e.g. Boyle, 1979) due to the lack of recognised geological processes, or dubious (e.g. BAM's VHMS[1]) because of the lack of evidence for related mineralised features, i.e. major and extensive massive sulphide gossans formed from massive sulphide deposits with 1 to 3 g/t gold at best; or unlikely, because of the lack of discovery of the vertical geological components (e.g. epithermal silica gold lodes or feeder systems).

- Exploration for classical vertical-orientated gold-quartz lodes and veins had been unsuccessful, but many of the major, particularly placer-related, goldfields are related to stratabound or sub-horizontal mineralised structures; such mineralised structures are difficult to find, but provide notably large deposits. It was noted that the Klondike Schist which forms the goldfield district's bedrock was not described as a turbidite metasedimentary sequence, thus ruling out the commonly economically unattractive slate-belt hosted quartz vein type of mineralisation.

- Geological maps and descriptions of the host rocks appeared rudimentary (e.g. Boyle, 1979).

- The northern Yukon and neighbouring region of Alaska had not been subjected to major Late Tertiary-Quaternary major glacial erosion processes, but was subject to permafrost (Douglas,

[1] VHMS: volcanic hosted massive sulphides

1. INTRODUCTION

This report covers exploration of the two large KLONDIKE and WEDGE claim blocks (Enclosure 1, Appendix 1, Figure 3) in the northern Klondike Goldfield within the Dawson Mining District (Figure 1). It should be noted that the exploration data provided in this report is of a regional to district nature with limited reconnaissance/orientation geochemical studies of rocks and soils. Thus the data covers a much wider area than the claim blocks (Figure 1) with Enclosures 3 to 6 consisting of four 1:100,000 sheet photo interpretation maps (Dawson, Grand Forks , Flat Creek and Granville) and a similar area covered by the structural study forming Appendix II.

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- 59% of the recorded production came from the Bonanza Creek drainage basin which covers less than 20% (140 km^2) of the total goldfield area (750 km^2) suggesting that there are one or more major sources of the placer gold in this relatively small area.
- Explanations for the hardrock source of the gold were either spurious (e.g. Boyle, 1979) due to the lack of recognised geological processes, or dubious (e.g. BAM's VHMS[1]) because of the lack of evidence for related mineralised features, i.e. major and extensive massive sulphide gossans formed from massive sulphide deposits with 1 to 3 g/t gold at best; or unlikely, because of the lack of discovery of the vertical geological components (e.g. epithermal silica gold lodes or feeder systems)
- Exploration for classical vertical-orientated gold-quartz lodes and veins had been unsuccessful, but many of the major, particularly placer-related, goldfields are related to stratabound or sub-horizontal mineralised structures; such mineralised structures are difficult to find, but provide notably large deposits. It was noted that the Klondike Schist which forms the goldfield district's bedrock was not described as a turbidite metasedimentary sequence, thus ruling out the commonly economically unattractive slate-belt hosted quartz vein type of mineralisation.
- Geological maps and descriptions of the host rocks appeared rudimentary (e.g. Boyle, 1979).
- The northern Yukon and neighbouring region of Alaska had not been subjected to major Late Tertiary-Quaternary major glacial erosion processes, but was subject to permafrost (Douglas,

[1] VHMS: volcanic hosted massive sulphides

Klondike Source Ltd



Figure 1:

Location Map
Klondike Goldfield

1968); thus there was no blanket of fluvioglacial deposits, and the geomorphology of the region should reflect major components (lithology, structure) of the underlying rocks allowing photogeological and Landsat interpretation to be a useful tool.

In early 1999, BAM was focussing its exploration efforts on its Longline project and the company provided Thomas with additional exploration and geological data on its Hunker Dome project, including a geological compilation of the Klondike district (Mortensen, 1996); a limited set of 1:50,000 aerial photography; a 1:100,000 scale LANDSAT image of unknown origin and band compilation; a 1:250,000 scale SLR image; a Yukon Development synoptic map of the recently defined Tintina Gold Belt with major deposits; compilation reports of published data on placer gold morphology and chemistry and stream sediment surveys. This data provided the following conclusions:

- The structural geology of the Klondike district was very poorly known and maps did not reflect the likely effect of 200 to 400 km strike slip displacement along the adjacent Tintina Fault Zone.
- Fineness data on the placer gold, in the range of 650 to +800 indicated the gold had been locally derived.
- The maximum recorded nugget size of 28 oz was unusually small for a typical quartz vein sourced placer gold accumulation if there had been a period of pre-glacial surface gold enrichment.
- The delicate shapes (e.g. dendrites, wire) of much of the placer gold morphology indicated a local primary source.
- The Klondike Goldfield with its +12 Moz gold production was not an accepted part of the mid-Cretaceous Tintina Gold Belt; although having nearly three times the gold production of the largest and highest grade accredited deposit of the Belt, i.e. the 5.2 Moz Pogo deposit with an average gold grade of 17.8 g/t.
- A large low-grade gold deposit (e.g. Fort Knox of the Tintina Belt, or "porphyry" breccia pipe Kidston, Australia) was unlikely to be the source of Klondike gold since it should be relatively easy to find by prospecting or steam geochemical techniques.
- Available geological maps of the Klondike district did not appear to have been compiled using structural and geomorphological data available from aerial photography and Landsat. Given the relatively incised topography of 300 to 700 metres and lack of glacial drift, aerial photography and LANDSAT should reflect the effects of weathering of different rock types.

Initial interpretation of aerial photography and re-interpretation of the description of the Klondike Schist units suggested an exploration play, based on the following interpretations:

- The asymmetric topography between Bonanza Creek and Hunker Creek could represent erosion of such a stratigraphic schist assemblage if the arcuate ridge line was an unconformity augen schist which had been strongly silicified by a pre-schist mineralisation event.
- This stratabound-based mineralising model, like the Proterozoic Telfer deposit in Western Australia, could reasonably explain the morphology of the "Bonanza Dome" with short scarp-based streams flowing west and southwest into Bonanza Creek and the much longer northeast tributaries of Hunker Creek (e.g. Independence, Last Chance) were dip-slope streams. In addition, such a simple geometrical model would explain the major disparity of placer gold production with more than three times the production from Bonanza Creek compared with Hunker Creek (Figure 2).

Figure 2: **Klondike Goldfield**
Placer Gold Production (after Kennecott)

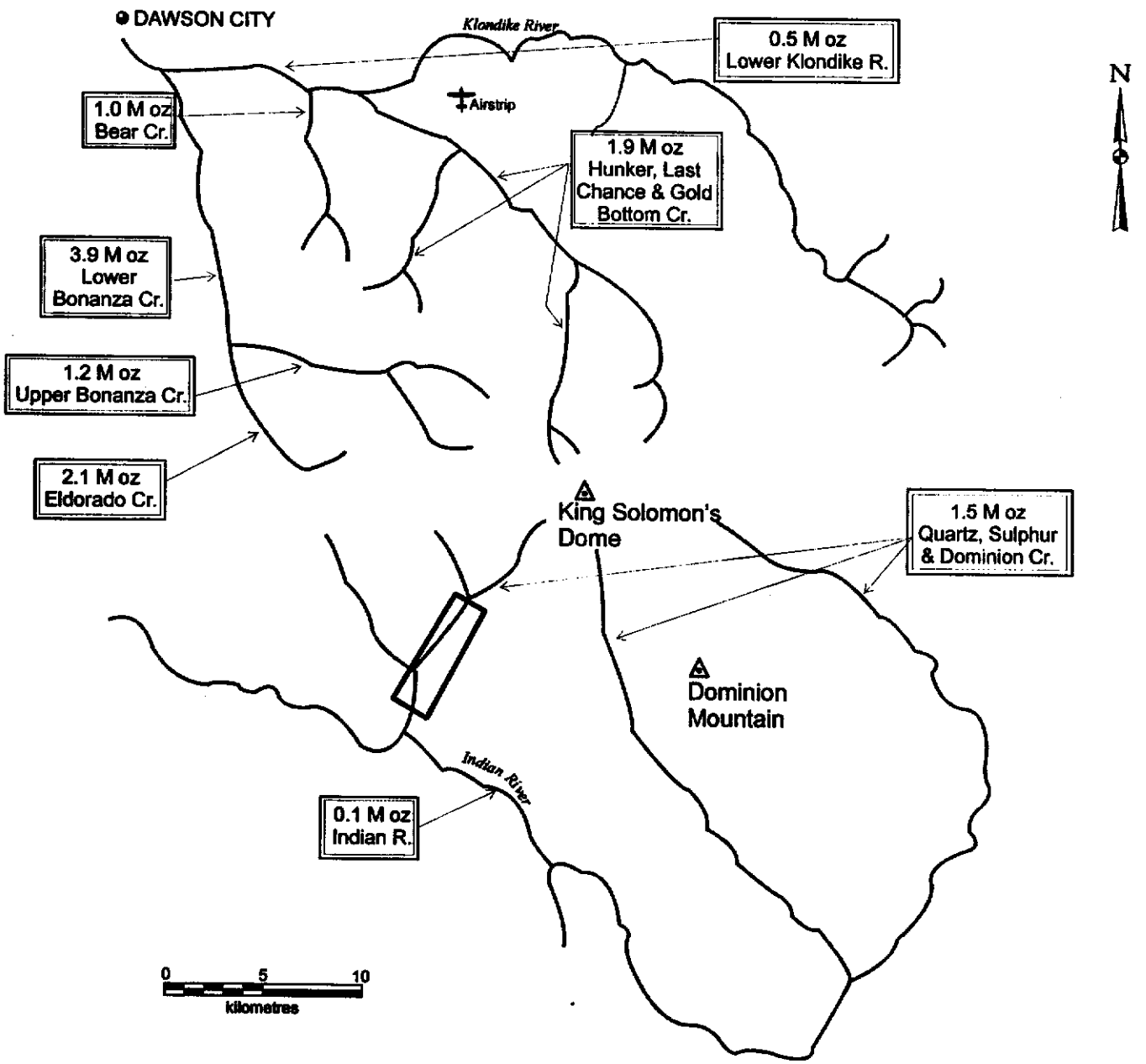
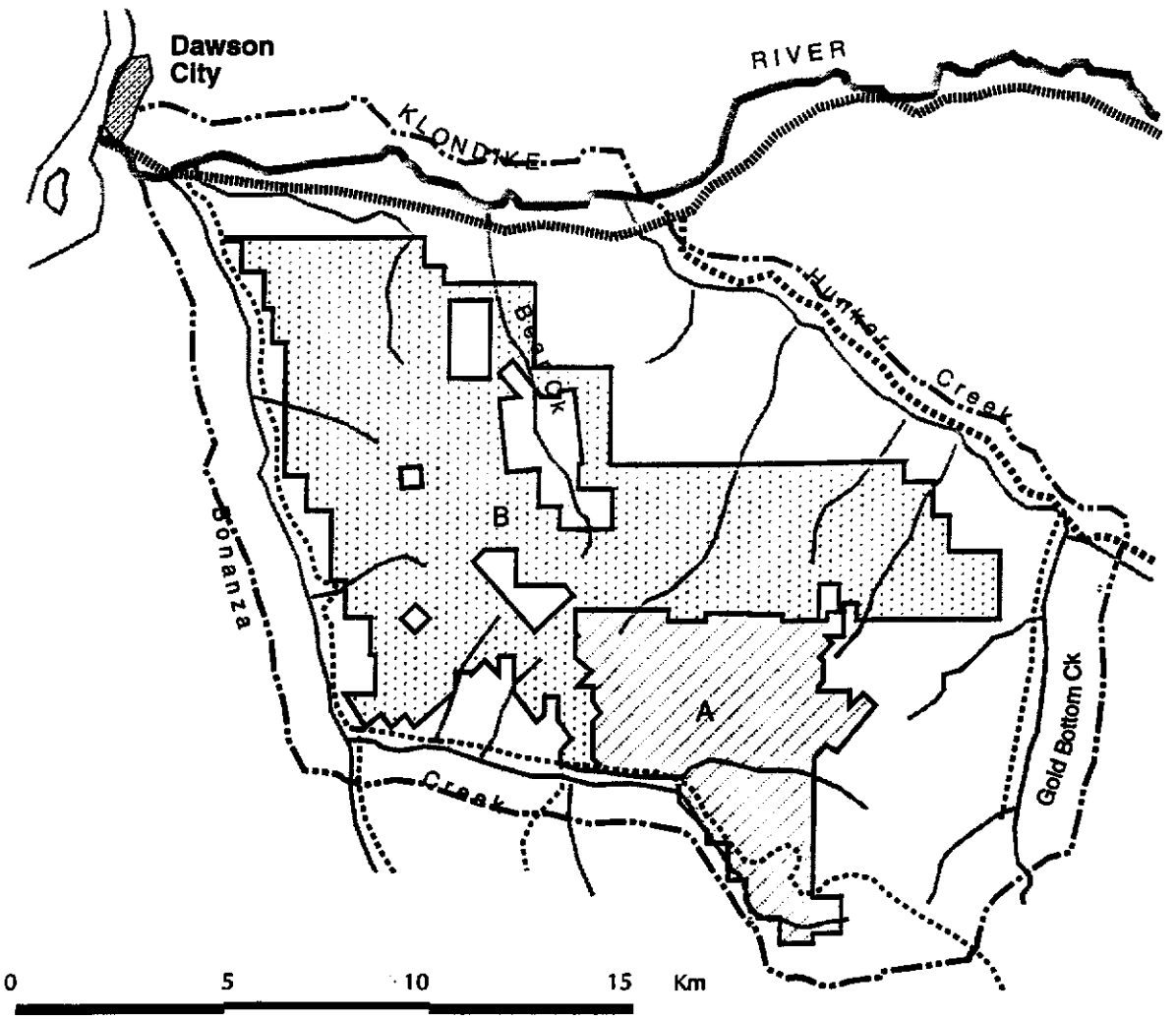


Figure 3



Barramundi – Klondike Source Joint Venture

CLAIM BLOCKS

A WEDGE Claims Block

B KLONDIKE Claim Block

3rd Party Claims or Open Ground

Area of Interest

1.2 JV WITH BARRAMUNDI GOLD LTD

1.2.1 Klondike Source JV (KSJV)

The development of an exploration model which had not been tested in the Klondike was a prerequisite condition for approaching BAM, who held extensive blocks of claims in the goldfield. The major components of the JV Heads of Agreement were:

- An Area of Interest covering the northwestern "Bonanza domain" bounded largely by Bonanza Creek, the lower Klondike River, Hunker Creek and Gold Bottom Creek (Figure 3).
- BAM to provide their relevant claims and stake further claims (WEDGE and KLONDIKE blocks) and KSL to spend $1 million to earn a 50% interest.

1.3 INITIAL FIELD VISIT AND INITIAL EXPLORATION PROGRAM

An initial exploration program was developed to test the proposed exploration hypothesis after a very brief field visit in Mid-May, 1999 by Thomas. This field examination indicated that the Klondike Schists were much more complexly structured than had been assumed, and the simple stratigraphic model developed could be in doubt.

Thus a reconnaissance exploration program was developed consisting of:

- a structured study of the Klondike Schist package,
- reconnaissance rock chip and soil geochemical sampling,
- district and regional geological studies based on aerial photography, Landsat imagery, and public domain regional aerial magnetic and gravity surveys, and
- acquisition of previous exploration data.

KSL engaged an experienced structural geologist, Dr Roger Marjoribanks with major experience in metamorphic rocks, with the remit to review the initial exploration hypothesis. His report is appended (Appendix II).

Later sections of this report provide full details of the other major elements of these exploration studies.

1.4 DATA ACQUISITION

1.4.1 Air Photography

Two sets of 1:50,000 scale, black and white aerial photography were acquired covering the Klondike Goldfield and the area to the east and southeast up to the eastern boundary of the Stewart River 1:250,000 map sheet (Figure 4).

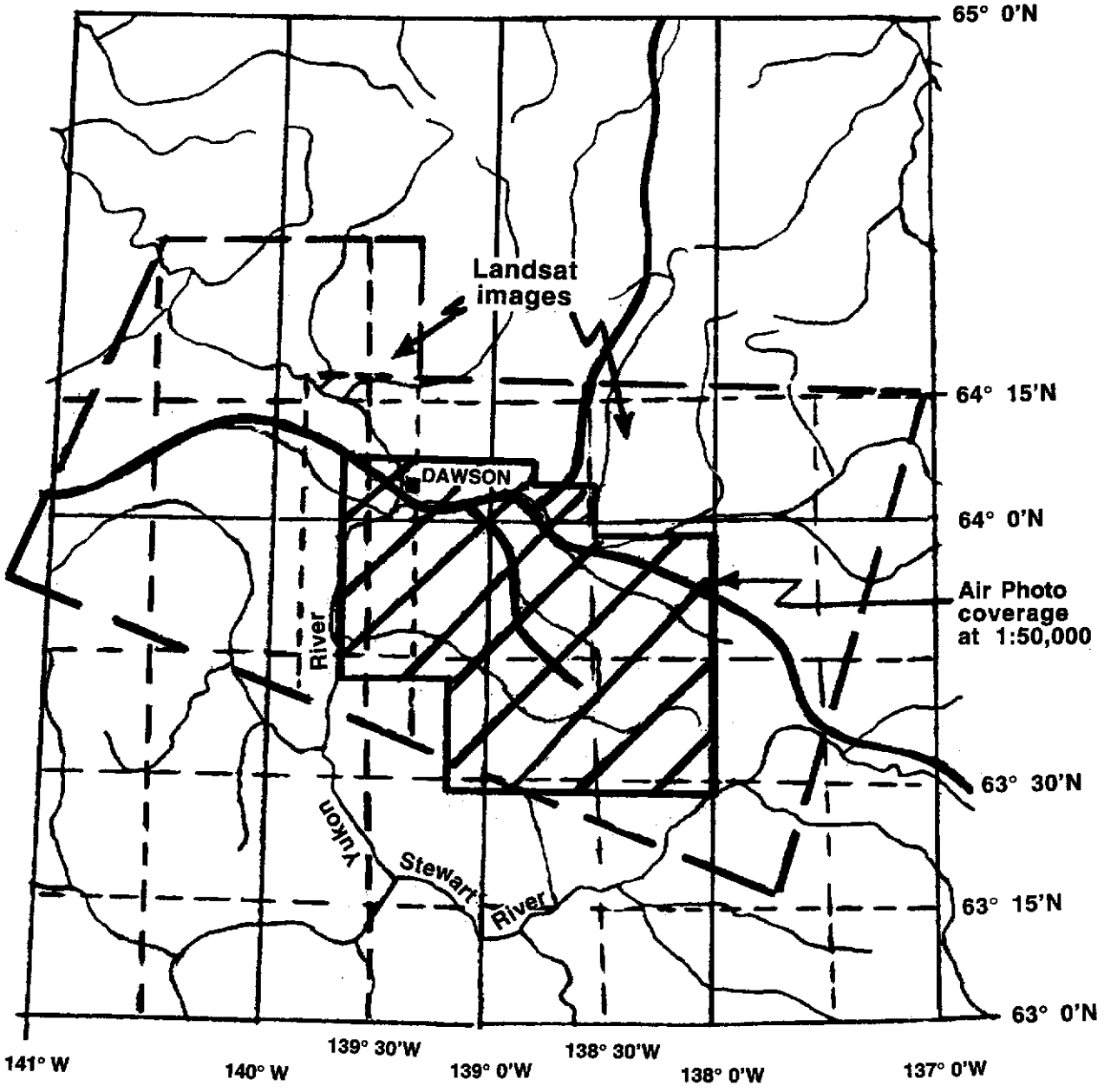
1.4.2 New Landsat Imagery

The 1:100,000 Landsat imagery inherited from BAM was of poor quality, unknown based mix, and provided very limited contrast. It appeared to be dominated by the infra-red spectrum contained in Bands 6 and 7 (Barramundi Annual Report, 1998, p115). These two bands characterise moisture and clay mineralogy, and provide very poor contrast over wooded and forest terrains.

Thus a new 1:100,000 Landsat image was generated by specialist processors Geoimage, Brisbane, Australia, only using Bands 3, 4 and 5. The area covered by this image is noted in Figure 4, and features illustrated in Figures 6, 7 and 8.

Figure 4:

1:100,000 Landsat Imagery and 1:50,000 Air Photography



1.4.3 Previous Exploration Data

Copies of all released open file exploration data were acquired for the northern Bonanza domain. There is a substantial body of data, notably Arbor Resources/Kennecott JV reports, which may remain embargoed to 30 June, 2001. We have taken note of two open-file drilling programs in the environs of the KLONDIKE-WEDGE claims:

(i) Lower **Last Chance Creek** (Cranswick and Doyle, 1994; Cranswick et al, 1995) where drilling intersected tuffaceous (breccia) volcanics and volcanic breccia were mapped in a S-flowing tributary of lower Hunker Creek; in addition, detailed aerial magnetic data covering a magnetic feature between Last Chance and Hester creeks.

(ii) **Cripple Creek district**, lower Bonanza Creek (Tomlinson and Gonzalez, 1991) where rotary drilling of an epithermal alteration zone provided anomalous arsenic, tungsten and thallium but no gold values.

Other public domain data was of limited use, partly because of the lack of well-defined sample location maps, but largely due to the limited sampling undertaken. These are however, some good descriptions of local rocks and early reports with perceptive exploration concepts (e.g. epithermal models) which presumably led to drill-testing noted above.

2. KLONDIKE EXPLORATION GEOLOGY

2.1 GEOGRAPHY

The Klondike goldfield is located in the west central part of the Yukon Territory centred immediately below the 64°N parallel and 139°E.

Geographically, the area is part of the Yukon Plateau and locally referred to as the Klondike Plateau. Elevations vary from about 400 metres (1,000 ft) along the Klondike and Yukon Rivers to over 1,200 metres (4,000 ft) at King Solomons Dome and Dominion Mountain.

In the region to the east and south of the Klondike goldfield, isolated hills rise up to 1,500 metres (4,800 ft), e.g. Australia Mountain, Eureka and Wounded Moose Domes, and Reindeer Mountain. It will be suggested later in this report that there is evidence that the hills with elevations of 1,200 to 1,500 metres are remnants of an early Tertiary or possibly late Cretaceous land surface. To the northeast, the Tintina Trench forms a wide (10 to 20 km) valley at an altitude of 500 to 600 metres separating the Klondike Plateau from the rugged juvenile topography of the Ogilvie Mountains, which rise to over 2,600 metres (8,500 ft).

For the purpose of further discussion, Figure 5 provides a division of the Klondike district into seven domains:

- the central Hunker (or King Solomons) domain, defined by radial drainage centred on the King Solomons summit,
- the northern Bonanza domain, defined by the lower Klondike River, Bonanza Creek, Gold Bottom Creek and Hunker Creek,
- the Dominion domain, lying between Dominion and Sulphur Creeks,
- the Lone Star domain, between upper Bonanza Creek and Eldorado Creek,

Leotta domain, covering the area north of Hunker Creek to the Klondike valley (Tintina Trench) and southeast to Allgold Creek,

Figure 5: **Klondike Domains**



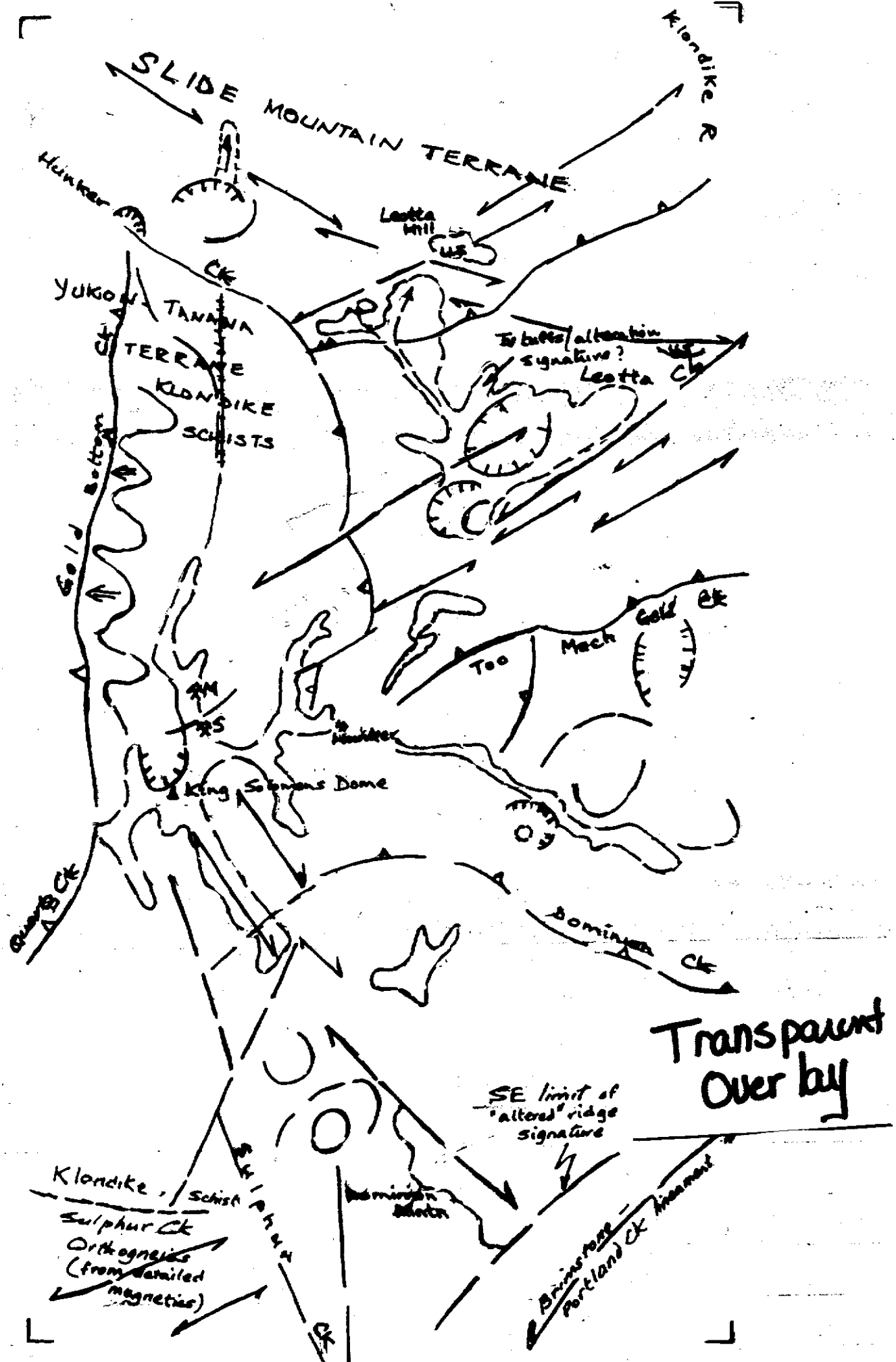

SLIDE MOUNTAIN TERRANE
Klondike R
Hunker Ck
Leotta Hill
US
Yukon
TANANA TERRANE
KLONDIKE SCHISTS
Gold Bottom
To bulls/alteration signature?
Leotta Ck
Gold Ck
Too
Mach
King Solomons Dome
Quartz Ck
Dominion Ck
SE limit of "altered" ridge signature
Klondike Schist
Sulphur Ck
Orthogneiss (from detailed magnetics)
Brimstone (Portland) Ck lineament
Transparent Overlay

Figure 6: **Hunker Domain Landsat Image**



Figure 6: **Hunker Domain Landsat Image**



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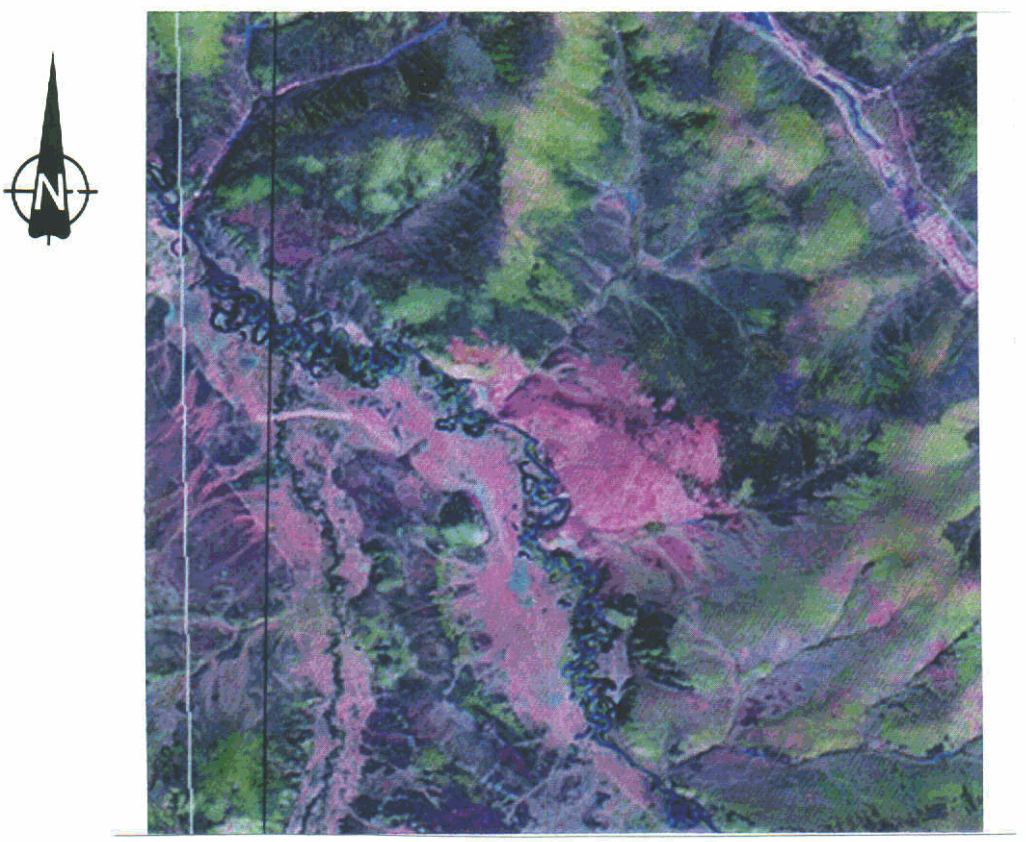
Combined Oxert Underlay

Figure 7: **Australia Mountain District**



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Figure 8a: **Indian River Landsat Image**
- acid tuff/pyroclastic cover or argillic alteration



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0 5 km

1:100,000

Figure 8b: **Indian River Drainage Divide - ?Plateau sedimentary sequence**



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0 5 km

1:100,000

- the Quartz Creek-Sulphur Creek domain which lies between those two creeks and the Indian River, and
- the Indian River domain, covering the large area south of the Indian River south to the drainage basin divide.

Figure 2 provides the location of the major placer gold workings which largely form the major boundaries of the Goldfield district, viz, the Lower Klondike River-Hunker Creek-Allgold Creek in the north and the Indian River in the south, lower Dominion Creek in the east and Lower Bonanza Creek-Eldorado Creek in the west.

The rolling hills of the Klondike were extensively, if not entirely, clear-felled during the goldfields heyday in the early years of the 20th century. This has resulted in a locally dense regrowth of alder and pine on the lower slopes and mainly birch at higher elevations.

In addition, there is a near blanket cover of moss, often called moss mats. The most dense vegetation occurs along creeks unaffected by placer mining.

2.2 TERRANE AND ROCK LITHOLOGIES

Mortensen (1996) and others (see bibliography) have provided the major descriptions and definitions of assemblages of the predominantly metamorphic rocks of the Klondike region, which are part of the Yukon-Tanana terrain. Four main lithological groups of rocks have been defined by Mortensen (1997):

1. gneissic to schistose metamorphic rocks of volcanic, sedimentary and plutonic origins (protoliths).
2. relatively undeformed, low grade mafic metavolcanic and ultramafic rocks.
3. undeformed intrusive rocks.
4. relatively young volcanic and sedimentary rocks.

2.2.1 Gneissic to Schistose Metamorphic Rocks (Yukon-Tanana Terrane)

The "basement" metamorphic rocks have been defined into four Assemblages:

(i) The **Nasina Formation** assemblage, consisting of carbonaceous quartz-muscovite schist, chlorite and chlorite-biotite schist and minor marble; non-carbonaceous metasediments in certain areas (lower Allgold Creek) are considered a separate facies. Limited U-Pb zircon age dating from felsic metatuffs indicate a latest Devonian-Middle Mississippian age for the assemblage.

This report provides evidence that, in the Goldfield district, this assemblage may structurally overly tectonically interleaved (thrust slices) or is interbedded with the Klondike Schist assemblage.

(ii) The **Klondike Schist** assemblage consists mainly of multiply-deformed schists of felsic metavolcanic origin (e.g. quartz-eye porphyries, pyrite quartz-muscovite schists, quartz-mica schists), lesser mafic (chlorite) metavolcanics and metagabbro (or metadiorite). U-Pb zircon dates of the felsic schists and metaporphyries give consistent mid-Permian ages.

(iii) The **Sulphur Creek orthogneiss** is reported to be a quartz-monzonite gneiss with a gradational contact with felsic metaporphyries of the Klondike Schist assemblage and has similar mid-Permian zircon age dates.

(iv) The **Mount Burnham orthogneiss** is a K-felspar augen-gneiss of granitic composition with an Early Mississippian U-Pb zircon age (360 million years). It is confined to the eastern border of the Klondike Goldfield.

2.2.2 Metavolcanic and Ultramafic Rocks of the Slide Mountain Terrane

Along the northern banks of the lower Klondike River within sight of Dawson, there are extensive outcrops of brecciated mafic volcanics of low metamorphic grade. In the same area there are strongly deformed serpentinites and serpentinised harzburgite. These rocks are part of the Slide Mountain Terrain (Mortensen, 1996).

Similar rocks, including pillow-flowed ultramafic basalts, occur in the Hunker Creek-Klondike River area (Leotta domain).

Mortensen (op. cit.) considers that this metavolcanics assemblage is Middle to late Palaeozoic in age, based on regional correlations.

There are uncorrelated ultramafic schists (talc-carbonate rocks) mapped at isolated localities in the Klondike Goldfield, most notably in the Hunker dome area. It has been suggested that the Hunker dome ultramafic schists and chlorite rich schists of the Klondike assemblage are stratigraphic correlatives of the volcanics of the Slide Mountain assemblage.

2.2.3 Undeformed Intrusive Rocks

Early Jurassic (K-Ar dated) biotite-muscovite quartz monzonite has been noted southwest of the Klondike district in the Jim Creek district. Interpretation of new Landsat data indicates that there are other granitoid intrusives of similar age in this south western district (Enclosure 2).

Younger Late Cretaceous (K-Ar dated) quartz-feldspar porphyry forms the small Whiskey Hill on the northern banks of middle Hunker Creek and occurs more extensively in the adjacent hills of the Leotta dome. Similar intrusive rocks have been described from Sourdough Gulch, on the western side of lower Bonanza Creek.

Felsite and rhyolitic dykes have been mapped at various localities and the air photograph interpretation study reported herein provides further evidence of acid hypabyssal intrusives.

In lower Hunker Creek, K-Ar age dating of a porphyritic plug or dyke provided an Eocene age. A substantial number of the acid dykes have an E-W orientation in the northern Klondike district.

Less commonly outcropping intrusives are plagioclase-phyric basalt and diabase (dolerite). Multiple dykes and/or sills of this kindred have been found throughout the Klondike district, and this report suggests they are dominantly N-striking dykes, as seen in lower Bonanza Creek. Many of these intrusives appear to have a reverse magnetic signature.

Andesitic dykes and plugs have also been recorded; a body in Calder Creek (tributary of Quartz Creek) has given a Late Cretaceous K-Ar biotite age.

2.2.4 Undeformed Volcanic and Sedimentary Rocks

In the lower reaches of Last Chance Creek — the major tributary of lower Hunker Creek — andesite probably interbedded with minor mudstone, siltstone, sandstone and pebble conglomerate forms a low, flat-topped ridge along the wide valley bottom. Mortensen (1997) noted that this sequence "resembles those of the Mid- to Late Cretaceous Tantalus Formation" described along the Indian River by Lowey (1984).

To the south, undeformed volcanic breccia and tuff was intersected by Kennecott in diamond drilling in the valley of lower Independence Creek and acid volcanics have been reported by Mortensen (op.cit.) in the vicinity of the mouths of Germaine and Goring creeks, north-flowing tributaries in the northeastern Leotta dome.

2.3 PLACER GOLD DISTRIBUTION AND CHARACTER

Figure 2 is a Kennecott-sourced compilation (report unknown) publicised by BAM showing the cumulative production figures for the major drainages of the placer gold Klondike goldfield.

This data indicates that 59% of the gold production, totalling 12.2 Moz, came from the northwestern Bonanza Creek-Eldorado Creek system. The area of the eastern half of the drainage basin represents between 15% to 20% of the total Klondike Goldfield area. As previously noted, major placer gold production has been derived from S-flowing drainage terrains.

The fineness of Klondike placer gold from bullion data shows a range from 650 to over 850 (878). Detailed studies have recorded locally fineness above 900 (Knight et al, 1994). There is no systematic pattern of increasing fineness downstream, and some of the creek headwaters (e.g. Eldorado, Bonanza, Gold Run, Dominion) have values of around 850. Knight et al (1994, 1999) also describe the morphology and rim geochemistry of a large (2700) suite of +200 micron gold particles from the Klondike Goldfield. These studies concluded that the gold was derived from the known and many unknown sources of mesothermal vein quartz in the district.

A great number of shapes of gold nuggets are known, and many are flattened shapes. Knight et al developed the thesis that increased flatness was a function of downstream transport.

It is interesting to note that there are good descriptions of delicate shapes of gold particles (e.g. dendritic, spiral, leaf, etc.) and that the largest gold nugget recorded was only 28 troy oz.

2.4 LOCATION AND SUGGESTED SOURCES OF PLACER GOLD

2.4.1 Location

(i) Basal Gravels of Current Drainage

The original discovery of gold in 1896 came from Claim 33 just below Grand Forks (the junction of Eldorado and Bonanza creeks) and quickly led to the exploitation of very rich gold accumulations in the basal gravels of the current drainages. Above Grand Forks, a four and a half mile long section of Eldorado Creek provided 65 oz. per running foot, giving a total 1.3 Moz.

The basal gravels were overlain by several metres of sands, two layers of permafrost, and an upper layer of "black muck". The black muck is a recent accumulation with numerous fossils of large extinct mammals. We think that a major component of the black muck is derived from recent weathering under permafrost conditions of thrust slices of the carbonaceous Nasina Formation.

The late-Tertiary reversal of the Yukon drainage basin has clearly paid a significant part of the distribution of placer gold. Interpretation of the significance of the results of this geological event is one key to define the most gold-prospective hardrock terrain.

(ii) White Channel Gravels

Extensive kaolinised gravels along the Lower Klondike valley and mainly lower reaches of Bonanza and Hunker creeks were extensively sluiced for gold in the early years of the Klondike Goldfield workings. Extensive remnants of these gravels remain.

They are considered to be alluvial deposits, within a braided river drainage and have associated valley wall debris flows. Economic gold concentrations only occurred in the basal section, generally 1 to 2 metres thick, but locally (Paradise Hill, Hester Creek, tributary of Hunker Creek) up to 4 metres was payable (Knight et al, 1994). Recent mining in the Lovett Hill district, at the confluence of Bonanza Creek and the Klondike valley, profitably

exploited by adits the basal 2 metres section of the White Channel gravel deposits. In contrast, mining of the similar gravels of Australia Hill on the northern side of lower Hunker Creek at the junction with the Klondike valley failed to demonstrate payable gold (David Skerlic, pers. comm.). At this latter locality chalcedonic quartz veining, potassic alteration and anomalous thallium geochemistry has been described as indicating an epithermal alteration event post-dating gravel deposition (Templeman-Kluit, 1982).

The White Channel gravels are characterised by large amounts of vein quartz material, of metamorphic (foliaform) and mesothermal origin.

(iii) Klondike River Gravels

In the order of 0.5 Moz. of placer gold is reported to have been recovered from extensive dredging along the lower Klondike River, entirely below the confluence of Hunker Creek.

We note a remarkable lack of interest in these gravels which are so well exposed along the highway leading to Dawson City, and provide some observations regarding their character and possible derivation later in this report.

2.4.2 Suggested Primary Sources of Gold

(i) Mesothermal Vein Quartz

McConnell (1907) considered that the primary source of gold was vein quartz, initially concentrated in the White Channel gravels, which was then recycled through at least two reworkings demonstrated by river terraces and subsequently concentrated into the basal current drainage sediments.

Boyle (1979) concluded that the mesothermal quartz veins, at a low grade of less than 1 g/t gold up to locally 3 g/t gold, could be the sole source of the placer gold. A mass balance calculation supported this hypothesis and it was concluded that there was little likelihood of economic hardrock gold deposits remaining.

Mortensen (1996, 1997) and Knight et al (1994, 1999) came to a similar conclusion that known and unknown mesothermal quartz veins were the source of the district's gold.

(ii) Epithermal Gold Origin

Knight et al (op. cit.) noted that epithermal alteration of White Channel gravels had suggested that gold could be sourced in this way.

Regional geochemistry (GSC Surveys) provide good evidence of widespread antimony, arsenic and mercury anomalies or highly enhanced backgrounds extending over a much larger area than the Klondike Goldfield as defined herein, including extensions into the adjacent sector of the Tintina Trench and east of the Dominion Creek-Indian River confluence. This geochemistry is indicative clearly of extensive epithermal alteration, and this report provides further photogeological, Landsat and rock chip sampling evidence for such epithermal alteration systems.

The rock chip sampling undertaken by KSL and drilling results of two Kennecott exploration programs on open file (Lower Bonanza Creek, Independence Creek) have failed to confirm this hypothesis for the primary source of gold in the Klondike district.

(iii) In-Situ Precipitation of Gold

Crystalline gold has been reported from a number of localities (Knight et al; op. cit.), notably Victoria Gulch with the Lone Star gold locality in its headwaters and Bear Creek. It was suggested that this gold could be due to in-situ precipitation in the current alluvium, largely

based on the furphy[2] of a gold-plated nail having been discovered in the Sixty Mile placer gold district, 80 km west of the Klondike.

Australian experience indicates that crystalline gold is common in deeply weathered, supergene enriched terrains, such gold is characterised by a high degree (90+) of fineness.

(iv) **Sulphide-hosted Gold**

There is good evidence that considerable gold in the Klondike is intimately associated with sulphides, including:

- High grade gold assays of +4 g/t to +30 g/t and more are associated with limonite veined mesothermal vein occurrences (e.g. Mitchell, Sheba, Hunker).
- The Yukon Minfile references of gold assays from the greater number of other vein quartz localities are correspondingly low.
- At the Lone Star locality, which has the only "major" hardrock gold production of some 1,000 oz. commenced in quartz which rapidly gave way to a sulphide lode (Minfile Ref. No. 1150 072); also, reports of good gold values in nearby trenches relate to a "yellow rock", i.e. limonite stained, not vein quartz (BAM files).
- An oxidised pyritic mica schist probably from the Mitchell-Sheba district assayed 30 g/t gold and the gossanous sulphides were shown to contain very fine free gold (5-10 microns) (BAM files).

3 REGIONAL GEOLOGICAL AND STRUCTURAL STUDIES

3.1 GEOMORPHOLOGY

Specialist geomorphology studies of the Klondike region have been undertaken (references in Knight et al, 1994) and the major features are:

(i) the **non-glaciated nature** (Douglas, 1970) of the Klondike-Yukon plateau and neighbouring region of Alaska.

(ii) The generally **mature landforms**, with rounded ridges at an elevation of about 1,000 metres, compared with the immature, rugged landforms of the Ogilvie Mountains to the northeast rising to well over 2,000 metres; and the wide valleys of the major drainages. This mature landscape has been considered to be of mid-Tertiary age (?Miocene) when regional drainage was to the southwest.

(iii) Remnants of a **plateau surface** at 1,200 metres to 1,400 metres with local evidence of sub-horizontal strata and deeply leached (Landsat data) have not been dated. To the west of the Yukon River a horizontal sequence of mafic volcanics overlying a basal conglomerate at Mount Hart (Templeman-Kluit, 1974) were mapped as post-Eocene age but Carmacks kindred. If these volcanics, and similar volcanics in Last Chance Creek are of Carmacks volcanics age (Late Cretaceous-Palaeocene) like the basalts south of the Indian River (Lowey, 1984 and 1985) then the mature land surfaces of the Klondike could be much older than previously envisaged, i.e. Late Cretaceous.

(iv) **Deeply incised valleys** characterise the upper reaches of the major drainages and consequent streams; and the current stream base is deeply incised with bounding flat river terrace

[2] furphy: Australian slang for an absurd or false story.

features. The lower Klondike River has a gorge-like confluence with the Yukon River, in contract to the very wide valley it inhabits upstream.

(v) **River terraces** are a significant feature of the major creeks and rivers. In the vicinity of West Dawson, the borders of the Yukon River have at least two terraces, and a third can be reasonable inferred from aerial photography and topographic maps. In the Klondike Goldfield district a single major terrace is easily defined.

(vii) Regional **Plio-Pleistocene uplift** resulting in **drainage reversal** is well established, and has resulted in the northerly drainage of the Yukon River seen today. It should be noted that this would have caused a period of sluggish flows to no flow with extensive lakes. The drainage reversal and down cutting of the present drainage system is considered to have preceded the commencement of Pleistocene to Recent glaciation (Knight et al, 1994).

Air photograph interpretation studies, reported in Section 5 of this Report, are based on geomorphological features inferred to be related to geological structures, or due to geological processes. Some of the inferences and conclusions of previous geomorphological studies are questioned as a result of this study, particularly with regard to the derivation of the White Channel gravels and gravels of the lower Klondike River.

3.2 REGIONAL GEOLOGY

Reconnaissance traversing along the roads and tracks of the northwestern half of the Klondike Goldfield has resulted in a number of lithological data observations as well as structural data. This data has been compiled and is summarised in Enclosure 2, and provides an interpretation of local rock relationships where reconnaissance traverses and photogeological data have provided sufficient information upon which to base a reasonable interpretation. For instance, in the northern part of the Bonanza Dome, the relationship of tectonically intercalated Nasina carbonaceous schists related to N-dipping thrusts appears sound and fits Marjoribanks (Appendix II) structural synthesis.

Definitive boundaries for the units of the Klondike Schist are virtually impossible to draw because there is virtually no photogeological (topographic or botanical) imprint reflecting lithology. In addition, structural data indicate that, for the most part, the F1 foliation defining lithology dips at a shallow angle, which axiomatically results in complex rock type boundary patterns in relatively well incised topography.

Marjoribanks initial study (Appendix II) has focussed on the structure of the Klondike Schist and relationship of mesothermal vein quartz localities.

In the broader region, there is considerable evidence for extensive Tertiary volcanism, largely late-Tertiary and dominantly pyroclastic, related to previously mapped rhyolite dykes. In addition, there is evidence for minor but extensive normal and strike-slip faulting and block rotation.

Thomas's interpretation of aerial photography and Landsat (Enclosures 2-6), in conjunction with available aerial magnetic data, has focussed largely on structures considered indicative of Tertiary volcanism and Tintina faulting.

3.2.1 Geological Notes

Reconnaissance traversing over a period of six months has led to the identification of a number of localities with rock relationships which could have regional or district geological significance, but are considered to be of little direct significance to KSL's gold exploration program:

(i) **Pillowed ultramafic (olivine-rich) basalts** with little deformation, akin to the Moosehide basalts of Dawson, crop out in a quarry just west of the Klondike Highway and four kilometres southeast of the junction with the Dempster Highway; the western side of the

quarry has an exposure of gabbro or diorite; the intrusive or faulted relationship was not determined.

(ii) The **spoil dumps of dredging** along the Lower Klondike appear to have escaped description, and they exhibit a number of interesting features:

- Rock types: quartzite boulders up to 60 cm diameter with brittle fractured, undeformed quartz-minor pyrite veins, sub-rounded pebbles of Nasina Formation, and small, sub-rounded pebbles of andesite, rounded pebbles of folial quartz typical of the Nasina Formation and some rounded vein quartz.

- A virtual absence of Klondike Schist.
- The quartzite boulders have a very high degree of rounding.
- There is a substantial variation in size of the rounded pebbles, suggesting a non-alluvial origin: Derivation of the large quartzite pebbles from the Ogilvie Mountains is surely nonsense - and later in the report a (?post-Eocene) volcanic diatreme origin for these conglomerates is suggested by the 'milled' roundness of the pebbles and surrounding geomorphology.

(iii) On the left (west) bank of Lower Bonanza Creek, 600 metres below the confluence of Sourdough Gulch and Bonanza Creek, there are **outcrops of a classical alluvial sequence** with upwards fining, washouts, and in the lower part of the section thin lignitic coals and seat earths. This sequence is unlike any of the major exposures of the White Channel gravels, and is overlain by terrace gravels.

3.3 REGIONAL STRUCTURAL STUDIES

Appendix II is a report commissioned by KSL from Dr Roger Marjoribanks, an Australian structural geology specialist with particular experience in metamorphic rocks.

This study has provided the foundation to:

- understand the structural deformation of the Klondike schist,
- interpret the tectonic relationship of the Klondike Schist and Nasina Formation in the northwestern part of the goldfield,
- explore for gold mineralisation relating to shallow-dipping structures, either parallel of sub-parallel to lithology or the shallow-dipping thrusts.

The structural study indicates that there are two major sets of northward-dipping thrusts:

- an early set, striking NE-SW, verging SE (the major group defined by Marjoribanks), and
- a younger set of E-W striking structures, parallel to the lower Klondike River, probably related to post-Eocene (?Miocene) strike-slip displacement along the Tintina Fault Zone.

3.4 COMPARATIVE STUDY (POGO, LONGLINE AND KLONDIKE)

Geological and exploration data on the high grade Pogo gold deposit, located in the Yukon-Tanana terrain of Alaska, some 370 kilometres west of Dawson City became available (Smith et al, 1999 and 2000) after the 1999 field season.

However, acquisition of public domain data (topographic, geological, geophysical) of the Pogo region (Big Delta Quadrangle) and data made available by BAM on the Longline Prospect

discovery has allowed a brief comparative structural study to be completed. This study by Marjoribanks forms Appendix III.

Published data on Pogo and our knowledge of the structural environment and character of high grade gold mineralisation in the Klondike and at Longline leave us in no doubt of the major similarities and probably similar gold metallogenesis in all three districts.

4 REGIONAL ORIENTATION GEOCHEMISTRY

4.1 Rock Chip Sampling

There are four groups of samples locations:

- pyritic sulphide zones in quartz-muscovite schists particularly well exposed in the King Solomons and Hunker Dome districts;
- the Mitchell and Sheba mesothermal veins;
- quartz vein-ferrous carbonate alteration associated with the "Klondike River Thrust" and other Marjoribanks-defined thrusts; and
- quartz-vein-ferrous carbonate alteration at other localities.

The location of these samples is plotted on Enclosure 7 and tabulated in Appendix IV and VI.

4.2 SOIL SAMPLING

Two soil sample traverses located along the accessible Klondike ridge trail (Jackson Gulch-King Solomons Dome) across structures defined by Marjoribanks (Appendix II).

Location A covers a structure interpreted to be vertical, and Location B crosses an inferred NW-dipping thrust (Enclosure 7). The results are tabulated in Appendix IV and V.

5 REVISED PHOTOGEOLOGICAL AND LANDSAT STUDIES

A full and detailed revision of initial photogeological interpretation was completed subsequent to Marjoribanks report (Appendix II). This study covered a much larger area (Figure 4) than initially possible. This work has been compiled at 1:50,000 scale using the published 1:50,000 scale topographic map sheets as a base, and covers four sheets: Dawson, Grand Forks, Flat Creek and Granville (Enclosures 3 to 6).

It is important to note that the revised air photo interpretations have focussed on:

(i) structural features of potential significance for locating economic gold resources: e.g. areas of substantial structural complexity including evidence of high strain zones with a late Tertiary (Tintina) imprint were considered to be negative features, and

(ii) classifying the differences of slope surfaces in the Klondike was considered important for the purpose of designing soil-geochemical surveys; e.g. remnants of inferred old (Cretaceous?) land surfaces with deep weathering are going to have a different geochemical signature to those formed in the late-Tertiary to Recent period.

Certain features which are more clearly defined on Landsat data than on the aerial photography are included on the summary interpretation (Enclosure 2), but excluded from the 1:50,000 aerial photo compilations.

In addition, major aerial magnetic features and early mapping, particularly that of Debicki (1984), has been noted where considered to have relevance.

5.1 GEOMORPHOLOGICAL FEATURES

5.1.1 Permafrost Features

(i) Slope Angles

Initial photograph interpretation work, due to ignorance and lack of experience of glacial and permafrost terrains, ignored landscape effects due to solifluction.

Marjoribanks noted that N-facing slopes, with limited incident sun, typically have low gradients whilst S-facing slopes have considerably steeper slopes as a result of increased erosion due to increased sun incidence and solifluction. This slope asymmetry is most obvious in the northwestern Bonanza domain and occurs locally elsewhere, e.g. south of Allgold Creek (to upper Dominion Creek). However, it is not typical, for instance, of the Dominion domain or the western district between lower Bonanza Creek and the Yukon River.

The major structural features of the basement Klondike Schists are NW- and N-dipping thrusts which will naturally provide topographic asymmetry, with N-dipping thrusts providing the slope asymmetry described by Marjoribanks. In addition, solifluction providing active post-Pleistocene erosion of southern slopes is not supported by:

- the asymmetric drainage divide between Bonanza and Hunker Creeks which is strongly displaced to the west and south;
- the very poor current stream gold geochemistry of the district; active erosion of south-flowing streams should have much enhanced gold geochemistry. There is limited evidence for gold anomalies of S-flowing creeks in the central Hunker domain district (BAM data). However, the basal placer gold production formed at the onset of the current erosion cycle (?Plio-Pleistocene) and prior to glaciation does reflect asymmetric erosion (Figure 2); in part, continuity of erosion along S-flowing streams and drainage systems (e.g. Dominion Creek) is a significant factor.

(ii) Rills

These solifluction features are very clearly seen (from the ground) along the obvious N-dipping fault escarpment on the south side of the lower Klondike valley, and are notably absent from the S-facing slopes on the other side of the valley; it should be noted that there is substantial loose rock materials for sourcing these rills from the high level Klondike River terraces. The rills cannot be seen on the aerial photography at this locality but possible rills are present elsewhere, particularly on steep (scarp) slopes of the inferred hanging wall of thrusts. They have not been defined in this photostudy.

(iii) Pingos

These intriguing frost mounds or mini-volcanoes have been interpreted at various valley localities related to inferred high level volcanic breccia pipes. The geological environment of a breccia-pipe would provide the perfect hydro-dynamic regime for pingo formation. They have been reported from the Dawson district (p81, Brown and Péwé).

5.1.2 Vegetation Patterns

The Klondike Goldfield and neighbouring districts are largely covered by secondary vegetation. This has probably resulted in a significant loss of photogeological information compared with long-established primary vegetation which has had the opportunity to better reflect variations in residual soils (i.e. formed from underlying rocks) of physical character nutrients i.e. chemistry) and water availability/porosity/permeability.

Evidence for this principle can be sought south of the Indian River or east of Dominion Creek where vegetation patterns show greater diversity.

However, there are vegetation patterns in the Klondike Goldfield which could have significance because of their restricted distribution. For example, Marjoribanks (Appendix II) noted that there were complex tree patterns with a strong down-slope component, particularly prominent vegetation patterns of this type are present on N-facing slopes of Queen and Mosquito Gulch, which are W-flowing tributaries of lower Bonanza Creek. Normal faulting between these two slopes could be invoked to suggest that they belong to a common, N-dipping thrust surface, or represent the Klondike Schist-Nasina Formation unconformity which has been exhumed.

There are other closely similar planar vegetation patterns which can be recognised on photographs which can be inferred to have a common origin.

Vegetation patterns also can reflect other geological features: e.g. major rock type changes (serpentine lenses, intrusive rocks (dykes, stocks), vertical-structured deformation where a strong mylonitic fabric may be inferred. Features of this sort have been noted in the interpretation compilations.

5.1.3 Slopes

It should be noted that these interpretations have focussed on defining several clearly defined types of slopes that can be seen in the region. These are:

(i) **Inferred sole thrust surfaces** (double arrows): these are surfaces on the footwalls of Marjoribanks' thrusts, e.g. Gold Bottom Creek, and analogous and similar-looking surfaces can be defined elsewhere; photogeologically they are characterised by a "polished" look with a lack of minor rivulet (or rill) creeks on the surface and similar apparent lack of any cross-cutting features; they occur as both NW- and N-trending structures.

(ii) **Shallow dipping surfaces** (long single arrows): there are a number of shallow dipping surfaces which are often slightly convex or concave and extend to flat, terrace-like areas on the boundaries of major creeks; arrows terminate at any major, or considered possibly significant, break in slope.

(iii) **Dip slopes** (short arrow heads): surfaces which show typical dip-slope indentation down drainage and inferred to be a strong parallel thrust package with slight, but significant, rock type or deformation character, the eastern side of Gold Bottom Creek (footwall of major thrust) has clearly a schist package providing this outcrop pattern; also; it is present along the south-facing northern slopes of upper Hunker Creek, indicating the location of a S-dipping thrust mapped by Mortensen (1996, 1997); the symbol has been conventionally used for Cretaceous sediments and volcanics south of the Indian River

(iv) **Eroded cone-surfaces**: volcanic cone-like features, nearly invariably deeply eroded only on the due S-facing slopes; mainly south of the Indian River in the district with a reported Cretaceous coal sequence (Lowey, 1984); but also present in the central Hunker Creek district.

5.1.4 Intrusive Bodies

(i) Gneiss Domes

There are no major intrusive rock bodies mapped to date in the Klondike Goldfield. In particular, the Sulphur Creek Orthogneiss defined by Mortensen (1996, 1997) cannot be outlined on aerial photography or Landsat, suggesting that the Orthogneiss is intimately associated with the Klondike Schists with gradational contacts. The current level of exposure may not be sufficiently deep to expose the massive granitic core of the type seen in many gneiss dome complexes. The geomorphology of the district suggests that the core of the Orthogneiss complex could be sought in the area between Quartz and Sulphur creeks. The two major creeks diverge from the environs of King Solomons Dome, suggesting a N-plunging structure. Detailed magnetic data (BAM files) of the Hunker domain provides enigmatic interpretations supporting

or discounting this interpretation. A second NE-plunging structure of this kind may be provided by the broad, unusually symmetrical, ridge between Queen Gulch and Gauvin Gulch in the northwestern Bonanza dome.

The older (Devonian-Mississippian) Burnham Gneiss dome previously mapped to the east of Dominion Creek is lithologically complex (Mortensen, op. cit.) an inference also suggested by both aerial photography and Landsat data. Topographically, it is related dominantly to regressive topography, and appears to have two major cores of more massive granitic rocks separated by a Landsat signature of gneisses.

(ii) Early Jurassic Granite

The Jim Creek granite of Jurassic age (Mortensen, op. cit.), located southeast of the goldfield close to the Yukon River, is a clearly defined Landsat feature. Similar granitic intrusive complexes, previously unidentified, have been inferred on both Landsat and aerial photography of this district.

(iii) Minor Intrusives

Aerial photograph interpretation has located a large number of dykes, the majority of which are topographically recessive. Debicki mapped rhyolite dykes on Australia Mountain, east of the Klondike Goldfield, and similar dyke-like positive topographic features characterise hill summits south of the Indian River (e.g. Eureka Dome).

Major dykes can occur along some of the major creeks, e.g. Bonanza Creek, indicating re-activation of major vertical fault structures.

A large area of quartz porphyry intrusive has been inferred to occur north of lower Hunker Creek (Mortensen, op. cit.). Aerial photography suggests that there are a number of separate intrusive plugs and possible some flows with younger felsic (pyroclastic) tuffs. More than one period of acid plutonism is indicated by age dating in this district. Porphyry plugs are defined by radial fractures on the aerial photography rather than notably positive topography.

(iv) Other Intrusives (re Marjoribanks interpretation)

Roger Marjoribanks interpreted a number of clearly positive topographic features, mainly lenticular in form, as igneous (intrusive) rocks. These features have a number of alternative interpretations, e.g.:

- In the northern Leotta Dome district Debicki mapped serpentinite at Mount Leotta and on other similar hills. The ridges in this area are strongly aligned E-W and could be interpreted as silicified shear zones (strike-slip faults) in the ultramafic basalts of the Moosehide Assemblage of the Slide Mountain Terrane (cf. Aeromagnetic interpretation, Section 6.1).
- In the Haystack Mountain district, south of the Indian River, Haystack Mountain and other isolated ridges in conjunction with other photogeological data of the area can be interpreted as outliers of faulted and altered Cretaceous sediments bounding a younger eroded volcanic caldera structure.

5.1.5 Inferred Volcanic Features

Initial interpretation of aerial photography of the Klondike district suggested the presence of breccia-pipe volcanic features at the head of Independence Creek due to the strongly arcuate inward dipping steep slopes. Further evidence for interpretation of these features as of probable volcanic origin came from acquisition of aerial photography covering the Indian River and Dominion Creek - Australia Mountain districts in conjunction with re-processed Landsat imagery (Figures 6, 7 and 8).

The 1:50,000 photo-interpretation maps have probably over-emphasised these inferred volcanic features, but they are considered to be common and a signature of widespread dominantly acid pyroclastic volcanism of (?) Eocene age, indicated by:

- interpretation of detailed, low level, magnetic data of the King Solomons Dome district held by BAM: strongly circular magnetic high and low features,
- quartz feldspar rhyolite porphyry mapped by Debicki (1984), at the head of the right fork of Little Blanche Creek (the only mapped locality noted in the centre of these circular features),
- the inferred presences of pingos (e.g. head of the left fork of Independence Creek),
- very widespread antimony, arsenic and mercury anomalism in the regional (GSC) geochemical data,
- the inferred lower Klondike River diatreme (cf. highly rounded milled-quartzite boulders), and
- Landsat alteration features of the Australia Mountain and Indian River districts with correlative signatures in the Klondike district (Figures 6, 7 and 8).

5.2 KLONDIKE DISTRICT

5.2.1 Introduction

Marjoribanks' structural study of the Klondike is a separate study forming Appendix I. The notes in this section refer to the 1:50,000 photogeology compilations attached as Enclosures 3 to 6. These compilations were completed by Colin Thomas subsequent to Marjoribanks' study, and as such have obviously benefited from, and extended, the structural concepts developed in the latter study.

Figure 5 has defined and divided the Klondike Goldfield into geographic areas relating to possible structural geological domains with boundaries formed by major creek which are inferred to have had substantial tectonic influence particularly through the Tertiary, if not so obviously through the late Palaeozoic and Mesozoic.

The 1:50,000 interpretations have also been compiled to assist the planning of systematic testing of shallow dipping structures which could host a mid-Cretaceous Tintina goldbelt deposit of Pogo-type geometry. The structures of primary focus are considered to be "scarp slopes" of the hanging wall of Marjoribanks' older NW-dipping thrusts.

Thus land surfaces which are footwalls to Marjoribanks' type thrusts, whatever the orientation, are unlikely to carry a direct signature of such a gold mineralised lode. Also, ridges and slopes with possible residual tuffaceous volcanics of Tertiary age of the eroded fluidised surface of a breccia pipe would similarly be a poor slope to sample. In addition, there are surfaces of only poorly inferred origin or structural relationship, including:

- late Palaeozoic (Pre-Permian) doming related to Sulphur Creek orthogneiss ductile emplacement.
- doming related to (?) pre-Tertiary intrusives, and
- shallow dipping surfaces related to arcuate normal faulting (?post-plutonism/plumbing collapse — Cretaceous or Tertiary.

We have also locally defined, where ground observations have been made and can be correlated with aerial photograph data, the boundary between the Nasina Formation and the Klondike schists, taking into cognisance also Marjoribanks' structural interpretation.

There are some substantial structural and other differences of probable significance, between the northwestern Bonanza and Lone Star districts and the southern Dominion district which are defined in Enclosure 2. These are:

(i) The regional aerial magnetic data which provides the signatures for deep (not near surface) magnetic basement. This data shows a marked change of pattern between the northwestern and southeastern districts of the Klondike Goldfield. The boundary is arcuate, NE to ENE-striking from Quartz Creek in the south across King Solomons Dome and along Allgold Creek.

To the southeast of this boundary the magnetics data has a strong WNW-ESE strike. Geomorphologically, this is reflected in the southeastern sector of the Dominion district by the parallel alignment of the major creeks (Sulphur, Gold Run, Washington, Hunker and the middle reaches of Dominion Creek). The northwestern boundary of this morphological domain is a parallel arcuate structure to the Quartz Creek-Allgold Creek feature formed by linking Brimstone Gulch and Portland Creek.

The southeastern Dominion sector has one other unusual features, albeit shared with the Quartz Creek drainage basin, and that is the lack of interfluvial ridges showing any evidence of an inferred residual land surface as defined by an "alteration-like" colour feature of the Landsat data. There is the strong inference (cf. Mortensen, op.cit.) that this area is more deeply eroded than elsewhere in the district; and this is likely to be due to the continuity of southerly drainage through the late Tertiary, i.e. less affected by the Yukon basin drainage reversal.

(ii) The major WNW-striking structures of the southeastern Dominion domain have analogies elsewhere, e.g. parallel creeks of much shorter length in the eastern Bonanza and Lone Star domains which are, viz. upper Bonanza Creek above the Carmacks Fork junction, middle Eldorado Creek, Calder and Little Blanche creeks.

(iii) The two major creeks bounding the northwestern Bonanza domain, i.e. Bonanza Creek and middle to lower Hunker Creek, occupy two of the broadest valleys in the goldfield with extensive river terraces. It is thought that both creeks follow major vertical fault structures. However, at the 1:50,000 airphotograph scale, these creeks have an intricate non-linear form, unlike any other creeks in the district, which is inferred to be due to extensive Tertiary plutonism (volcanic breccia pipes, epithermal alteration, dyking and porphyry plugs).

5.2.2 Bonanza Creek Domain

This domain is bounded by the lower Klondike River and Hunker Creek in the north and Bonanza Creek in the west and south with the eastern boundary defined by Gold Bottom Gulch and Creek.

The northern boundary is a straight line escarpment indicative of a normal fault downthrown to the north virtually along the line of a major N-dipping thrust with Nasina schists overlying Klondike Schists. To the south N-dipping thrusts are interpreted by Marjoribanks to be younger than the W- to NW-dipping thrusts and related to (?Neogene) dextral displacement along the NW-trending Tintina Fault Zone.

The pre-dominance of N- and NW-dipping thrusts in our interpretation is at variance with previous interpretations.

Remnants of the Nasina Formation largely in the north appear to be tectonically intercalated by both sets of thrusts. It is suggested recent erosion of this friable carbonaceous formation has provided the "black muck" of the major creeks.

A major geomorphological feature of this domain is the asymmetric drainage divide along which the goldfield trail runs. Short creeks run west and southwest into Bonanza Creek and long creek (e.g. Last Chance, Independence) into the eastern Hunker Creek.

Outcrops of andesitic volcanics and sediments in lower Last Chance Creek have the geomorphological appearance of valley fill. To the southeast the interfluvial areas south to Colorado Creek have photogeological evidence for remnants of an undeformed volcanic-sedimentary sequence and small volcanic landforms (cone, crater/breccia pipe). Late Cretaceous and Eocene ages have been reported from porphyries cropping out on the north bank of Hunker Creek (respectively Whiskey Hill, lower Hunker Creek) by Mortensen (1997). Thus the shallow ridge slopes and major valley bottom of Last Chance Creek can be inferred to define a late Cretaceous or Eocene land surface. It should be noted that there is no geomorphological evidence for a major caldera in Last Chance Creek.

The headwater geomorphology of both Bear Creek and Last Chance is significantly different to other creeks in the domain, with a broad fan of arcuate or linear feeder creeks and strongly arcuate ridge lines. The strongly arcuate, pipe- or crater-like topography of these areas (on photography) and defined elsewhere in the district can appear to have central cores or pingos, which are inferred to be volcanic breccias or intrusives. These features can have a magnetic low signature.

The valley walls of lower Bonanza Creek and parts of Hunker Creek (south of Australia Hill, Gold Bottom Creek confluence) are characterised by strongly eroded arcuate features which are also interpreted to be of late Tertiary volcanic or epithermal plumbing derivation.

Along lower Bonanza Creek, particularly in the Cripple Hill district and middle Bonanza Creek, there are arcuate breaks in slope which suggest slumping or normal (?listric) faulting has occurred. In middle Bear Creek this faulting occurs in the vicinity of a magnetic high feature which has been explored. These features may also be related to Tertiary volcanism/plutonism.

Clearly defined intrusive rocks other than occasional acid porphyry or rhyolite dykes have not been mapped in this domain. Our interpretations of air photography indicate that mafic and acid dykes are common and generally occur as N- or W-striking sets clearly indicative of two major periods of W- or N-orientated dilation. Areas where dyke rocks have been noted and not previously recorded on maps include:

- N-striking, plagio-phyric gabbro-dolerite in lower Bonanza Creek immediately below the confluence of Sourdough Gulch,
- similar lithologies crop out or are clearly present (bright red soil) between the headwaters of Last Chance Creek and the Carmacks fork of upper Bonanza Creek, and
- acid (rhyolite) dykes in the headwaters of Mosquito Gulch.

A notably extensive outcrop of leucocratic metagabbro or metadiorite with schistose margins crops along the road in the valley of the Carmacks Fork.

The major drainages which form the boundaries of the domain have all been described in various reports as major faults. It can be postulated that these structures have been reactivated in different stress regimes with resulting different types of displacement. Characteristically, it is the exception to be able to correlate lithological or structural continuity across the valley bottoms. Notes on possible structural interpretations are appended (Appendix VII).

5.2.3 Leotta Domain

The Leotta Domain is bounded by Hunker Creek, Allgold Creek and the Klondike River. Long recognised to border the goldfield, the area's geology is significantly different in that it is

dominated by the Nasina Formation and basic metavolcanics with (related) ultramafic rocks of the Moosehide Assemblage (Mortensen 1996, 1997).

Limited photo-interpretation has suggested:

- E-W (bearing 275° to 280°) lineaments along strike of low, similarly orientated ridges, en-echelon or parallel with serpentinite/ultramafic mapped at Leotta Hill and intermittently to the head of Flat Creek,
- WNW-trending (Tintina-parallel) lineaments,
- NE-striking, NW-dipping thrusts, with Allgold Creek a very well defined domain boundary in the regional magnetic data,
- in the southern half, ENE-trending lineaments, which extend into the Tintina Trench, are inferred to have minor sinistral displacement, and have a buckling effect on the NW-trending escarpment boundary of the Trench,
- in the upper Hunker Creek area there are S-dipping structures, which may be related to a S-dipping thrust — the best photogeological evidence for Mortensen's S-dipping Tanana Terrane boundary thrusts, and
- in the north differentiation of geomorphological differences of the large ameoboid-like blob of porphyry mapped in the Australia Hill district, some of which may be extrusive, some intrusive, and
- between Leotta and Allgold creeks, an extensive Landsat colour anomaly related to circular crater features suggesting remnant tuff cover along the ridges and northern slopes (Figure 6).

5.2.4 Lone Star Domain

This district encompasses the area between upper Bonanza Creek, Eldorado Creek-Calder Creek and Quartz Creek.

Only limited detailed photogeological study has been made of this area because the area is held largely under claim tenure by Klondike Gold and the Hawkes group. However, the location of the Lone Star gold workings make it a key area to ascertain some clues to the structural setting of sulphide-associated gold in the Klondike.

The Lone Star district is geomorphologically similar to the northern Bonanza Creek Domain with NW-dipping thrusts and notably arcuate ridges in several of the major drainages. The major difference is the strong WNW-striking set of parallel lineaments bounded by E-W striking creeks forming a parallelogram structure.

The central WNW-striking lineament from Grand Forks to Lone Star may correlate with a geophysical/geochemical anomaly parallel to the Buckland (Minfile, Ref. 1150 072). This WNW-strike direction parallels the Tintina Trench and the strike of dextral Neogene (post-Eocene) shear, and also the prominent deeper magnetic basement of the southern Dominion domain.

5.2.5 Hunker Dome Domain

This domain is centred on the high point, King Solomons Dome, with a radial-like drainage pattern, although the dominant creeks flow north, southwest and southeast (Figure 6).

Structurally, this area appears to be very complex, a fact probably borne out by detailed magnetic data of BAM although comparative data is not available. The correlation of magnetic features with photogeological or Landsat is good when studied in detail and the magnetic data shows:

- correlation of shallow W-dipping (Marjoribanks) thrusts with breaks in high magnetic signature, particularly along and in the footwall of the Gold Bottom Creek thrust,
- a transgressive intrusive complex in the headwaters of the S-flowing unnamed tributary east of Flannery Pup (Carmacks Fork, upper Bonanza Creek),
- evidence of the intersection of ENE- and WNW-striking fractures or shears,
- magnetic lows over the King Solomons Dome summit and crest to the west southwest with a magnetic high reflecting the ultramafic schists found in the vicinity of the Hunker Summit, and
- a marked change in magnetic character and polarity to the south in the Sulphur Creek-Quartz Creek-Canyon Creek district, reflecting probably the presence of Sulphur Creek gneisses, and
- a N-trending reversely magnetised dyke on the western side of Sulphur Creek can be traced further north on the magnetic data than on the aerial photography.

However, the major feature may be considered to be a broad zone of high magnetic signature forming a N-facing concave arc from the ridge west of Gold Bottom Creek to and along the curve of upper Hunker Creek. This magnetic feature mimics the N-facing closure of the ridges bounding Quartz and Sulphur creeks to the south.

5.2.6 Dominion Domain

This domain is centred on the area between Dominion Creek and Sulphur Creek, extending north to Allgold Creek and South to the Indian River. The central area has a major NW-striking set of vertical structures with N-striking (dextral) offsets defined by sub-parallel creeks and in the northwest, ridges (e.g. Dominion Mountain); also, the NW direction is the dominant grain of the (deep) magnetic basement.

A southeast and northwest division of this domain can be invoked with an arcuate NE-trending boundary formed by Brimstone Gulch and Portland Creek (Figure 6); this boundary can be inferred from the regional magnetic data and parallels the more clearly defined Quartz Creek-Allgold Creek magnetic lineament.

The good correlation of the strike of southeastern sector's magnetic basement with the major NW-trending creeks is a reflection of deeper erosion. This is probably due to the southerly alignment of the creeks being much less affected by late Tertiary drainage reversal of the Yukon basin to a N-flowing regional system.

The northwestern area adjacent to the Hunker domain is significantly less eroded with Landsat evidence for the high ridges (e.g. Dominion Ridge) being remnants of an older land surface (Figure 6).

The areas bounding the central sector, i.e. Dominion Creek-Allgold Creek area and Sulphur Creek to the Indian River, form the poorly defined boundary zones of the Goldfield and the Klondike Schist terrain. In both these border areas, higher metamorphic grade schists or granitic gneisses have been reported, and a gradational boundary appears likely. In contrast, the southwest flowing lower Dominion Creek (Jensen Creek) thrust structure interpreted by Marjoribanks forms a well-defined boundary with the Burnham Orthogneiss domain to the east.

5.2.7 Quartz Creek - Sulphur Creek Domain

This domain narrows northwards to the vicinity of the King Solomons Dome topographic high point and geomorphologically suggests a N-plunging anticlinal structure.

The central part of the domain has a more fragmented fracture pattern, particularly evident on Landsat, than the neighbouring domains of the Klondike Goldfield.

BAM's detailed magnetic survey centred on the Hunker domain indicates a major change in magnetic character south of Mack Creek which extends northwest along Little Blanche Creek. This magnetic change can be inferred to reflect the increasing dominance southward of the Sulphur Creek orthogneiss.

In the southeast of this domain on the Indian River escarpment, midway between the confluences of Dominion and Quartz creeks with the Indian River, there is significant colour feature on Landsat data (Figure 8a). This 2 km radius feature surrounding a strongly embayed (arcuate) outline of the escarpment is interpreted to reflect remnant cover of acid tuffs from breccia pipes/craters located along the Indian River fault. This remnant cover of tuffs (or possible epithermal alternation) has a subtle signature on the air photography.

5.2.8 Indian River District

Two reasons led to photogeological studies of this area:

- the presence of a Cretaceous coal basin (Lowey, 1984) with associated sills of basalt dated late Cretaceous-Early Tertiary (64 my), with a basal conglomerate compared to the auriferous White Channel Gravels of the Klondike, and
- the Eureka Creek placer gold workings — a single creek placer gold deposit with potentially a single source which could provide some structural guidelines for the Klondike Goldfield.

The northern half of the district along the Indian River has significantly simpler photogeology with shallow north to sub-horizontal dips. Both the photographs and Landsat suggest that there is considerable faulting and a number of volcanic features (craters/pipes/cones), with extensive areas covered by inferred younger (?Eocene) volcanics.

Eureka Creek's placer gold can be traced to a broad headwater creek system covering 30 km^2 with arcuate ridge lines (remnant craters/pipes) and two prominent N-striking dome structures. There is evidence for one small igneous intrusive stock. Locally, and in the wider district, there are N-striking dykes. Southeast of upper Eureka Creek there are two other creek headwaters (the western branch of Wooded Moose Creek and a tributary of Australia Creek) with similar complex morphology and possible intrusives.

The southern drainage divide of the Indian River basin is marked by high ridges, locally plateau like (Figure 8b). At Eureka Dome conglomerates and quartzites have been reported. Air photography indicates in the ridge area dominantly NE-trending linear features thought to be acid dykes (cf. Australia Mountain, Debicki, 1984; Figure 7).

The plateau-like nature of these ridges and Landsat signature suggests these are remnants of an old land surface, the age of which would be very useful to know, because there is clear evidence of piercement or doming structures on the surface, and significantly deformation of a quartzitic sedimentary sequence only in the ridge district.

Quartzite sediments or quartzites are considered to be a major, if not the major, component of the Nasina Formation which is considered to form the major part of the basement of the Indian River district. Photogeologically, this stratigraphic unit appears very uniform and appears to lack major quartzite units, which would be expected to form strongly positive topography.

6. REGIONAL GEOPHYSICAL DATA

6.1 MAGNETIC DATA

The 1960's Geological Survey of Canada analog survey data is only relatively useful in the form of original contour maps because the regional gradient has not been removed. This gradient of 5 nT

per mile is significant given the low magnetic amplitude (400-500 nT) of the Yukon-Tanana Terrain.

Enclosure 2 illustrates some of the major structural lineaments and magnetic low or high features seen on this data set.

6.2 GRAVITY DATA

Figure 9 shows a contour plan provided to KSL by a very experienced gravity interpreter.

The gravity network is too widely spaced to be of exploration significance, we consider. However, as would be expected, it largely reflects the NW-striking Tintina Trench trend. A large parallel NW-trending low dominates the northwestern Bonanza domain (Grand Forks 1:50,000 map sheet) with a major gravity high feature in the middle Hunker Creek area.

Regionally, this data shows numerous, mainly small, magnetic high domains which often have no obvious linkage or often similarity. The largest high domain is the Dawson-Leotta domain of the Slide Mountain Terrane.

Arguably, the most important feature of this data set is the inference that broadly NW-striking lineaments (structural breaks) can be divided into sets with cross-cutting relationships. Several major lineaments can be correlated with major topographic features, notably:

- the WNW-striking Indian River sector bounding the Klondike goldfield and extends southeast to Wounded Moose Dome,
- the southeast continuation of the lower Flat Creek alignment,
- NW-striking structures through the eastern half of the Leotta domain,
- a major (4 km diameter) circular low in the Klondike valley, north of upper Hunker Creek (evidence for a post-Eocene diatreme?), and
- basement structural control of major river alignments (e.g. much of the Yukon, lower Stewart) but not the spectacular arcuate arc of Sixty Mile River of middle Stewart River.

7. NOTES ON REVISED EXPLORATION GEOLOGY

The structural and photogeological/Landsat studies described in this report have, as previously noted, been based on the premise that none of the past or current geological theories for (or the lack of) hardrock gold sources of the Klondike's placer gold are plausible.

Data on the discovery of the blind Pogo gold deposit in the Goodpaster River district in the Alaskan sector of the Yukon-Tanana Terrane has provided confidence, in conjunction with KSL's structural work, that the Klondike Goldfield district is part of the Tintina Goldbelt and prospective for major gold deposits.

The major gold exploration issues for the Klondike are:

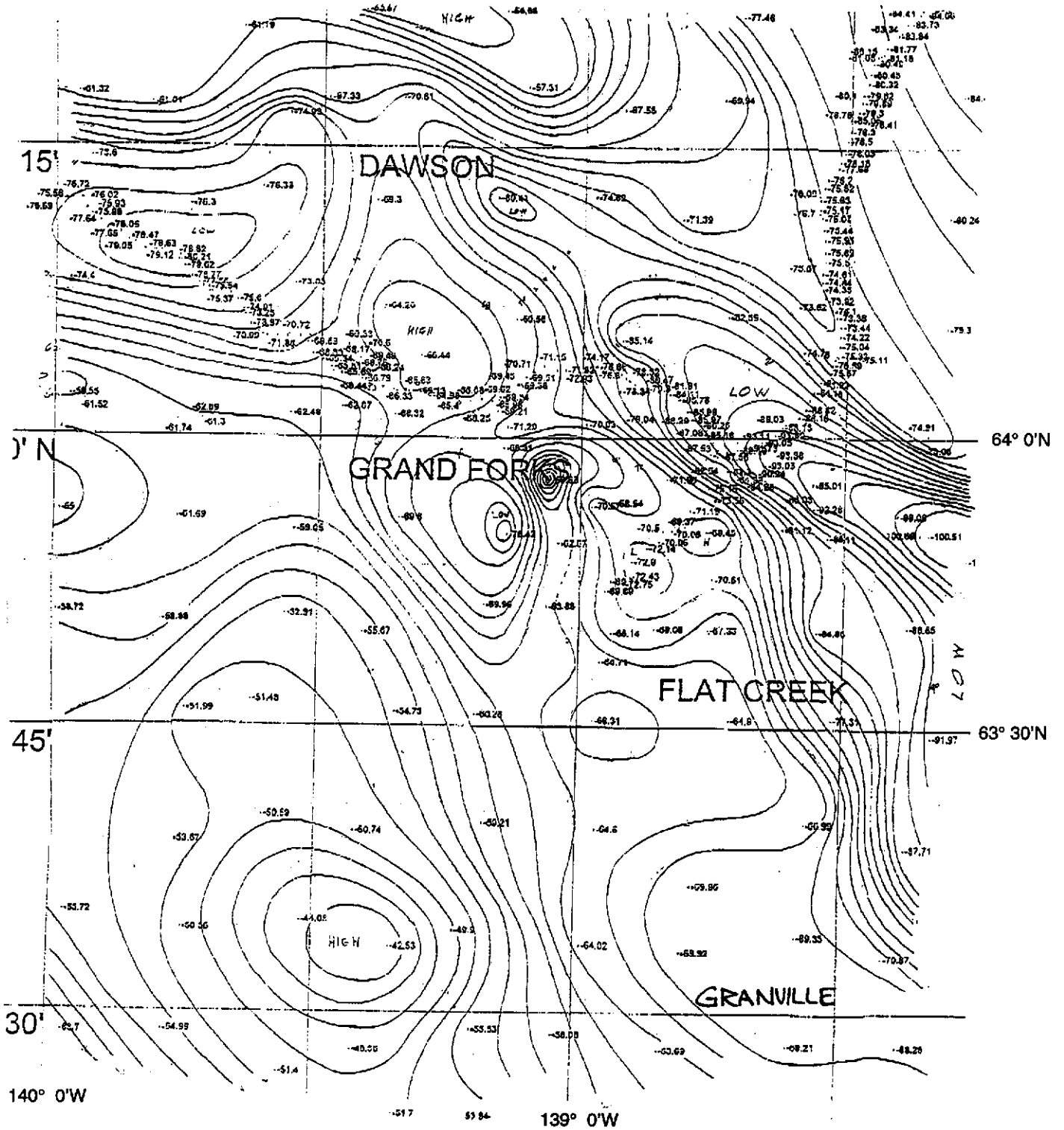
(i) is there surface (geomorphological) structural evidence of a Pogo-type plumbing system;

(ii) given the blind but stacked multiple lode geometry of the Pogo plumbing system, if such lodes come close to surface, where are they most likely to be found;

(iii) what geochemical survey technique is most likely to be effective;

(iv) given the likelihood that very little gold, if any, is shedding into the current drainages, poor surface geochemical results may not negate prospectivity;

Figure 9: **Regional Gravity Data Interpretation**



(v) Pogo is an attractive and suitable structural model for the Klondike district but it is unlikely to be the only model for (high grade) gold mineralisation in the Yukon-Tanana terrane;

(vi) defining the cost benefits of RC and diamond drilling as a primary exploration tool.

Two sets of data are considered to have major importance in defining areas or structure for initial exploration surveys:

- the structural studies of the Klondike and comparative studies of Pogo, Longline and the Klondike, and
- the photogeological/Landsat study of the southern Eureka Creek district and defining areas in the Klondike with analogous features.

8. PROPOSED EXPLORATION PROGRAM, 2000

8.1 GEOCHEMISTRY

8.1.1 Initial (orientation) MMI geochemistry

Mobile metal ion geochemistry is an Australian adaptation of Russian geochemical studies and techniques developed for permafrost and covered terrains.

Geochemistry using *fine* (200 micron) or conventional 80-mesh sample splits has had very limited success.

A program is planned to compare the MMI technique with conventional geochemical techniques over the most prospective structures and apparently geochemically 'dead' structures sampled in 1999.

8.1.2 Systematic geochemical surveys

The surveys initially will not be grids but appropriately spaced traverses or profiles of other prospective structures based on priority, and the results of the orientation surveys.

Depending upon the results of profile traverses and the identification of a better defined, less ambiguous, suite of element indicators for Pogo-type mineralisation, more conventional systematic surveys will be considered. Sampling at the base of ridges, i.e. along the valleys at the lowest break of slope, and hydrogeochemical surveys are two options with potential merit.

8.2 GEOLOGICAL SURVEYS, PROSPECTING

As a matter of routine, all rock types and possible alteration material encountered in soil geochemical survey sampling will be recorded

Certain of the more prospective structures may be prospected by pitting.

8.3 DRILLING

Subject to adequate funding being available, a drilling program will be instigated as soon as practical.

9. ACKNOWLEDGEMENTS

Commencing exploration in Canada with no prior experience in Cordillera geology or Yukon exploration and mining procedures required assistance from many sources, both technical and administrative. Thus KSL acklnowledges the assistance of their colleagues at Barramundi Gold Ltd., and in particular Professor Jim Mortensen of UBC, Mike Burke, Dan Murphy and Craig Hart of the Yukon Geology Program, Steve Gordey of the Geological Survey of Canada for geological discussions and information; and Brenda Oziewicz of the DIAND library, Whitehorse.

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APPENDIX I

SCHEDULE OF CLAIMS: KLONDIKE AND WEDGE BLOCKS

A) SHEET 116-B-3 (DAWSON):

KLONDIKE Claim No.	Registration Number	No. of claims
169 - 170	YC16384 - 16385	2
531 - 532	YC16745 - 16746	2
730 - 735	YC16944 - 16949	6
740 - 759	YC16954 - 16973	20
764 - 767	YC16978 - 16981	4
804 - 807	YC17018 - 17021	4
812 - 831	YC17026 - 17045	20
859, 861, 863	YC17069, 17071, 17073	3
865, 867	YC17075, 17077	2
869 - 889	YC17079 - 17099	21
912 - 933	YC17121 - 17142	22
TOTAL:		**106**

B) SHEET 115-O-14 (GRAND FORKS)

(i) KLONDIKE Claim No.	Registration Number	No. of claims	
1 - 6	YC16216 - 16221	6	
9 - 14	YC16224 - 16229	6	
17	YC16232	1	
19 - 29	YC16234 - 16244	11	
32 - 54	YC16247 - 16269	23	
62 - 89	YC16277 - 16304	28	
96 - 102	YC16311 - 16317	7	
109 - 128	YC16324 - 16343	20	
133 - 144	YC16348 - 16359	12	
149 - 166	YC16364 - 16381	18	
171 - 204	YC16386 - 16419	34	
227 - 244	YC16442 - 16459	18	
247 - 329	YC16462 - 16544	67	
337 - 376	YC16552 - 16591	40	
383 - 451	YC16597 - 16655	69	
463 - 495 (odd nos. only)	YC16677 - 16707 (odd nos. only)	17	
497 - 528	YC16711 - 16742	32	
572 - 601	YC16786 - 16815	30	
637 - 670	YC16851 - 16884	34	
TOTAL:		**473**	**579**

(ii) WEDGE Claim No.	Registration Number	No. of claims	
53 - 56	YC15957 - 15960	4	
61 - 100	YC15965 - 16004	40	
102 - 133	YC16006 - 16037	32	
136	YC16040	1	
138 - 221	YC16042 - 16125	84	
224 - 229	YC16128 - 16133	6	
TOTAL:		**167**	**746**

APPENDIX II

R. MARJORIBANKS:
GEOLOGY AND GOLD MINERALISATION OF THE KLONDIKE AREA, CANADA
— AN AIRPHOTO BASED STUDY

RobSearch

GEOLOGY AND GOLD MINERALISATION OF THE KLONDIKE AREA, CANADA

AN AIR PHOTO INTERPRETATION BASED STUDY

Roger Marjoribanks
September, 1999

RobSearch Australia Pty Limited
(formerly *Robertson Australia Pty Limited & Robertson Research (Australia) Pty Limited*)
ACN: 000 762 078
INDEPENDENT CONSULTANTS
NATURAL RESOURCES • SAFETY & ENVIRONMENTAL RISK MANAGEMENT • PROJECT IMPLEMENTATION
11th Floor, 80 Arthur Street, North Sydney, NSW 2060, Australia Phone: (02) 9957 3199 Fax: (02) 9954 4011
E.Mail: info@robsearch.com.au

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SUMMARY AND CONCLUSIONS

The Klondike Schist originated as a sequence of felsic volcanic rocks which were intruded by co-magmatic quartz-feldspar porphyry and by intrusions of granodiorite and gabbro. These rocks are interbedded with minor interflow graphitic sediment.

The schists were affected by a pervasive regional metamorphism accompanied by intense ductile deformation. This event largely destroyed all original textures and transposed original contacts into a new mylonitic foliation.

Subsequent to metamorphism, the schists were sliced up and repeated through a complex imbricate thrust zone of probable regional extent. The thrust faults are the dominant fault structure of the area and control much of the present drainage.

In the Indian River Region, during the early Cretaceous, uplift and erosion of the Schist provided the material to infill a sedimentary basin.

In the Tertiary, stress associated with initiation of the adjacent crustal-scale Tintina strike-slip fault zone re-activated existing faults of the area. Associated with this, widespread intrusion of dominantly felsic dykes and stocks occurred.

Heat from deep seated magma during the Tertiary circulated ground water through the thrust-imbricated Klondike Schist. These fluids had a focussed discharge along steep-dipping fracture zones, where they deposited gold-sulphide mineralised quartz veins.

The gold-sulphide-quartz veins are the obvious source of placer gold in the Klondike.

The high-grade placer deposits resulted from the rapid erosional release of gold from narrow, pyrite rich veins, coupled with the hydraulic gold-concentrating efficiency of the stream system.

In the Indian River Region, placer gold occurrences show a direct spatial relationship to a major centre of felsic intrusion. There are references in the literature to sediment - hosted epigenetic gold prospects in this area.

The area is a mature exploration play. Nevertheless, previous exploration appears superficial and focussed on a limited number of mineralisation models.

The Klondike area is considered to have good prospects for future discovery of significant primary gold ore. Application of applicable sediment-hosted and high-level, intrusive-related gold deposition models offer new ideas to guide exploration.

INTRODUCTION

THE BRIEF

The author was requested by Colin Thomas, Managing Director of Klondike Source Limited, to undertake an air photo interpretation of the geology of the Klondike area, Yukon Territory, Canada. Using any new insights gained from this study, he was asked to report on the nature of primary gold mineralisation in the area and to comment on the potential for new primary ore discovery.

SOURCES OF DATA

The following sources of information were utilised :

- black & white air photographs giving a full stereoscopic coverage at 1:50,000 scale over an area of 2,000 km^2. This area covered the productive gold placer workings of the Klondike district;
- a collection of extracts from published papers on the geology and mineralisation of the area (these will be acknowledged as appropriate in the text) ;
- information, ideas and insights gained during discussion, and a 1-day field tour, with Professor J. Mortensen of the University of British Colombia - Mortensen has extensive field and laboratory knowledge of the Klondike rocks and has published numerous papers on the area;
- examination of available outcrop across the area during ten days spent in the field.

ABOUT THIS REPORT

Two maps have been prepared for this report and are included at 1:100, 000 scale in the end pockets. The maps are :

- Figure 1: Photo-interpreted Geology of the Klondike area
- Figure 2: Gold Occurrences in the Klondike Area.

This report is written to present field observations, provide a brief commentary on the maps, and give observations and conclusions on gold mineralisation of the area.

ACKNOWLEDGMENTS

This report was instigated by Colin Thomas and the author is indebted to his constant enthusiasm and support during the project. The content reflects the benefit he has gained during many discussions on the geology and mineralisation of the Klondike with Colin Thomas and Bob Adamson. However, the observations, conclusions and opinions presented in this report are the author's own.

LANDSCAPE AND REGOLITH EVOLUTION

The Klondike area has a landscape history characterised by development of a mature rounded topography followed by a later period of marked rejuvenation (figures 3, 6 &7). The mature surface is preserved in the ridges and upper hill slopes as plateau remnants, and in the profiles of the upper parts of the major drainages. The effects of the rejuvenation can be seen in the cutting of recent river channels through thick accumulations of earlier terrace gravels, but is particularly evident in the development of young secondary streams which terminate, with steep gully ends, against the rounded ridge flanks[1].

The landscape was not directly affected by continental ice sheets or valley glaciers during the Holocene Ice Age and the weathered regolith inherited from the Miocene has been essentially preserved intact. Over the slopes and summits of the Klondike hills this regolith consists of thin residual soils overlying moderately weathered bedrock[2].

Although the area is not glaciated, the intense cold conditions during Holocene and Recent times have had a marked influence on vegetation and weathering patterns in the area. These are detailed in the next section.

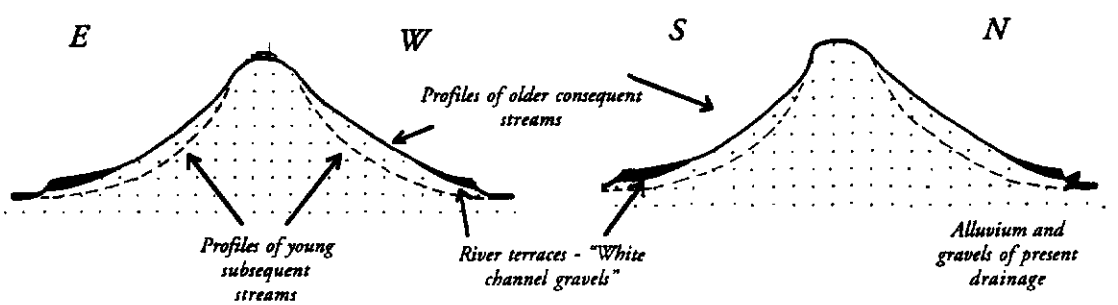


Figure 3 : Sketch profiles across typical Klondike Hills. Major consequent streams typically lie within a mature valley profile. A late landscape rejuvenation has incised the present drainage and initiated short subsequent drainage with steep, actively-eroding, heads. East-west trending ridges (right-hand sketch) are generally asymmetric with steeper south-facing slopes..

[1] According to Templeman-Kluit (Evolution of physiography and drainage in Southern Yukon, Geological Survey of Canada, 1980) the mature plateau remnants are an early Miocene surface, whereas the down cutting commenced in the late Miocene with the development of the Tintina Trench.

[2] In most areas that were examined, a few seconds work with a pick produced recognisable bedrock fragments from the surface soil. This type of regolith offers an ideal geochemical sampling medium.

AIR PHOTO INTERPRETATION

The air photo expression of rocks and structure can be understood in terms of the landscape evolution. Thus :

- Lithologies within the Klondike Schist could not be distinguished on the air photographs. It was also not possible to distinguish between Klondike Schist lithologies and meta-sediments of the Nasina Group. Since other quite subtle lithological contrasts are distinguishable -- for example young intrusive stocks and dykes into the Schist, this is taken to reflect the essential homogeneity of the Klondike Schist -- Nasina Group unit, at least in terms of those rock parameters which control erosion and vegetation.
- During the early erosion phase which produced the mature landscape forms, the course of valleys was generally controlled by the major steep-dipping faults of the area. These valleys are those of the Bonanza, Eldorado, Hunker, Upper Dominion, Sulphur and Indian River. As an exception to this observation, mature valleys developed at this stage along the shallow-dipping Gold-Bottom-Quartz fault zone.
- During the landscape rejuvenation phase, young secondary streams cutting down to the new base erosion level, generally followed shallow-dipping thrust faults or else picked out narrow steep-dipping dykes. It is noticeable that thrusts, followed on either side of a ridge by young secondary streams, have had no effect on the contours of the older interfluve.
- Ridges which trend E-W (or NE or NW) are generally asymmetric with a steep slope or scarp facing south, and a more gentle slope to the north. North-trending ridges, on the other hand, tend to have symmetric profiles (figure 3). This is interpreted as reflecting the rock-shattering effects of alternate freezing/thawing on the south-facing slopes as a result of diurnal temperature variations in Spring and Autumn.
- Steep-sided secondary drainages show vegetation trend lines as fine bands running directly up slope. This is interpreted as reflecting movement of fine rock particles (scree) directly down the steep slopes as result of solifluction.
- North-facing slopes typically display dark, upwardly-closing, wedge-shaped bands of vegetation. Such bands often mimic the appearance of isoclinal fold closure, but they are interpreted as the result of control on vegetation patterns by sun direction and gravity vectors.

LITHOLOGIES

KLONDIKE SCHIST

Almost all the area covered by this report is underlain by a unit of regionally-deformed metamorphic rock known as the Klondike Schist[3]. The schist represents volcanic and igneous rocks which have been metamorphosed to mid-greenschist facies and subjected to intense strain. This process has largely obliterated original texture and produced a penetrative mylonitic foliation. However, the metamorphic mineral

[3] R.G. McConnell, Klondike District, Yukon Territory. Geological Survey of Canada. 1903 and 1907.

assemblages, combined with the local preservation of original mineralogy and texture, allow the original rock types to be fairly readily identified.

In order of abundance, the lithologies within the Klondike Schist comprise:

Lithology	*Protolith*
quartz-muscovite schist	felsic volcanic (rhyolitic) rock - flows or lapilli tuff
quartz muscovite schist with quartz and feldspar "eyes"	quartz-feldspar porphyry intrusive or flow with relict igneous texture
quartz-muscovite-pyrite schist	felsic volcanic with pre-metamorphic pyritic alteration
quartz-muscovite-chlorite	felsic volcanic (more mafic than units above)
quartz-chlorite schist	as for quartz-muscovite-chlorite schist above
quartz-biotite-feldspar schist	granitic intrusive with primary preserved biotite
quartz-feldspar-hornblende schist; feldspar-hornblende schist/rock	granodiorite/diorite/gabbro with preserved mafic minerals and (locally) igneous texture
quartz-graphite schist	graphitic clastic interflow sediment
muscovite schist	felsic volcanic rock, re-textured and altered by strain and pressure solution in a ductile shear zone.

Graphitic schist occurs as narrow and discontinuous bands within quartz-mica schist as a relatively minor part of the metamorphic sequence. In the northern parts of the area, immediately south of the Klondike River, the frequency and thickness of intercalated graphitic schist increases. These graphitic sediments have been described as the Nasina Group. However, in outcrops seen near the mouths of Jackson's and Bear Creeks, rocks mapped by Mortensen[4] as Nasina Group are still clearly interlayered with quartz-muscovite schist and there is no structural break between the two lithologies. Within the area mapped, all the graphitic schist units are therefore considered to be an integral part of the Klondike Schist sequence.

Although individual schist lithologies can be identified in the field, the variations are one of differing proportions of a relatively few metamorphic minerals. The Klondike Schist is essentially a fairly homogeneous unit of siliceous rocks representing a felsic volcanic sequence (flows and associated epiclastic rocks) along with associated (probably co-magmatic) high-level intrusions.

In addition to the above lithologies, narrow lenses of ultramafic rocks have been mapped by Mortensen within the sequence. These lenses cannot be distinguished on the air photographs. In the Hunker Dome area strongly sheared talc-carbonate rocks were observed apparently lying within S1 schistosity. The air magnetic image shows that extensive zones of ultramafic rocks are present in the northern part of the area as west trending bands which lie along interpreted thrust fault zones. North of the Klondike River, beyond the area of photo-interpretation, mapping by Mortensen[4] shows extensive outcrop of undeformed mafic and ultramafic rocks. This latter sequence is known as the Moosehide Group. It is possible that all the ultramafic rocks of the area belong to the Moosehide Group and that they have been caught up by thrust faulting, and thus interlayered within the older Klondike Schist.

For mapping purposes, Mortensen has divided the Klondike Schist into four broad groupings, characterised by the following field terms[4] :

- muscovite schist (felsic volcanic)
- chlorite schist (a more mafic variant of the felsic volcanic)
- augen schist (quartz-feldspar porphyry)
- orthogneiss (granitic intrusive)

Mortensen has published maps showing the distribution of these lithologies, based on his detailed recording of all available outcrop and rock chips recovered from residual soils. The author believes that Mortensen's map is an over-interpretation of a limited data source, and that the interfingering of the different rock types is much more marked than his maps would suggest. In particular, the nature of the deformation means that the contacts between all lithologies must be largely parallel the dominant schistosity (S1). Since S1 is generally shallow-dipping, so also must be lithological contacts. Across the strong relief of the Klondike hills, the mapped contacts of shallow-dipping surfaces must show a strong deflection across topography. Few of the contacts between the Klondike Schist units on Mortensen's interpretation map show such topographic control.

The author believes that the available outcrop only allows the qualitative observation that orthogneiss dominates in the south and south west of the area, that graphitic schists increase in frequency towards the north of the area and that elsewhere, the lithologies of the schist appear to interfinger at all scales within the S1 foliation.

The present distribution of the lithologies dominantly reflects the deformation they have undergone. Beyond the observations in the above paragraph, the original primary distribution of rock units cannot be determined with any confidence.

THE INDIAN RIVER SEDIMENTS

South of the Indian River, in the south of the mapped area, a sequence of flat-lying sediments has been mapped. Three stratigraphic units are distinguished on the photographs : at base a well bedded sequence of clastic rocks, probably conglomerate / sandstone and siltstone. Stratigraphically above this is a dark- weathering unit on which extensive scree fields are developed - this is interpreted as a mafic volcanic sequence. Above this are massive pale-weathering rocks which probably represent sandstone and conglomerate units.

The sediments are flat-lying to shallow south dipping. In the west, the unconformable contact with underlying schist is preserved. To the north, the sediments are believed to be unconformable upon Klondike Schist, but a normal fault, with a small downthrow to the south, probably exists along the Indian River.

According to Lowey[5], the Indian River sediments have been dated on fossil evidence as Lower Cretaceous. Lowey describes conglomerate units from this area which have the appearance of the White Channel Gravels, and have clearly been derived from Klondike Schist.

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[4] J.K. Mortensen, Geological compilation map of the Northern Stewart River map area Klondike and Sixty Mile Districts. Indian and Northern Affairs, Canada, Yukon Region Open File, 1996-1 (G).
[5] G.W. Lowey, Auriferous conglomerates at McKinnon Creek, West-central Yukon : palaeoplacer or epithermal mineralisation? Yukon Exploration and Geology. 1983 pp 117-124.

POST-METAMORPHIC INTRUSIVE ROCKS

Outcrops of small bodies of quartz-feldspar porphyry are common throughout the area. These rocks show no ductile deformation or regional metamorphic effects and cut across the metamorphic foliation. Dolerite and andesitic dyke rocks were also seen in outcrop. On photographs, a large number of crosscutting dykes are identified with dominantly east-west and north-south trends. One of the E-W photo-interpreted dykes corresponds to a quartz-feldspar-porphyry dyke seen in outcrop. The dykes are often in-weathering features, followed by small secondary drainages. It is not known which of the photo-interpreted dykes are mafic, and which felsic.

In the NE of the area around Mount Leotta, and in the south of the area around Eureka Dome, are a number of positive features interpreted as intrusive stocks. These are thought to be felsic in nature The intrusives around Mount Leotta are into Klondike Schist, whereas those around Eureka Dome are into sediments of the Indian River Basin. The Mount Leotta intrusives appear to be part of a NW-trending line of such intrusives which can be traced for around 30 km. The Eureka Dome occurrences are more irregular in shape, and appear to be associated with N-S and NW-SE trending dyke swarms.

Radiometric dating by Mortensen gives Tertiary ages for at least some of the felsic intrusive rocks. It is concluded that rocks of this age are related to initiation of the regional Tintina fault.

RIVER TERRACE GRAVELS

Old river terraces have been interpreted along most of the major river valleys (figures 1 & 7). Along the Klondike River, these terraces are perched up to 100 m above the present valley bottoms. They reflect accumulations of locally derived boulders on the valley floors of the old mature land surface (see earlier discussion on landform). Along the Klondike, Bonanza, Eldorado, Hunker, Sulphur and parts of Indian River drainages, these gravels have been extensively worked for placer gold, and are well-known as the White Channel Gravels (McConnell, ref. cited).

DUCTILE DEFORMATION

EARLY PERVASIVE EVENT - D1

A well-developed penetrative schistosity, the result of a syn-metamorphic, intense, ductile flattening strain, is present in all lithologies of the Klondike schist. As well as flattening, a strong stretching of the rock fabric produced a well-developed mineral lineation. The deformation which produced this fabric is referred to as D1, the foliation as S1, and the lineation as L1. S1 generally has a shallow dip (< 45°) to the south-west. Through much of the central parts of the mapped area, measured dips are < 20°. This may indicate a gentle doming of S1 across the area (this idea has been used in constructing figure 5) but very much more field work would be needed to confirm such a structure. Where steeper S1 dips are locally present, this is thought to be the result of later folding. S1 surfaces could not generally be recognised on air photographs, although slope-breaks defining sub-horizontal surfaces in the King Solomon-Hunker Dome area are thought to reflect lithological variations within a flat-lying S1 surface. These are shown as trend lines on figure 1.

S1 is an axial-plane surface to isoclinal folds. Such folds can be found in most outcrops as rootless intrafolial folds (F1) (see figures 8 & 9). No consistent vergence was recorded from these folds. The surface which defines the folds is a pre-deformation banding, usually a quartz vein, but sometimes an original lithological banding (S0) of the rock. Apart from in the hinges of such folds, all original structure of the rock (bedding, flow banding, unconformities, intrusive contacts etc...) has been transposed into parallelism with S1. L1 is parallel to the axes of F1 folds.

F1 folds are present at the scale of hand specimen and outcrop. The available outcrop (and the air photo expression) is insufficient to determine whether map-scale isoclinal F1 folds are also present . However, the style of deformation seen in the Klondike Schist is well known from other areas. In such areas, deformation at regional scales takes place by means of movement along ductile faults or slides developed on fold limbs, rather than by the production of large fold nappes. A sequence of rocks deformed in this way might preserve a number of "slices" of preserved stratigraphy (when viewed at map scale) separated by narrow zones of intense strain and ductile fault movement. All structures are apparently conformable. Such a deformation model may well apply to the Klondike Schist. Major zones of D1 ductile fault movement would be parallel to S1, and could be expected to develop along significant original lithology contacts, for example, the contact between the felsic volcanic sequence and the intrusive granite, or the contact between Klondike Schist and adjacent (underlying ? overlying ?) Nasina Group sediment.

In spite of the probable regional importance of early ductile D1 faults, no such faults were able to be mapped.

Metamorphic quartz veins which formed during D1 are ubiquitous in the Schist. Such veins are flattened and elongated parallel to S1 and L1. They are typically lensy and, as pointed out by Mortensen[6], often have fine chloritic selvedges. Undoubtedly, the majority of quartz cobbles accumulating in adjacent river terrace gravels are derived from this source. Mortensen has also clearly demonstrated that the metamorphic veins do not carry gold.

LATE DUCTILE DEFORMATIONS - (D1, D2 ETC...)

In most outcrop of Klondike Schist, a late crenulation cleavage of S1 is present (figure 10). The crenulation is a typical spaced cleavage[7] and is locally so intense as to all but obliterate the earlier S1 fabric. Late generation folds of S1 are also common. Such folds have wave lengths up to many tens of meters, and the crenulation cleavage is an axial-plane structure.

Possibly as a result of the limited time spent in the field, no consistent orientation for these late ductile deformation structures was observed. An intense planar mica fabric such as the S1 surface in the Klondike will be very readily deformed by later folding and crenulation. Such crenulation can be expected to have occurred several times. Post S1 ductile deformation structures seen in the Klondike Schist may therefore belong to more than one generation -- the outcrop evidence is insufficient to resolve these various later events deformations.

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[6] J.K. Mortensen, B.E. Nesbit & R. Rushton. Preliminary observations on the geology and geochemistry of quartz veins in the Klondike district, West Central Yukon. In, Yukon Geology, vol 3: Exploration & Geology Services Division, 1992, pp 260-270.

[7] A spaced cleavage is one which results from the tight crenulation of an earlier surface. The name is descriptive and reflects the millimetre-scale regular spacing of the late cleavage

BRITTLE DEFORMATION

THE KLONDIKE THRUST ZONE

The drainage pattern of the Klondike is largely controlled by bedrock faulting. There are two common stream orientations and styles. These are though to reflect two differently-oriented, but kinematically-related, fault types. Straight drainages flowing to the NW or SE, such as Bonanza/Eldorado, Upper Bonanza, Lower Hunker, Upper Dominion and Sulphur creeks, are believed to follow steep-dipping, strike-slip faults. These drainages typically are major consequent streams and controlled the development of the early Miocene mature topography.

The generally-minor subsequent streams flowing NE or SW, which developed as a result of the late landscape rejuvenation, are typically curvilinear. Although such streams are short, they can usually be matched across intervening ridges with adjacent streams to define continuous zones which are interpreted as following planar faults. From the effects of topography on their outcrop trends, these faults have a consistent, shallow north-west dip ($< 45°$). The steep strike-slip faults often terminate against the shallow dip faults.

This pattern of faulting occurs across the whole outcropping area of the Klondike Schist. It is interpreted a stacked zone of SE-verging thrust faults, linked by steep-dipping strike-slip transfer faults. The pattern is a classic one for an imbricate thrust zone. It will be here referred to as the **Klondike Thrust Fault Zone** (KTFZ). A schematic section through the thrust zone is shown in figure 4.

The thrusts post-date the D1 deformation. Many of the post -D1 crenulations and folding observed in outcrop may be associated with thrust fault movement. The fault complex should probably be regarded as brittle-ductile in nature.

The thrusts pre-date the intrusion of late dykes and stocks and also the intrusion of steep gold-quartz veins (se next section). In addition, the faults pre-date the deposition of the early Cretaceous sediment of the Indian River region.

The Klondike Thrust Fault Zone terminates against the Tintina Fault in the east. To the west, the thrust zone extends beyond the mapped area. To the south the fault zone is overlain by the Indian River sediments, although the major thrust along the lower course of the Dominion Creek may represent a sole thrust to the zone. To the north, a series of north-dipping, south verging thrusts have brought undeformed mafic/ ultramafic rocks of the Moosehide Group to overlie Klondike Schist. These latter thrusts, because they bring younger undeformed rocks over deformed (presumably older) Klondike Schist , are probably unrelated to the Klondike Thrust Zone, and are most reasonably interpreted as having formed in association with Tintina Fault movements.

Because the mapped area covers only a small portion of the KTFZ it is impossible for the author to comment on its regional significance, but it is undoubtedly a major structure with a major regional importance.

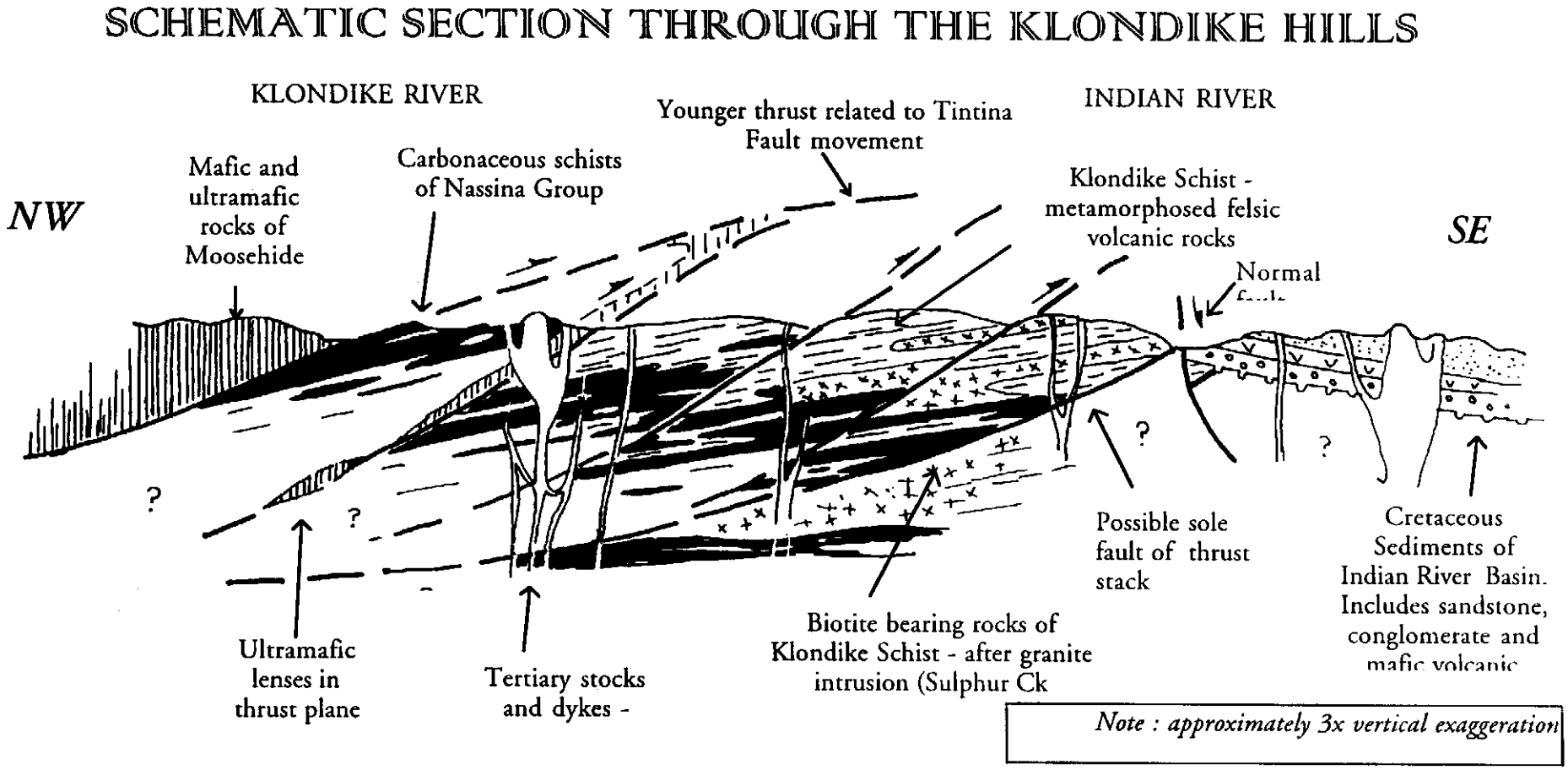


Figure 4 : The Klondike Schist is a group of metamorphosed, intense ductile-strained, felsic volcanic rock and associated porphyry. The Schist was affected by, and outcrops within, an imbricate zone of thrusts which verge towards the south and south east. Structurally deeper levels are exposed in the NW, where carbonaceous sediment (Nasina Group) predominates. In the SE, a pre-metamorphic granite (now biotite-bearing ortho-schist) is exposed. Subsequent to thrusting, high-level, dominantly felsic, stocks and dykes were intruded.

THE TINTINA FAULT ZONE

This is a dextral strike-slip fault which can be traced for over 2500 km. According the published studies, the fault has a right-lateral displacement across it of around 450 km. The fault was initiated in the late Miocene, and is no longer active. The fault passes along the eastern edge of the mapped area where it is marked by a wide and linear alluvium-filled valley -- known as the "Tintina Trench" .

It is almost inevitable that structures related to such a large crustal-scale zone of movement are present within adjacent rocks. Stress associated with the Tintina dextral strike-slip movement would have produced north-south compression and east-west extension strains in adjacent rocks. During movement on the Tintina Fault, it is expected that any pre-existing faults which were parallel or sub-parallel to the controlling structure would have been re-activated as dextral strike-slip faults.

The E-W trending, north-dipping thrust faults which are interpreted as occurring below the Klondike valley in the northern part of the mapped area are later than the Klondike Thrust Zone and may have formed at this time (Miocene) as compressional features associated with Tintina Movement.

Many of the NE trending transfer faults of the Klondike Thrust Fault Zone were probably re-activated during Tintina movement, but any such movements could not have been great. Re-activation of pre-existing NW-trending faults may also have contributed to controlling the distribution of late intrusions, particularly felsic stocks and dykes and the gold-quartz veins (see figure 5).

MINERALISATION

THE SOURCE OF THE KLONDIKE PLACER GOLD

The Klondike is renowned as a placer mining camp having produced in excess of 13 million ounces of placer gold and only around 1000 oz of primary gold.

To the author's mind, there can be little doubt that the gold in the creeks was derived from adjacent bedrock of the Klondike Schist. High grade "pay streaks" can be traced along particular drainages and their tributaries and define, fairly precisely, relatively-limited zones of bedrock from which the gold must have been derived.

These placer gold trains offer vectors to their primary sources, and the workings which mark them are readily-defined on the air photographs (see figure 2). The vectors were, of course, also well known to early prospectors who followed them to discover a large number of steep-dipping gold quartz veins in the bedrock schist.

A relatively-brief review of the literature shows that there are around 50 named primary occurrences in the Klondike hills, although there is some confusion of names and exact locations. Most of these occurrences have been plotted on figure 2. The known veins are narrow, and, at best, sub-economic, but this in no way negates their role as a source for the placer gold. Mass balance calculations show[8] that, given the volume of rock removed to form the present landscape, only reasonable and conservative assumptions as to the average gold endowment of these rocks are necessary to produce the amount of gold which has been recovered from the streams.

[8] Bob Adamson, personal communication.

The key factors in the formation of the placer deposits are believed to be these:

- Gold bearing veins must occur fairly consistently through several hundred meters of schist and over several kilometres strike length. The patterns of known gold quartz vein occurrences (figure 2) indicate that gold-quartz veins are to be found in at least two zones which meet these criteria. In the east of the area, known gold-bearing veins occur through a zone which stretches in a NW direction over a strike length of 40 km. In the west of the area is a similar zone with a NW trend of over 10 km. These two zones are drained by the major placer gold-bearing streams of the district.
- Gold must be quickly and readily liberated from the rocks during weathering. Present day colluvium gold workings which are only a few hundred meters below known gold-quartz vein occurrences demonstrate that rapid gold liberation must have taken place. Gold occurring in association with pyrite on the selvedges of narrow quartz veins, could provide such a ready source of gold for colluvial concentration.
- The hydraulic concentrating of gold must be very efficient. In the Klondike this was provided by a two stage concentrating mechanism, first in old river terraces, and then later into the recent drainage. In the bedrock of the streams, S1 cleavage is a regular planar surface which would open during weathering to create an efficient natural riffle. Placer miners take the top few meters of bedrock as well as the bottom few meters of the gravels; finally, the astonishingly high grades of Bonanza Creek occurred where sediment was trapped below natural restrictions in the width of the valleys.

NATURE OF THE EPIGENETIC GOLD QUARTZ VEINS

The veins cannot be directly seen on the air photographs. They are generally steep-dipping veins which post-date both D1 deformation and the Klondike Thrust Zone structures.

Exposed veins range from a millimetre or so in thickness to around 3 meters. Individual veins have short strike lengths, but zones of veining may persist for several hundred metres. Strike directions are variable but published reports show a predominance of NW strikes, both to individual veins and to zones of veins.

The veins are of milky quartz and are often associated with sulphide (pyrite, galena, chalcopyrite) both as selvedges and as streaks and patches within the veins. Veins are usually massive, but banded crack-seal structure is not uncommon (figure 11). In spite of this, the veins generally have a mesothermal appearance.

In the prospects visited, veins at all scales occur in sheeted arrays through a large volume of rock.

According to fluid inclusion studies by Mortensen, the fluids which deposited the quartz veins were meteoric in origin. Mortensen also has published a mid-Cretaceous date for the gold quartz veins. The date however is based on a single sample and may not be reliable.

The sheeted epigenetic veins are the obvious source for most of the placer gold in the Klondike. Their nature has been described in detail in the paper already cited by Mortensen, Nesbit & Rushton. The veins have been the focus of the majority of previous hard rock exploration the Klondike. This exploration has yet to define a large economic resource.

GOLD MINERALISATION IN THE INDIAN RIVER REGION

In the southern part of the mapped area, air photo interpretation shows extensive placer gold mining in the north-flowing Eureka Creek and the south-flowing Black Hills Creek (figure 2). Both streams drain Eureka Dome -- a mountain peak developed on an interpreted felsic complex intruding Early Cretaceous sediment. On the photographs, a small area of hard rock or colluvial

gold workings is identified on the southern slopes of the dome. According to Lowey (ref. cited) hard rock mining (grades "up to 3.4 g/t ") has also taken place in the area in McKinnon Creek. Lowey did not provide an exact location for the McKinnon Creek workings and they could not be located on the photographs.

Lowey describes the McKinnon Creek workings as occurring within conglomerates with "extensive quartz and clay cementation and authigenic pyrite and tourmaline". Lowey rejects a palaeoplacer origin for this gold occurrence, and concludes that they are epigenetic in origin.

The significance of the Indian River gold occurrences is their obvious spatial relationship to late felsic intrusion and the nature of the host rocks which permit sediment hosted gold mineralisation models to be applied. If gold is related to felsic intrusion at Indian River, then it is arguable that late intrusion might have played a similar genetic role in the Klondike hills to the north. More investigation is warranted on the gold mineralisation of this area.

THE ORIGIN OF THE PRIMARY MINERALISATION

The following model is preferred for the formation of the known gold-quartz veins:

- The felsic volcanic rocks of the Klondike area show evidence of extensive pre-metamorphic (syn-volcanic) clay-pyrite-silica alteration -- probably a result of lateral fluid flow through a permeable volcanic pile. This produced low-level but extensive base-metal and gold anomalism through a large volume of rock[9]. This rock volume the source rock for later gold concentration.
- Regional deformation and metamorphism of the area (D1).
- Thrust imbrication of the Klondike Schist (late Permian?)
- Uplift and erosion. Penetration of ground water through the thrust stack (late Mesozoic - Early Tertiary).
- Initiation of Tintina Fault (Tertiary). Re-activation of deep NW-trending basement Faults below the Klondike Schist. These faults did not break through to present day surface. They are marked within the Schist by broad zones of NW-trending, steep-dipping tensional fracturing and by intrusion of felsic and mafic dykes and irregular felsic stocks (figure 5).
- Circulation of ground water through the Klondike Schists. The circulation was driven by magmatic heat. Fluids passed laterally through a large volume of the thrust-imbricated Klondike Schist and were able to leach gold and base metal from the rocks. Fluid discharge was focussed along the restricted zones of steep-dipping tensional fractures. Quartz-sulphide-gold deposition took place within these fractures as a result of pressure and temperature drops.

[9] This raises the interesting possibility that syngenetic gold-rich massive sulphide deposits could be a valid exploration target in the area. However, any such sulphide accumulation would have been attenuated and perhaps destroyed, by the intense D1 strain.

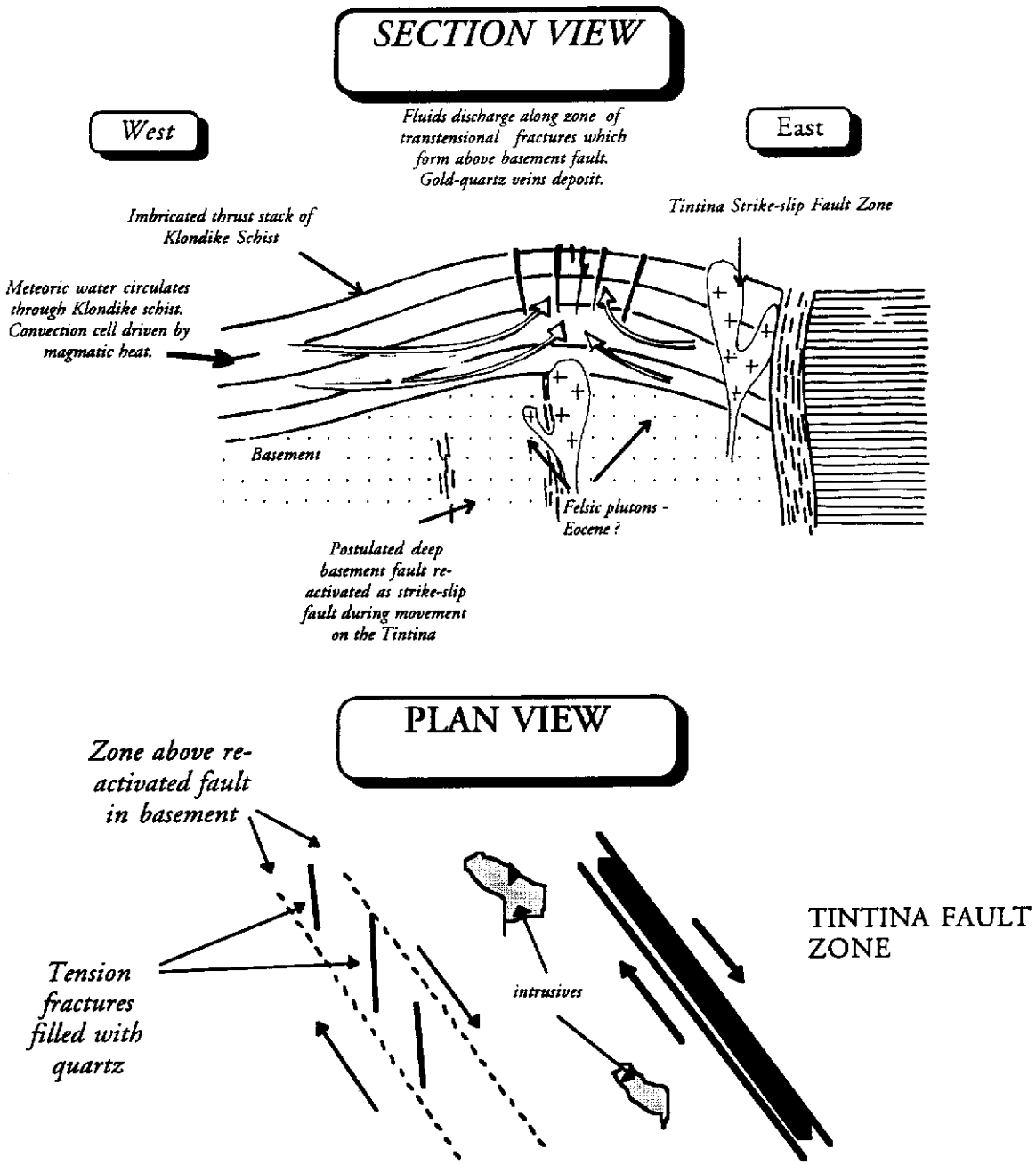


Figure 5 : Conceptual; sketch illustrating formation of epigenetic gold quartz veins as a result of lateral flow of meteoric fluids through flat-lying thrust stack of Klondike schist.

POTENTIAL FOR NEW PRIMARY ORE DISCOVERY

There is a large volume of rock within the Klondike area that contains significant gold endowment. This fact makes it likely that, given appropriate conditions, an economic primary gold deposit could be present. Although the Klondike must be regarded as a mature exploration play, previous exploration programs in the area are considered to have been relatively superficial. In the authors opinion, the potential for significant new ore discovery is good.

The following points are relevant to this assessment :

- Gold mineralisation within stockworks or sheeted zones of gold-sulphide-quartz veins remains the most readily applicable model for primary gold mineralisation.
- Much of the previous exploration effort has been focussed on the known epigenetic gold quartz veins cutting the Klondike Schist. In view of the lack of significant deep erosion or transported cover over the Klondike hills, the lack of success of these previous exploration efforts is disappointing. However, previous explorers apparently focussed on the discovery of large single quartz veins and may not have been aware of the potential of more sulphide rich stockwork material which may not have had significant surface expression. Such zones should be readily-definable by properly planned geochemical programs. To asses the remaining exploration potential for this type of deposit, it is essential that details of previous exploration programs be acquired and assessed.
- Other gold mineralisation models with significant potential can be applied to the area. It appears that exploration to date may not have adequately tested these potential styles of mineralisation. They are:
  - Sediment hosted gold within the Indian River Sediments. Gold-bearing zones of silicification and alteration which have been described from these rocks merit immediate follow up.
  - Sediment hosted gold within Nasina group sediments. The literature describes carbonate rich lithologies within this group. Carlin-type replacement models might well be applicable.
  - Mesothermal gold in flat-lying siliceous lodes controlled by faults of the Klondike Thrust Zone. A very relevant and applicable example of this style is the Liese Zone gold deposit (10 million tonnes @ 15 g/t Au), at Pogo in Alaska. In this deposit, intrusive-related lodes are hosted by post-S1, shallow-dipping, brittle-ductile faults[10]. If such flat-dipping lodes were present in the Klondike they would have a minimal surface expression and could easily have been missed (or miss-interpreted) by previous explorers.
  - Replacement or stockwork mesothermal gold deposits associated with mid-Cretaceous felsic stocks. This age and style of mineralisation has been described from many economic deposits in Alaska. The gold occurs in quartz-veins which can be hosted by the intrusion (Fort Knox deposit - 4 million oz reserves at 7.5 g/t), lie solely within adjacent schist (Christina and Cleary Hill deposits) or partly in schist, partly in intrusive (Ryan Lode)[11]. A mid-Cretaceous age has been published from a gold-bearing quartz vein in the Klondike (Mortensen, ref. Cited) and it remains possible that many of the felsic stocks in the area which have been mapped by the present author are also of this age.
  - Epithermal gold associated within high-level felsic intrusives.

[10] Geology of the Liese Zone, Pogo property, East-central Alaska. 1999. Society of Economic Geology Newsletter, July, 1999. By: Smith, M, Thomson JFH, Bressler J, Layer P, Mortensen JK, Abe I, Hidetoshi T.

[11] Plutonic-related gold deposits of interior Alaska. 1997 Economic Geology, Monograph 9. Pp 191-241. By : McCoy D, Newberry RJ, Layer P, DiMarchi JJ, Bakke A, Masterman JS and Minehane DL.



Figure 4 View looking south along Bonanza Creek . Note mature landform with recent drainage rejuvenation. White scars reflect the placer mining which has produced 7 million oz gold from this drainage.

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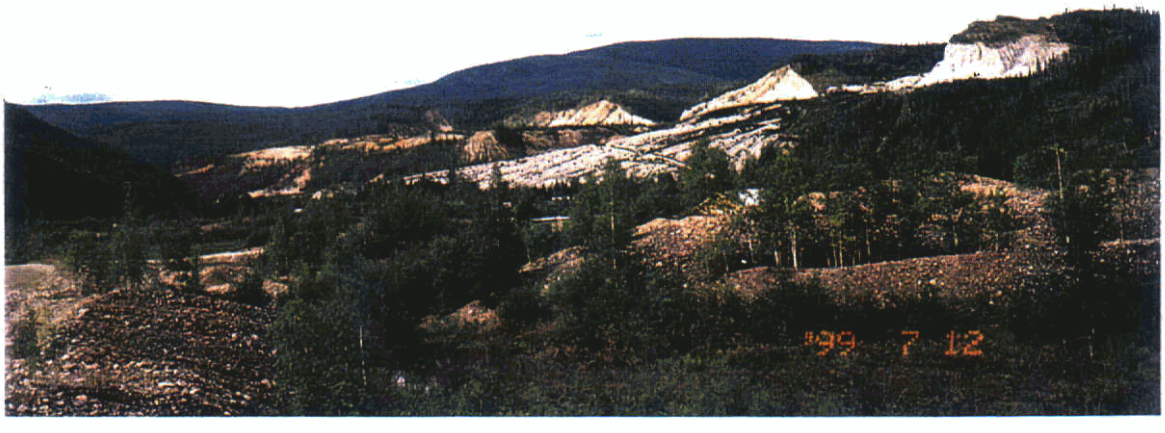


Figure 5 View along Bonanza Creek. Note high level placer workings in perched river terraces of the White Channel Gravels.



Figure 6 Rootless, isoclinal, F1 fold in quartz-muscovite-chlorite schist. The fold is defined by a relict compositional banding of a rhyolitic protolith. The dominant rock schistosity (S1) is an axial plane surface to these folds.

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Figure 7 Isoclinal F1 folds in quartz-muscovite Klondike Schist.



Figure 8 Fine crenulation "spaced cleavage" (top to bottom of frame) developed on strong S1 schistosity (left to right) in quartz muscovite schist of Klondike Schist .

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Figure 9 Steep-dipping, banded quartz-sulphide veinlet cutting across quartz-muscovite schist at Sheba Mine. A large number of such veinlets appear to be associated as sheeted arrays in association with the major known gold quartz veins.

APPENDIX III

R. MARJORIBANKS:
DESCRIPTION AND COMPARISON OF POGO, LONGLINE AND KLONDIKE GOLD CAMPS,
ALASKA AND YUKON TERRITORY

DESCRIPTION AND COMPARISON OF POGO, LONGLINE AND KLONDIKE GOLD CAMPS, ALASKA AND YUKON TERRITORY

Roger Marjoribanks
20TH April, 2000

SUMMARY

The Pogo and Longline gold veins are shallow-dipping tensional veins associated with moderate to steep-dipping thrusts and reverse faults. This is a characteristic mesothermal vein structural style.

A set of imbricate thrust structures is present in the Klondike which is similar in style, age and intrusive associations to that interpreted at Pogo .

Pogo and Longline deposits provide a structural model applicable to the Klondike. Flat dipping lodes could be present in the Klondike and would have been easily missed by previous explorers

The steep dipping lodes known in the Klondike may have been only a relatively-minor source of the alluvial gold.

INTRODUCTION

The author was asked by Colin Thomas, Technical Director of Klondike Source Limited, to examine the structural setting of the Pogo (West-Central Alaska) and Longline (NW Yukon Territory) Gold Camps : compare these with the structural setting of the Klondike area and comment on the implications for economic gold occurrences in the latter Camp.

The comparison is based on the authors mapping of the Klondike area in 1999[1]. Interpretation of the Pogo and Longline Camps was based on information (detailed in the text) supplied by KSL limited. The contract, including writing this report, occupied 4 days.

It must be emphasised that the interpretations offered here are based on limited data bases. The hard field evidence which could offer high levels of certainty in such interpretations has either never been acquired by Alaskan and Yukon geologists, or else is confidential within company files. Nevertheless, the ideas presented are considered to be consistent with all evidence available to the author, to match structural styles of gold mineralisation known from around the world, and to offer practical and applicable models to guide exploration in the Klondike.

POGO GOLD CAMP

Data Sources Supplied

1: 63,360 scale topographic maps of Pogo area
1:250,000 scale regional air magnetic maps (contoured data)
Recent published paper on the Liese deposit at Pogo by Smith et al[2].

Host Lithologies

According to the published data, the Pogo Camp is underlain by metasediments and meta-volcanic rocks of the Yukon-Tanana Terrain, extensively intruded by a variety of post - metamorphic felsic to gabbroic intrusions.

The Yukon-Tanana Terrain is an extensive unit of amphibolite to greenschist facies basement rocks occurring through Alaska and the Yukon, much disrupted by later intrusion as well as by brittle and brittle-ductile faulting. There appears to be surprisingly little knowledge or understanding of these metamorphic rocks. They are described as being of

[1] *Geology and gold mineralisation of the Klondike area, Canada - a photointerpretation based study.* Report to Klondike Source Limited, August, 1999.
[2] *Geology of the Liese Zone, Pogo Property, East-Central Alaska.* By Smith M, Thomson JFH, Bressler J, Layer P, Mortensen JK, Abe I & Takaoka H. 1999. SEC Newsletter 38 (July, 1999)

Late Proterozoic to Early Palaeozoic in age. No isotopic age (ages?) for the high grade metamorphic event have been seen, but dated post-metamorphic intrusions starting in the Jurassic, indicate this occurred at least pre-Jurassic.

In the Pogo area, greenschist facies metasediments (described as gneiss) are the immediate host-rock to most of the high-grade gold mineralisation of the Liese Zone.

Several post metamorphic intrusive suites have been identified in the region with ages from early Jurassic to early Tertiary. In the Pogo area, the most voluminous intrusives are the Mid-Cretaceous Goodpaster batholith - a granodiorite body with extensive WNW-trending outcrop. Intrusions of this age (referred to as the Tombstone Suite, of gabbro to granite compositions) are associated with many gold deposits of the Tintina Gold Belt such as Fort Knox, Cleary Hill and Ryan. This granodiorite is reflected in the regional magnetics of the Pogo area as a series of WNW-trending lows (Figure 1).

The host gneiss of the Liese ore body is cut by granite, quartz-monzonite, diorite and basalt bodies with apparent stock, dyke and sill-like forms.

Structure

The gneiss has a strong foliation (S1) developed during a syntectonic metamorphic event (D1). Lithological variation within the gneiss is parallel to S1except in the noses of (infrequent) isoclinal rootless folds (F1), which have S1 as an axial plane structure. Although based on limited surface measurements (apparently no measurements were made on drill core) S1 is described having a NW strike and steep dip to the NE across the property. It is cut at a high angle by the structures which host the Liese gold ore body.

Inch-to-the-mile topographic maps show a distinct pattern of linear and curvi-linear streams which can be readily interpreted as following bedrock faults. (Figure 1). This interpretation is strengthened by the fact that the stream patterns show a marked similarity to patterns of the Klondike, where the author has conducted field work and detailed air photo interpretation, and so has a fair level of confidence in their interpretation.

To the north and south of the Liese Zone, major consequent streams (Central Creek and the west-flowing portions of Goodpaster Creek) with mature valley profile and straight linear courses reflect steep-dipping, WNW-trending faults. These provide the base level for a series of short, actively-eroding subsequent streams which drain the main WNW-trending ridge between the major streams. The short subsequents have a curvi-linear trace, and can be matched in pairs across the ridge line, implying control by a continuous structure. They are interpreted as shallow WNW-dipping faults. By utilising structural contours, an approximate dip on these structures of 30-50° to the NW, can be calculated. The shallow-dip faults terminate against the continuous steep fault structures of the consequent valleys.

As with the Klondike (see Marjoribanks, 1999, op cit.) this pattern is interpreted as reflecting a stacked or imbricate series of SSE-verging, WNW-dipping, thrust faults linked by through-going major strike-slip transfer faults. The age of this thrust stack is clearly post-D1, and must pre-date the late brittle fault of the south flowing Goodpaster valley, against which the faults terminate. There is insufficient detailed mapping available to determine the age of the thrusts relative to the intrusive rocks.

The fault zone along the south-flowing sector of the Goodpaster valley (here called the Goodpaster Fault) to the west of the Liese Zone, is interpreted as a dextral strike-slip fault with associated reidel shears and extensional graben. In the Liese ore body, the minor post-ore reverse faults (Liese and mid-ridge faults) described by Smith et al, can be readily understood as compressive features associated with the dextral movement on the Goodpaster Fault. This provides evidence that gold mineralisation pre-dates the Goodpaster Fault.

To the west of the Goodpaster Fault, a similar style of SE-verging, early thrust imbrication can be determined. North-trending, steep dipping faults in this area are probably related to the Goodpaster Fault.

In the far west of the interpreted area a major, NE-trending, steep-dip fault zone is interpreted. This is the well-known Shaw River Fault. It is clearly a strike-slip fault and is probably a late brittle feature to which the Goodpaster fault is related. A dextral movement across it is implied. These transgressive faults are most reasonably interpreted as accommodation structures to the Tertiary oroclinal bending of the Alaskan cordillera.

Mineralisation

According to Smith et al, the Liese ore body (or Liese Zone, as they call it) is a stacked series of 10-40° NW-dipping quartz lodes. The largest, and best explored, is the uppermost lode, L1. The lodes contain up to 3% sulphide and are interpreted from extensive fluid inclusion, textural, petrographic, geochronology and stable isotope studies to represent a mesothermal deposit of mid-Cretaceous age. It is described as having formed from magmatic fluids and probably related to the mid-Cretaceous Tombstone suite of granitoids. Quoted geological resource at 0.1 g/t cut-off is approximately 10 MT at 15g/t (5 M oz gold). The Liese quartz lodes do not outcrop, and it is assumed that they were found through drilling a geochemical anomaly.

Structural Control

The quartz lodes occupy extensional brittle, or brittle-ductile, fractures. The fractures formed as a result of high fluid pressures in a deviatoric stress field at the time of gold deposition. The shallow dip of the fractures indicates a compressive environment characterised by a NW-SE principal stress vector. Since a similar stress vector can be deduced for the thrust fault complex of the area, an association of the two sets of structures is compelling. As a further piece of evidence, a NW-SE longitudinal section through the L1 lode will show a distinct sigmoidal shape (see figures 2 and 3) - a classic dilational jog shape. The association of flat-dipping tension veins or vein arrays with compressive thrust or reverse faults is a very common, indeed, almost a characteristic, style of mesothermal veins[3].

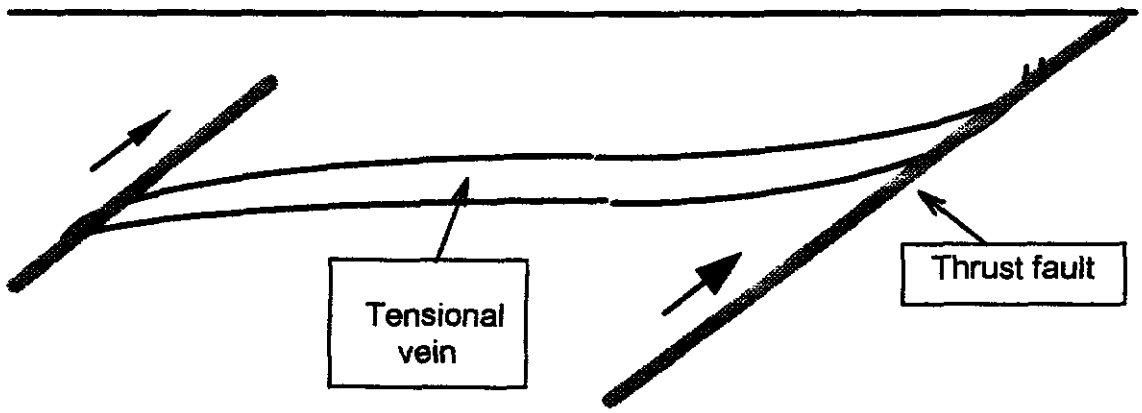


Figure 3 Sketch section showing relationship of sigmoidal tensional veins associated with steeper thrust shears during an episode of horizontal compression.

[3] See Sibson, R.H. & Poulsen, K.H. 1988 *High-angle reverse faults, fluid pressure cycling and mesothermal gold-quartz deposits.* Geology, v16, pp 551-555. Also, Sibson, R.H., 1998 *Brittle failure mode plots for compressional and extensional tectonic regimes.* Journal of structural geology, v20, pp 655-660.

Cross sections of the Liese veins presented by Smith et al, show interpreted sill-like granite bodies with similar dips to the quartz lodes. If this is the case it might imply that granite intrusion took place in a similar stress environment to that of the quartz lodes - thus it could be argued that granite intrusion and quartz deposition were broadly co-eval. A similar relationship might however have resulted from imbricated slivers of a pre-existing granite being caught up in the shallow dipping shears associated with the quartz lodes. Much more geological data is needed.

Thrust faults such as shown in figure 3 above, cannot be projected either up or down dip for any distance. Up dip, such thrusts might steepen into reverse faults, or flatten into the top thrust of a duplex. When projected down-dip, thrusts typically flatten into a sole thrust. The regional implications of this are profound. The Yukon -Tanana Terrain may consist of relatively thin allochthonous slivers. These slivers have themselves been broken up and disoriented by later brittle faulting. Only regional, air photo and remote sensing geological mapping, of the type not yet attempted trough Alaska-Yukon, could resolve such potential complexity.

LONGLINE GOLD CAMP

Sources of data

1:25,000 scale ortho-photo map of the Longline district
1:25,000 scale digital terrain model of Longline district
1:25,000 scale air magnetic pixel map of central Longline district
contoured surface geochemistry for gold and arsenic
A recently-published paper on the Longline prospect[4]
Barramundi Gold Annual reports for 1998 and 1999.

Bedrock lithology

An interpretation map for the Longline area is shown in Figure 4.

The bed rock to the mapped area is described in available reports as consisting of granitoids. From air-magnetic, topographic and air photographic information they have been divided into 5 units :

1. NNW trending ridge-forming unit with a tabular, dyke-like, form. Strongly magnetic. Appears to lens out to NNW and SSE. Cuts across (and hence younger than) trend lines of unit 2. Interpreted as a younger granodioritic-gabbroic intrusion.

2. N to NNW-trending zone of highly magnetic rocks. Forms upland areas but not so rugged as unit 1. Magnetic striping defines N-S internal trend lines. These are interpreted as an older, foliated, deep-level , composite gneissose granodiorite/diorite intrusion.

3. Sharply-bounded, ovoid areas to 1000m across defined by intense magnetic lows. Appear to link with NNW-trending dykes. Interpreted as late, high level intrusive stocks of felsic rock.

4. Areas of relatively low magnetics and generally lower topographic relief than 1 and 2. No marked magnetic trend lines. Interpreted as probable felsic igneous rocks or homogeneous metasediments.

[4] *Exploration on the Longline gold project, Moosehorn Range, Yukon Territory* by D Ritcey, Sears S, Conroy P. & Gorton R in the Tintina Gold Belt Conference volume, 2000, BC & Yukon Chamber of Mines, pp 173-180.

5. Dykes with NNW trends. Most of the dykes are magnetic lows - the single exception is a dyke in the east of the mapped area. They generally have distinctive inweathering topographic expression. The most prominent and continuous dyke trends through the centre of the property just east of Longline. From its topographic expression, this dyke dips west at around 50°. Since all the dykes have a similar strike, it is assumed that all will similarly dip to the west.

Structure

A series of late brittle faults dominate the structure. These have the following characteristics:

- Consistent NE strike
- Consistent steep dips
- Close-spaced arrays with faults every 500-1000 meters
- Consistent left-lateral apparent displacements of the magnetic units of the intrusives.
- Most displacements are minor. However a major fault zone through the centre of the property (along Kenyon Creek) has left-lateral displacement of around 1000 m.
- All faults are narrow linear zones of magnetic low. This is interpreted as indicating magnetite destruction as a result of fluid flow along the faults.
- Most faults have controlled the position of drainage.

There is little available evidence to determine the nature of the faults. They could be strike-slip or dip-slip. A preferred interpretation is that they are steep NW-dipping reverse faults. The evidence for this is the prevalence of NE-striking compressive faults in the adjacent Klondike and Pogo areas, and the association of the faults at Longline with flat-lying tensional veins. If this interpretation is correct, the apparent strike-slip displacement across them is the result of a regional west dip on the magnetic units of the intrusive complex.

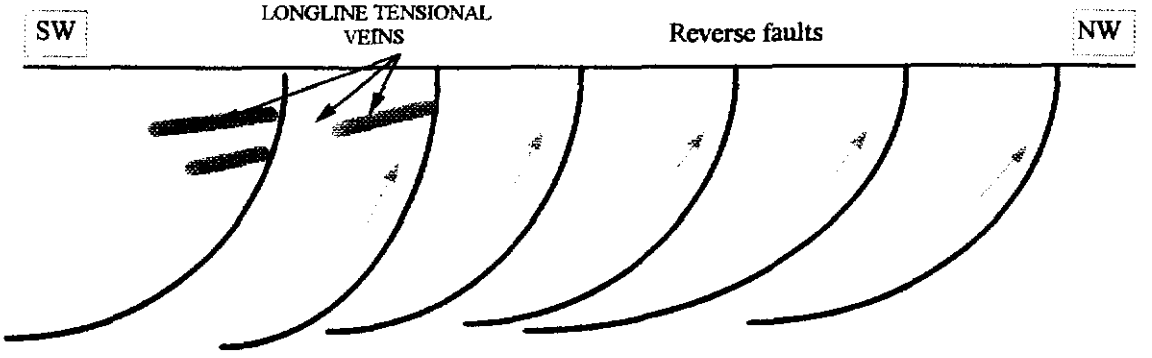
Mineralisation

- Placer gold trains have been exploited in Kenyon Creek and Swamp Creek (draining SW) and in two NE trending drainages.
- Primary quartz vein gold mineralisation is known at Longline Prospect in the beds of Soya and Swamp Creeks. These veins have shallow (30°) east dips (V1, V2 & V3 on Swamp) and shallow west dips (Soya).
- Shallow dipping veins imply a compressive tectonic environment at time of vein formation.
- Primary quartz veins with gold are known from the ridge of unit 1 rocks 3 km east of Longline. No data is available on the attitude of these veins.
- Veins are banded, have mesothermal character, and contain up to 5 % sulphide (As/Pb/Sb). Gold grades patchy, but locally bonanza. Thicknesses range to 1.5 m.
- Longline mineral veins are spatially associated with NE-trending faults. Base-metal geochemical anomalies trend NE-SW parallel to the fault traces. A close genetic association of the veins with the adjacent faulting is therefor a reasonable assumption.
- However, descriptions of the outcrop of the veins make no mention of faults, but describe the immediate host rock as a foliated granodiorite. Outcrop is however apparently limited to the immediate vein environment, and is probably insufficient for determining detailed geology.

The simplest and most logical interpretation of the structure of the Longline veins are that they are tensional quartz-filled fractures associated with reverse fault movement on adjacent NE trending, steep NW-dipping reverse faults. These faults are relatively-late, brittle features.

This interpretation makes the structural setting at Longline similar to that in the adjacent Klondike and Pogo Gold Camps. The major difference is the steepness of the compressive faults at Longline (reverse faults rather than thrust faults). When projected to depth, however, the steep reverse faults can be expected to flatten to thrust faults, and may bottom at depth into a sub-horizontal sole thrust.

Figure 5 Sketch section through Longline Prospect



Potential for further primary mineralisation exists along all the NE fault sets.

Where these faults cut the massive competent rocks of unit 1, large tonnage fracture arrays may have formed. The known veins of the DEA Property (located within unit 1) also therefore define an attractive target area.

KLONDIKE GOLD CAMP

A structural map of a portion of the Klondike area between the Klondike River and Dominion Mountain, is given in figure 6.

Sources of data

This section is based on work done by the author in 1999 for Klondike Source. Figure 6 is a photo-reduced portion of 1:50,000 scale air photo mapping completed for that project (see ref. Marjoribanks, 1999, cited). Information is based on :

- 2 weeks field work in Klondike area
- 1:50,000 scale B/W air photographs
- low-level air magnetic imagery of a portion of Klondike area by Barramundi gold
- various published reports and papers on the Klondike geology and mineralisation

Bedrock Lithology

Bedrock consists predominantly of quartz-muscovite schist with variable amounts of chlorite, feldspar and pyrite. Other lithologies present are quartz-biotite schist and quartz-graphite schist . From lithology and relict textures it can be shown that they represent a felsic volcanic sequence, with graphitic sedimentary interbeds and co-magmatic intrusive rocks. These have been metamorphosed to greenschist facies and subject to intense syntectonic deformation. Published reports ascribe the Klondike schist to the Yukon-Tanana Terrain. As discussed in the section on Pogo, the Yukon -Tanana terrain represents a basement sequence of unknown age which was metamorphosed and cratonised prior to the Jurassic.

The volume of post-metamorphic intrusive rocks in the Klondike is much less than in the Pogo area of Alaska or at Longline. The schist is cut by numerous dykes with basalt to felsic compositions. These dykes have dominantly N-S and E-W trends. Larger areas of intrusives have been photo-interpreted around Mt Leota in the north of the Klondike hills, and around Eureka Mountain, south of Indian River. Some radiometric dating on rhyolite dykes in the east of the area adjacent to the Tintina Fault has yielded Tertiary ages. However, the bulk of

the intrusive rocks remain undated. It is possible that intrusives with Cretaceous or even older ages are present. At Eureka Mountain, the intrusive rocks cut a sequence of flat-lying unmetamorphosed coal-bearing sediments, which are in down-faulted relationship with Klondike schist. The age of these sediments is considered to be Cretaceous, based on fossil evidence.

Structure

The structure of the Yukon area is remarkably similar to that interpreted from the Pogo area, and has some elements of similarity with the Longline area.

S1 surfaces of the Klondike schist are generally shallow dipping but are steeper in the east and west of the area. This suggests that S1 surfaces are gently domed across the area.

Schists are cut by an imbricate array of NW-dipping, SE-verging thrust faults linked to steep, NW-striking strike-slip transfer faults. These are brittle-ductile structures which post-date S1, but appear to pre-date many of the intrusive dykes. Otherwise the age of the thrust system is unknown. The pattern of compression related faults, and the distinctive drainage developed on them, is remarkably similar to that at Pogo.

The regional, strike-extensive, right-lateral Tintina fault system lies immediately to the east of the Klondike area. Published research indicates this fault was initiated in the Tertiary. The imbricate thrust system of the Klondike Hills cannot be readily related to movement on the Tintina Fault, and is considered to be an older, deeper -level structure. Nevertheless, it is probable that pre-existing faults in the Klondike were re-activated during Tertiary movements. A major fault, or faults, along the E-W section of the Klondike River, cut across elements of the early thrust fault complex, and is a late structure (possibly a normal fault with downthrow to the north, the mirror image of the post-Cretaceous Indian River normal fault in the south) . The Klondike River fault is closely analogous with the Goodpaster Fault which cuts across the thrust complex at Pogo.

Mineralisation

The Klondike is famous as an alluvial field having produced in excess of 13 M oz gold. Although a large number of primary vein gold occurrences are known, all are sub-economic, and less than 1000 oz of gold from this source is recorded. This miss-match between primary and secondary sources is astonishing, and lead to the conclusion that major primary sources have yet to be discovered.

Known veins are all small, lensy and steep dipping. At least 50 such veins are known. In spite of exploration over a 100 year period, no significant tonnage of ore has been developed. The veins are described as having mesothermal character. It is certain that the known primary veins were that source of at least some of the alluvial gold won in adjacent creeks, but it takes some special pleading to argue that they were the source of all the placer material. An alternative style of mineralisation, based on a different structural model, may be present in the Klondike. The Pogo area offers such a structural model.

COMPARISON OF STRUCTURAL STYLES AT POGO, LONGLINE AND THE KLONDIKE

Host rocks at Pogo and Klondike are metamorphic schists of the Yukon-Tanana terrain. The style of D1 deformation at both camps appears to be identical.

Host rocks at Longline consist of felsic to intermediate plutonic rocks which are of Jurassic to Cretaceous age.

At Pogo and Longline, mineralisation occurs in flat-lying tensional fractures which are associated with, and formed at the same time as, thrusts and reverse faults.

Primary gold-quartz mineralisation at Pogo, Longline and Klondike is of mesothermal character and may have formed during the mid-Cretaceous in association with felsic intrusive activity.

Known primary mineralisation at Klondike occurs in lensy, steep-dip veins which may be associated with strike-slip faulting. Flat-lying veins such as are seen at Pogo and Longline are not known. However, arrays of shallow thrusts, remarkably similar to the thrusts associated with flat lodes at Pogo, are present in the Klondike. There is therefore good evidence to suppose that flat veins may be present also in the Klondike.

Flat veins are more likely to be non-outcropping than steep-dip veins. If such veins are present in the Klondike, they could easily have been missed by exploration to date. On the other hand, any such veins that were intersected by the downward degradation of previous land surface, could have had a major input to the voluminous placer gold which accumulated as lags in the present drainage.

Roger Marjoribanks
Sydney, 20/04/00

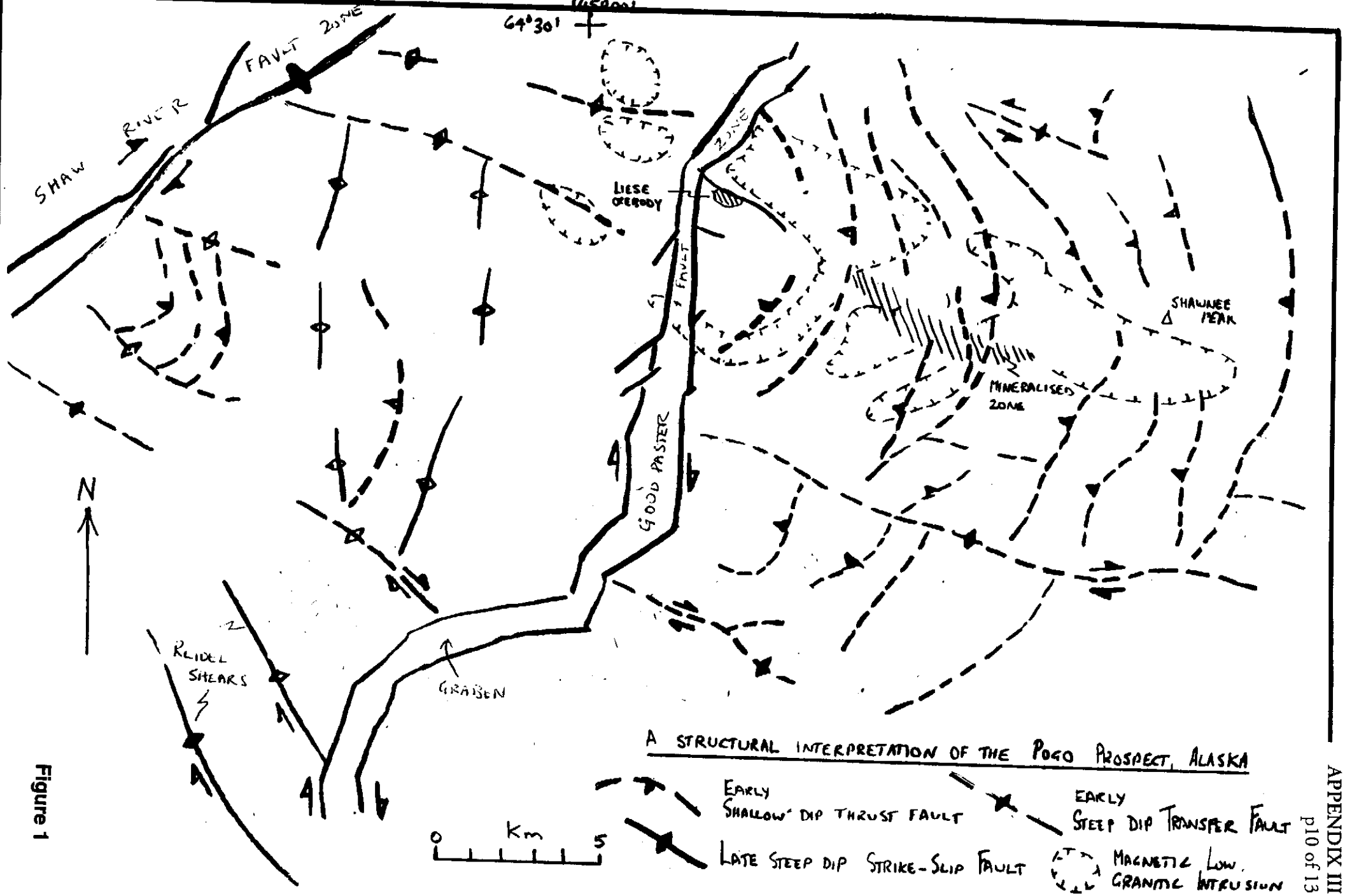


Figure 1

R.W. MARJORIBANKS 04/00

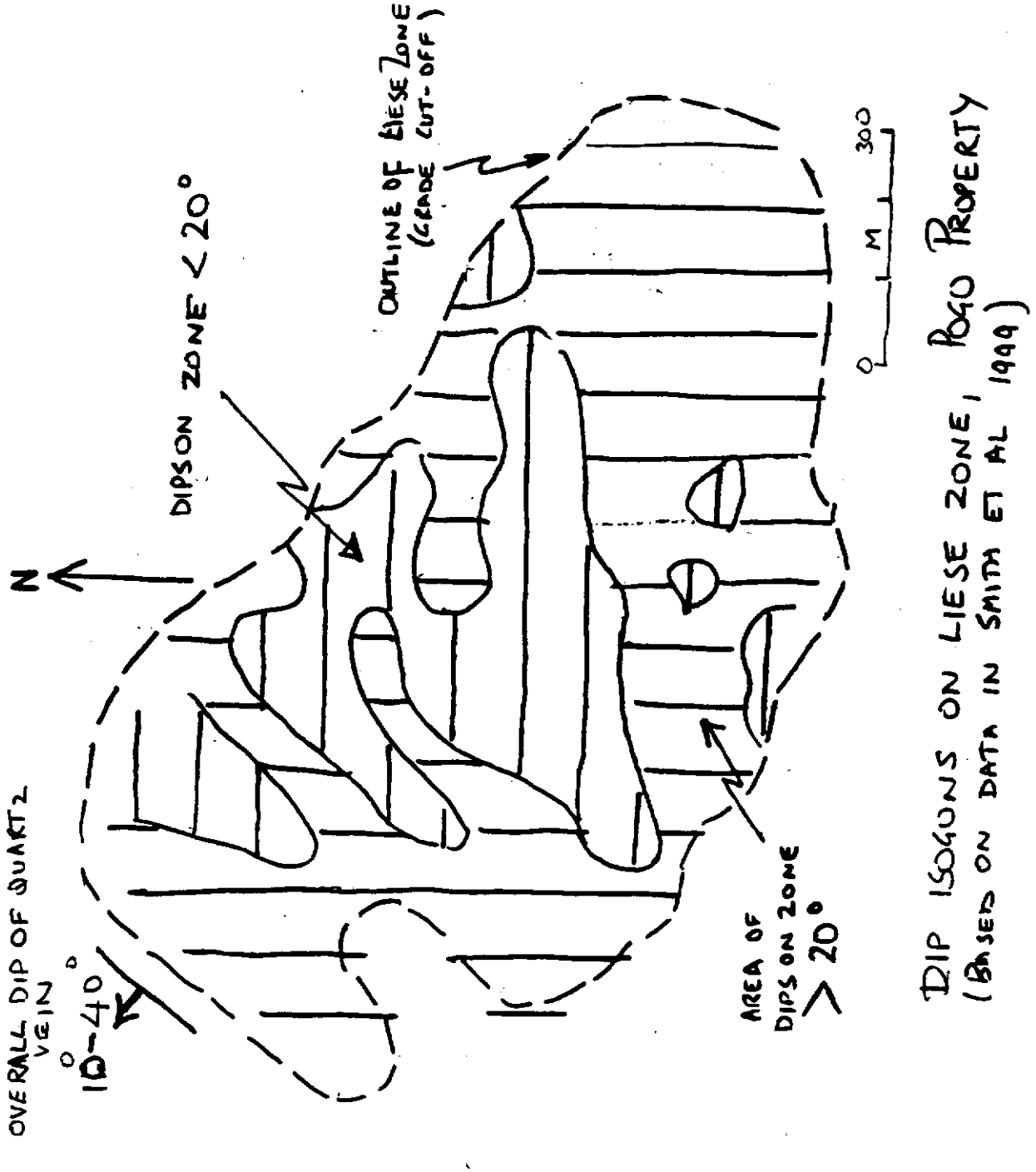
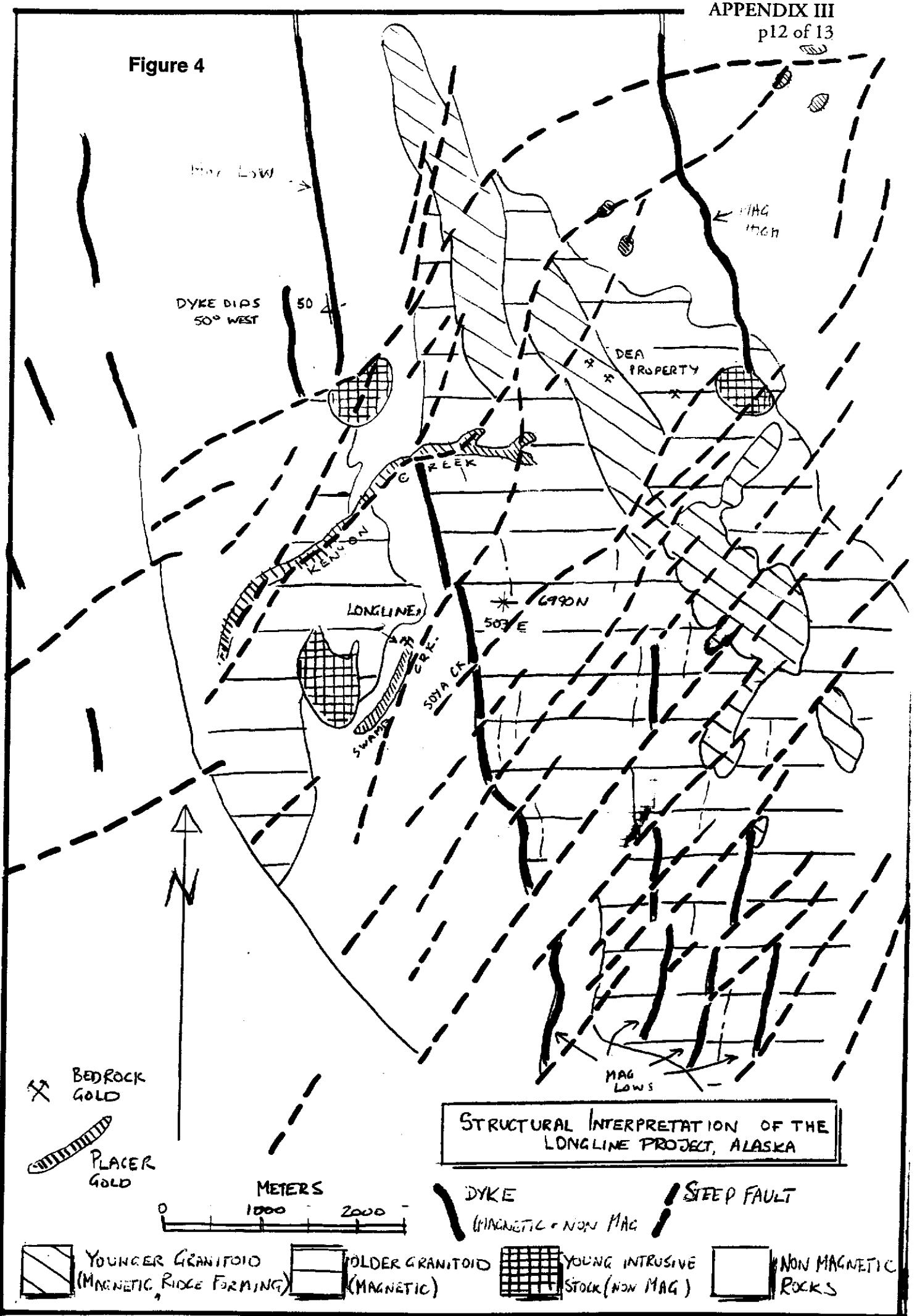

N
DIPSON ZONE < 20°
OUTLINE OF LIESE ZONE (GRADE CUT-OFF)
OVERALL DIP OF QUARTZ VEIN
10-40°
AREA OF DIPS ON ZONE > 20°
0
M
300
DIP ISOGONS ON LIESE ZONE, ROGO PROPERTY
(BASED ON DATA IN SMITH ET AL 1999)

Figure 2

Figure 4

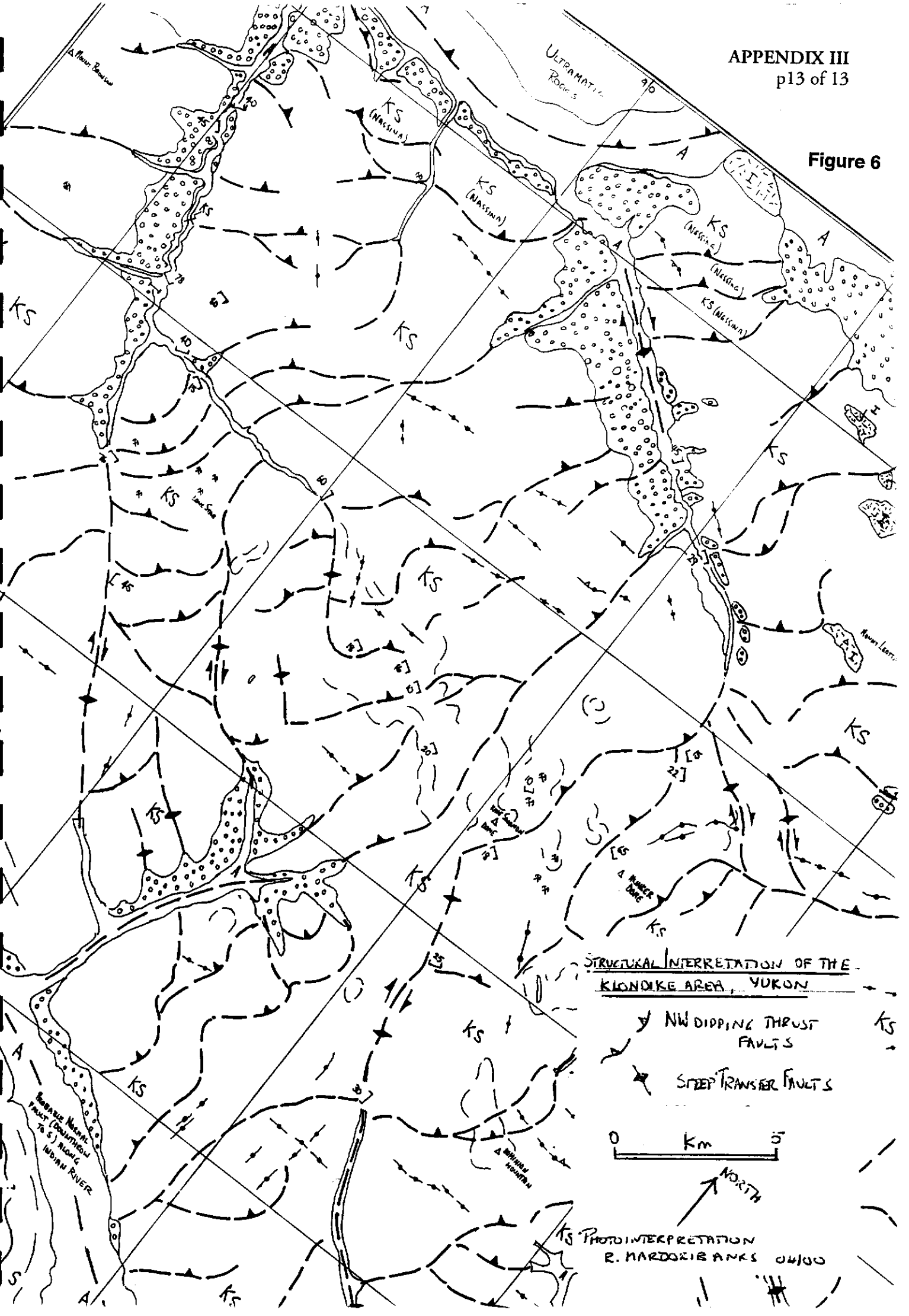


STRUCTURAL INTERPRETATION OF THE LONGLINE PROJECT, ALASKA

R.W. MARJORIBANKS 04/00

(SCALE 1:50,000 APPROX)

Figure 6


ULTRAMAFIC ROCKS
KS (NASSINA)
KS
A
STRUCTURAL INTERPRETATION OF THE KLONDIKE AREA, YUKON
NW DIPPING THRUST FAULTS
STEEP TRANSFER FAULTS
0 Km 5
NORTH
PHOTOINTERPRETATION
R. MACDONALD BANKS 04/00

PHOTOINTERPRETED GEOLOGY OF THE KLONDIKE AREA YUKON TERRITORY, CANADA

A	RECENT ALLUVIUM
Gr	GRAVELS ON RIVER TERRACES
S	CLASTIC SEDIMENTS: WELL BEDDED
M	MAFIC VOLCANIC FLOWS OR SILLS — UNMETAMORPHOSED
S	CLASTIC SEDIMENTS: MASSIVE
KS	KLONDIKE SCHIST (INCLUDES NASSINA FORMATION)
I	INTRUSIVE STOCKS — POST METAMORPHIC
Gt	GRANITOID ROCKS (NE OF TINTINA FAULT)

DYKE OR VEIN-UNDIFFERENTIATED f: FELSIC m: MAFIC
LITHOLOGICAL CONTACT
AIR PHOTO TREND LINE (IN KS LITHOLOGY DOMINANTLY OF S_1)
CLOSE SPACED JOINTS OR FRACTURES
FAULT — SHALLOW (<45°) DIPPING. — THRUSTS
FAULT — VERTICAL TO STEEP-DIPPING — (DOMINANTLY STRIKE-SLIP)
STRIKE & DIP OF S_1 TECTONIC FOLIATION (FIELD MEASUREMENT)
FLAT LYING BEDDING (AIR PHOTO INTERPRETATION)
SHALLOW DIP (< 30°) BEDDING (AIR PHOTO INTERP.)

SCALE 1:100,000 | ROGER MARJORIBANKS for: KLONDIKE SOURCE LTD.

0 5 10 KILOMETERS

TN MN

ULTRAMAFIC/MAFIC ROCKS OF MOOSEHIDE GROUP

ULTRAMATIC ROCKS

TINTINA FAULT ZONE

PROBABLE NORMAL FAULT (DOWNTHROW TO S) ALONG INDIAN RIVER

NORMAL FAULT DOWNTHROW TO WEST

Mount Brownson

Mount Leotta

King Solomon Dome

Hunker Dome

Dominion Mountain

Eureka Dome

Haystack Mountain

Ruby Mountain

Lone Star

094 I 9

FIGURE 1

R.M. Aug 5, 1999

0084 1:100,000

Klondike #4086

1999 Aug

Field Exploration

Geology

R Marjoribanks original: Fig 2: Photointerpretation of Klondike area

GOLD OCCURRENCES IN THE KLONDIKE AREA YUKON TERRITORY, CANADA

084119

- AREAS OF FORMER & CURRENT RECENT ALLUVIUM & AND WHITE CHANNEL GRAVEL RIVER TERRACE PLACER WORKINGS
- HARD ROCK GOLD MINE OR PROSPECT (NO DATA AVAILABLE)
- HARD ROCK GOLD MINE OR PROSPECT (WITH SYMBOLIC REPRESENTATION OF VEIN ORIENTATION)
- COLLUVIAL PLACER MINING OPERATION
- P.A. POSITION APPROXIMATE
- WATERSHED

SCALE 1: 100 000

0 5 10 KILOMETERS

ROGER MARJORIBANKS AUGUST 1999 for KLONDIKE SOURCE LTD.

FIGURE 2

R.M. AUG 5, 1999

APPENDIX IV

CHEMEX LABORATORIES: ANALYTICAL SHEETS AND SAMPLE LOCATIONS

Chemex Laboratories: Analytical Sheets and Sample Locations

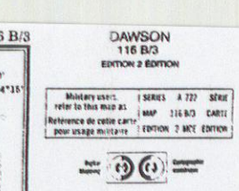
LOCATION OF ORIENTATION GEOCHEMISTRY

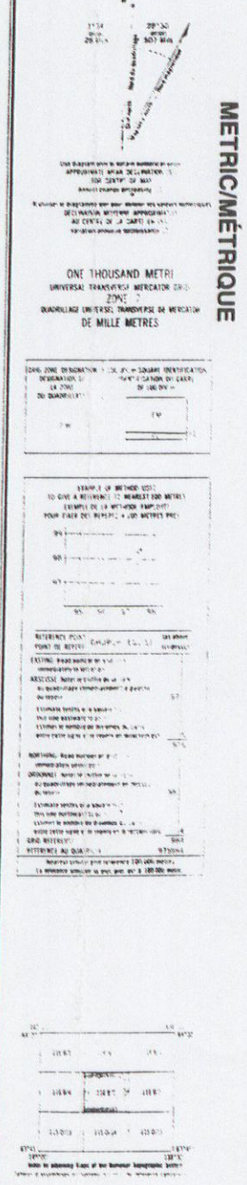
Sheet 116 -B/3 (Dawson)

LEGEND

- **27/9** Rock grab sample locality and reference number





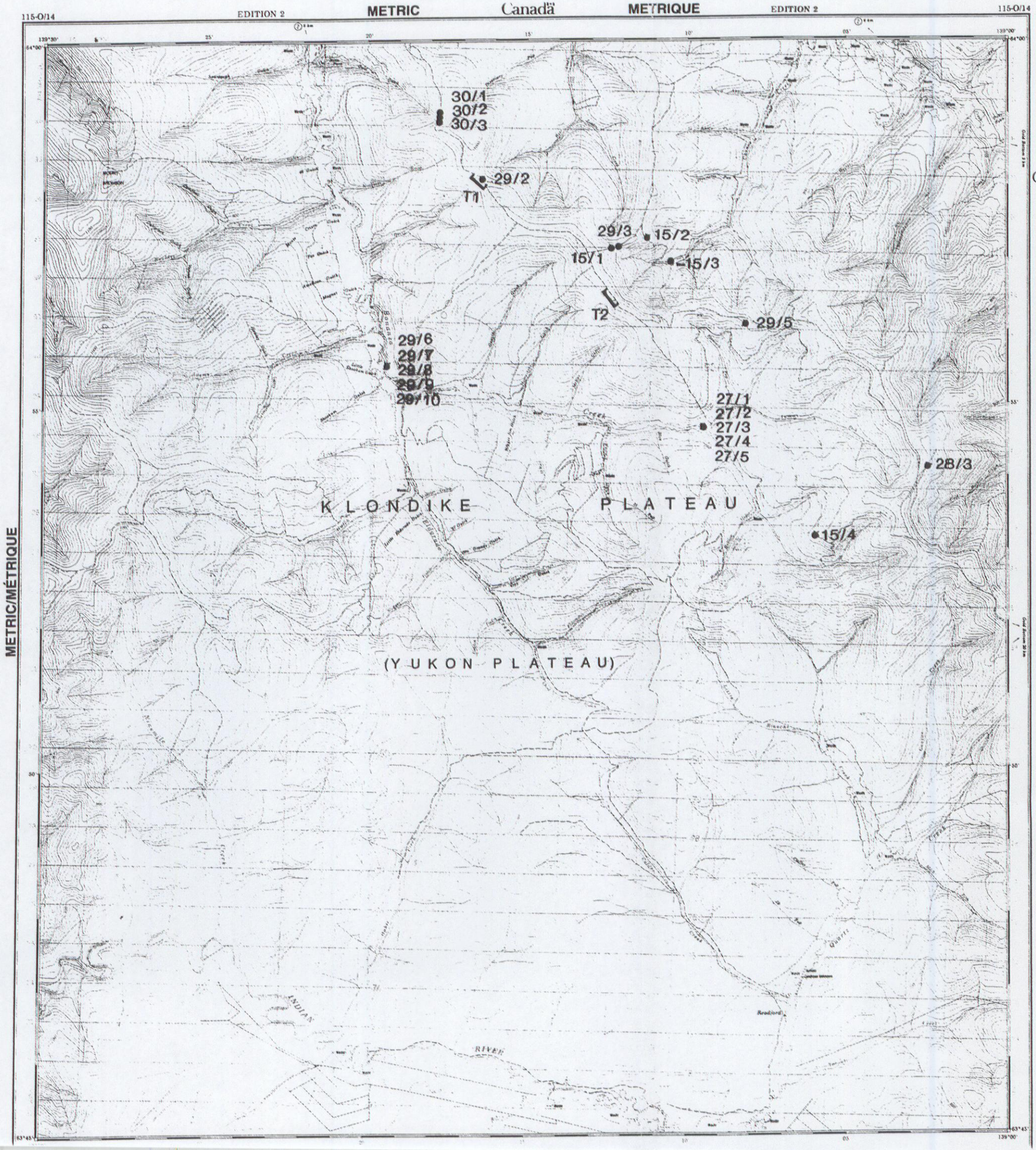


METRIC/MÉTRIQUE

Chemex Laboratories: Analytical Sheets and Sample Locations

LOCATION OF ORIENTATION GEOCHEMISTRY

Sheet 115-O-14 (Grand Forks)



LEGEND

- **15/1** Rock grab sample locality and reference number
- **T1, T2** Soil traverse (T) Locations

Chemex Laboratories: Analytical Sheets and Sample Locations

LOCATION OF ORIENTATION GEOCHEMISTRY

Sheet 115-O-15 (Flat Creek)

LEGEND

• **15/5** Rock grab sample locality and reference number



KLONDIKE SOURCE LIMITED **ROCK GEOCHEMISTRY - SAMPLE REGISTER 1999**

Number	Location	East	North	Sampled by	Date	Description	Au ppb	Au g/t
15/1	Last Chance/Bear Ck ridge	?587 800 RM	7093 000	RGA/RJM	15-Jul-99	?calc sil schist; foliated, ?Mn stained, ?carbonate pitting	535	-----
15/2	Last Chance/Bear Ck ridge	588 800 RM	7093 300	RGA/RJM	15-Jul-99	qtz-musc-py schist; ?metam qtz vein (5-6 cm) limonitic vugs	<5	-----
15/3	Upper Last Chance Ck	589 400	7092 700	RGA/RJM	15-Jul-99	carbonaceous qtz schist; dissem py, strongly cleaved.	<5	-----
15/4	Site "L"Upper Bonanza-K Solomon rd	593 400	7085 800	RGA/RJM	15-Jul-99	qtz-musc-py schist; gossanous, abundant py (as limonite).	<5	-----
15/5	Site "Q" Qtz Ck rd junct	598 600	7083 200	RGA/RJM	15-Jul-99	qtz-musc-chl-py schist; abundant limonite after dissem py and foliation py.	<5	-----
15/6	Site "R" between Qtz Crk junct & K Sol Dome	599 800	7083 700	RGA/RJM	15-Jul-99	qtz-chl -?siderite schist; abundant limonite after ?siderite	<5	-----
20/1	Mitchell Vein F/W (0.0 - 0.75m)	600 800	7086 100	RGA/RJM	20-Jul-99	biotite-py schist	390	-----
20/2	Mitchell Vein F/W (0.75 - 1.5 m)	600 800	7086 100	RGA/RJM	20-Jul-99	biotite-py schist	1655	-----
20/3	Mitchell Vein H/W (0.0 - 0.75m)	600 800	7086 100	RGA/RJM	20-Jul-99	biotite-py schist	815	-----
20/4	Mitchell Vein H/W (0.75 - 1.5 m)	600 800	7086 100	RGA/RJM	20-Jul-99	biotite-py schist	45	-----
20/5	Mitchell Vein H/W (50m E of M Vein)	600 800	7086 100	RGA/RJM	20-Jul-99	chl-qtz-py schist; dissem cubic py to 5mm. In contact with mass white xtalline qtz vein (4cm) Cubic py dissem in 2-3 cm black chl selvedge	10	-----
20/6	Mitchell Vein area; cntry rock within 10-15 m of vein.	600 800	7086 100	RGA/CMT/RJM		qtz-chl-py schist; dissem py (as limonite) to 5mm.	275	-----
20/7	Mitchell Vein; outer 10 cm of vein on H/W side.	600 800	7086 100	RGA/CMT/RJM	20-Jul-99	white xtalline qtz vein, slightly limonitic	5720	-----
20/8	Mitchell Vein; outer 10 cm of vein on F/W side.	600 800	7086 100	RGA/CMT/RJM	20-Jul-99	white xtalline qtz vein, slightly limonitic	0000	33.4
26/1	Site "4" Bear Ck	585 800	7100 400	RGA/CMT	26-Jul-99	qtz-musc schist; disc qtz-siderite veins (2-10 mm)	120	-----
26/2	Site "4" Bear Ck	585 800	7100 400	RGA/CMT	26-Jul-99	qtz-musc schist; disc qtz-siderite veins (2-5 mm)	245	-----

Number	Location	East	North	Sampled by	Date	Description	Au ppb	Au g/t
27/1	U Bonanza Ck road sectn E of quarry	590 400	7088 500	RGA/CMT	27-Jul-99	qtz-musc-py schist; minor cubic py (limonitic), disc qtz-py-?siderite veinlets	<5	-----
27/2	U Bonanza Ck road sectn E of quarry	590 400	7088 500	RGA/CMT	27-Jul-99	carbonaceous qtz schist; bxa txt, vuggy late qtz veins.	<5	-----
27/3	U Bonanza Ck road sectn E of quarry	590 400	7088 500	RGA/CMT	27-Jul-99	carbonaceous chl-qtz-py schist; nr massive, dissem py as limonite, limonitic fx, wk jarosite.	20	-----
27/4	U Bonanza Ck road sectn E of quarry	590 400	7088 500	RGA/CMT	27-Jul-99	carbonaceous qtz -py schist; sparse cg cubic py as limonite; disc qtz-py veinlets.	<5	-----
27/5	U Bonanza Ck rd	590 400	7088 500	RGA/CMT	27-Jul-99	qtz-musc-py schist; gossanous.	<5	-----
27/6	Quigley Ck-rock slide on track W side of ck.	583 650	7101 220	RGA/CMT	27-Jul-99	qtz-musc-py schist; sparse dissem py, 2 sets siderite-qtz veinlets (1-3mm).	10	-----
27/7	Quigley Ck-rock slide on track W side of ck.	583 650	7101 220	RGA/CMT	27-Jul-99	qtz-musc schist; disc 3cm qtz vein with central leached zone (?carbonate), v @ 80 to S1.	<5	-----
27/8	Quigley Ck-rock slide on track W side of ck.	583 650	7101 220	RGA/CMT	27-Jul-99	carbonaceous qtz schist; dissem & vein siderite.	<5	-----
27/9	Jackson Gulch/Calleson	580 500	7101 570	RGA/CMT	27-Jul-99	carbonaceous qtz schist; 5mm qtz-py vein.	10	-----
27/10	Jackson Gulch/Calleson	580 500	7101 570	RGA/CMT	27-Jul-99	carbonaceous qtz-py schist; tr dissem py, 1 mm qtz-py & qtz-siderite veinlets.	<5	-----
27/11	Jackson Gulch/Calleson	580 500	7101 570	RGA/CMT	27-Jul-99	qtz-musc schist (below carb q sch); disc qtz-py & qtz-siderite veinlets.	<5	-----
27/12	Jackson Gulch/Calleson	580 500	7101 570	RGA/CMT	27-Jul-99	qtz-musc schist; 2 cm disc qtz vein; V @ 80 to S1	<5	-----
27/13	Jackson Gulch/Calleson	580 500	7101 570	RGA/CMT	27-Jul-99	carbonaceous qtz-py schist; dissem py, fine s/w siderite-py veinlets.	<5	-----
27/14	Jackson Gulch/Calleson	580 500	7101 570	RGA/CMT	27-Jul-99	qtz-musc-chl schist; siderite & qtz-siderite veinlets to 2 mm.	<5	-----
27/15	Jackson Gulch/Calleson	580 500	7101 570	RGA/CMT	27-Jul-99	qtz-musc schist (massive); disc qtz-py veinlets 1 to 3 mm.	<5	-----
28/1	rdside c. 2 km E of K Sol Dome, loc of interpreted thrust.	601 770	7084 650	RGA/CMT	28-Jul-99	qtz-biot-py schist; patchy dissem cubic py (goethite), patchy qtz-py veinlets. Qtz-chl-biot schist on W side.	20	-----
28/2	0.5km SE Dominion rd junct. Adjacent U Hunker Ck thrust.	604 400	7085 800	RGA/CMT	28-Jul-99	qtz-musc-py schist; variable dissem py (limonite), crushed appearance, py in foliae, vuggy folial qtz.	<5	-----

Number	Location	East	North	Sampled by	Date	Description	Au ppb	Au g/t
28/3	Boxcar Cu/?Pb prospect	596 220	7087 570	RGA/CMT	28-Jul-99	gossan band in E part of 1m wide vert shear in qtz-chl-biot schist.	15	-----
29/2	Ridge Trail, across interp thrust.	584 500	7094 600	RGA/CMT	28-Jul-99	mass qtz schist; faint dissem/stain hematite, common ?py voids, rare disc qtz-?py veinlets.	<5	-----
29/3	Ridge Trail-Bear Ck track; costean.	587 990	7093 050	RGA/CMT	28-Jul-99	carbonaceous qtz-py schist; strongly sheared, common fx. Py as deformed folial vainlets.	<5	-----
29/4								
29/5		591 350	7091 200	RGA/CMT	28-Jul-99	qtz-chl schist; disc qtz veinlets (2 mm) with rare cubic py.	<5	-----
29/6	Bonanza Ck carb schist o/c	582 200	7089 800	RGA/CMT	29-Jul-99	chl-musc-py schist; flaggy, tr cubic dissem py, occ disc qtz-py veinlets.	<5	-----
29/7	Bonanza Ck carb schist o/c	582 200	7089 800	RGA/CMT	29-Jul-99	carbonaceous qtz-py schist; strongly foliated / cleaved.	<5	-----
29/8	Bonanza Ck carb schist o/c	582 200	7089 800	RGA/CMT	29-Jul-99	qtz-musc schist; some strong limonite weathering. well shd, some strongly muscovitic.	<5	-----
29/9	Bonanza Ck carb schist o/c	582 200	7089 800	RGA/CMT	29-Jul-99	carbonaceous qtz-py schist; common dissem py cubes, some fg intra-folial py, occ lens mass qtz.	<5	-----
29/10	Bonanza Ck carb schist o/c	582 200	7089 800	RGA/CMT	29-Jul-99	qtz-musc-py schist; c. 10% dissem py in foaliation limonitic, patches qtz-musc-chl schist.	<5	-----
30/1	Ridge Trail (sim 29/1-4), vic. interp thrust.	583 400	7096 350	RGA/CMT	30-Jul-99	qtz-chl schist; pervasively carbonated.	<5	-----
30/2	Ridge Trail (sim 29/1-4) Sample in low part of ridge.	583 400	7096 250	RGA/CMT	30-Jul-99	qtz-musc-chl schist; moberately carbonated, talcy	<5	-----
30/3	Ridge Trail (sim 29/1-4), vic. interp thrust.	583 400	7096 150	RGA/CMT	30-Jul-99	qtz schist; massive, ?silicified, faint pervasive dissem/stain hematite. Mostly small ang frags.	<5	-----

Number	Ag ppm	Al %	As ppm	B ppm	Ba ppm	Be ppm	Bi ppm	Ca %	Cd ppm	Co ppm	Cr ppm	Cu ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Mo ppm	Na %	Ni ppm	P ppm	Pb ppm	S %	Sb ppm
15/1	<0.2	0.25	48	<10	360	<0.5	<2	1.73	<0.5	<1	180	4	0.3	<10	<1	0.28	100	0.03	5970	1	<0.01	6	60	20	<0.01	4
15/2	0.4	0.24	6	<10	60	<0.5	<2	<0.01	<0.5	<1	119	11	0.85	<10	<1	0.08	10	0.16	40	6	<0.01	2	50	142	<0.01	6
15/3	0.2	0.48	164	<10	240	<0.5	<2	0.14	0.5	8	184	24	1.77	<10	<1	0.19	30	0.26	305	9	<0.01	40	620	20	0.01	<2
15/4	<0.2	0.58	6	<10	620	<0.5	<2	0.07	<0.5	2	94	9	1.36	<10	<1	0.13	10	0.31	130	1	0.01	3	210	8	0.01	<2
15/5	0.6	2.68	78	<10	170	<0.5	<2	0.08	<0.5	3	81	62	4.38	<10	<1	0.13	10	2.2	375	3	<0.01	10	670	22	0.06	2
15/6	0.2	2.34	<2	<10	160	<0.5	<2	0.09	1.5	27	81	82	5.84	<10	<1	0.11	<10	1.43	1900	1	0.01	19	480	10	0.01	2
20/1	0.6	2.5	140	<10	130	<0.5	<2	0.43	<0.5	18	53	62	5.44	<10	<1	0.5	<10	2.03	1080	1	<0.01	4	560	16	0.2	2
20/2	0.6	2.71	126	<10	110	<0.5	<2	0.35	<0.5	25	54	63	5.65	<10	<1	0.48	<10	2.37	1760	1	<0.01	19	410	<2	0.05	2
20/3	0.6	1.9	178	<10	130	<0.5	<2	0.39	<0.5	15	71	54	4.77	<10	<1	0.51	<10	1.57	975	1	<0.01	4	600	12	0.18	2
20/4	<0.2	2.6	20	<10	90	<0.5	<2	1.27	<0.5	17	35	46	5.27	<10	<1	0.43	<10	2.1	1125	1	0.01	1	750	2	0.17	2
20/5	1.4	2.2	48	<10	60	<0.5	<2	1.32	<0.5	13	117	84	3.36	<10	<1	0.13	<10	2.26	545	3	0.01	26	520	<2	0.16	<2
20/6	0.6	2.73	144	<10	100	<0.5	<2	0.82	0.5	17	42	94	5.67	<10	<1	0.21	<10	2.35	1225	1	<0.01	1	70	8	0.79	4
20/7	1.6	0.39	274	<10	80	<0.5	<2	0.04	<0.5	4	265	32	3.68	<10	<1	0.2	<10	0.11	105	4	0.01	4	30	8	0.19	<2
20/8	2.2	0.26	328	<10	50	<0.5	<2	0.02	<0.5	4	160	19	2.26	<10	<1	0.08	<10	0.12	125	2	<0.01	3	10	2	0.08	<2
26/1	<0.2	0.43	1030	<10	530	<0.5	<2	0.01	<0.5	1	150	5	0.83	<10	<1	0.35	10	0.01	30	<1	<0.01	4	90	12	0.01	<2
26/2	0.2	0.51	14	<10	60	<0.5	<2	2.58	<0.5	2	56	9	1.68	<10	<1	0.04	10	1.52	100	1	0.05	2	140	14	0.16	2

Number	Ag ppm	Al %	As ppm	B ppm	Ba ppm	Be ppm	Bi ppm	Ca %	Cd ppm	Co ppm	Cr ppm	Cu ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Mo ppm	Na %	Ni ppm	P ppm	Pb ppm	S %	Sb ppm
27/1	<0.2	0.39	46	<10	180	<0.5	<2	0.01	<0.5	<1	133	15	0.6	<10	<1	0.14	30	0.11	30	<1	0.05	5	20	20	<0.01	<2
27/2	0.8	0.54	100	<10	150	<0.5	<2	0.17	0.5	3	177	15	1.54	<10	<1	0.08	<10	0.1	60	35	<0.01	14	380	12	<0.01	<2
27/3	0.4	2.3	514	<10	170	<0.5	<2	0.35	1.5	5	66	28	4.09	<10	<1	0.15	10	1.04	325	2	0.03	16	930	<2	0.04	2
27/4	<0.2	1.18	46	<10	130	<0.5	<2	0.94	<0.5	5	97	11	2.04	<10	<1	0.15	10	0.66	320	1	0.03	11	410	38	0.01	<2
27/5	0.2	0.66	8	<10	240	<0.5	<2	0.01	<0.5	<1	141	12	2.56	<10	<1	0.17	20	0.11	40	1	0.03	4	440	10	0.03	<2
27/6	<0.2	0.6	374	<10	260	<0.5	<2	1.59	<0.5	1	66	5	1.62	<10	<1	0.24	30	0.24	360	<1	0.05	2	180	8	0.1	2
27/7	<0.2	0.07	6	<10	50	<0.5	<2	4.18	<0.5	1	169	1	0.31	<10	<1	0.03	<10	0.07	225	1	<0.01	3	10	18	<0.01	<2
27/8	0.6	0.97	6	<10	320	<0.5	<2	0.04	<0.5	3	123	32	2.42	<10	<1	0.15	10	0.77	215	<1	0.03	17	190	<2	0.07	<2
27/9	<0.2	0.15	12	<10	160	<0.5	<2	6.37	0.5	<1	114	2	2.17	<10	<1	0.09	10	3.19	1005	1	<0.01	3	30	42	0.33	<2
27/10	0.4	0.85	14	<10	190	<0.5	<2	2.16	1.5	7	183	46	2.2	<10	<1	0.2	<10	0.79	315	13	<0.01	52	620	16	0.82	<2
27/11	0.2	0.3	20	<10	430	<0.5	<2	0.55	<0.5	<1	109	7	0.67	<10	<1	0.2	10	0.28	85	1	0.01	4	10	20	0.19	<2
27/12	<0.2	0.35	8	<10	540	<0.5	<2	0.01	<0.5	<1	138	2	0.49	<10	<1	0.16	30	0.06	60	<1	0.03	3	30	12	<0.01	<2
27/13	0.4	0.45	18	<10	440	<0.5	<2	0.04	<0.5	1	151	14	0.91	<10	<1	0.2	30	0.09	20	1	0.01	9	30	22	0.05	<2
27/14	0.2	0.61	50	<10	270	<0.5	<2	1.3	<0.5	2	61	9	1.29	<10	<1	0.22	20	0.78	195	<1	0.01	7	230	10	0.08	<2
27/15	<0.2	0.34	20	<10	480	<0.5	<2	0.01	<0.5	<1	78	4	0.44	<10	<1	0.18	30	0.05	80	<1	0.03	3	20	28	<0.01	<2
28/1	<0.2	2.49	14	<10	30	<0.5	<2	2.29	<0.5	14	39	29	4.6	<10	<1	0.12	<10	1.64	905	1	0.02	6	580	<2	<0.01	<2
28/2	0.2	0.25	12	<10	1360	<0.5	<2	<0.01	<0.5	<1	159	9	3.28	<10	<1	0.17	10	0.04	20	1	<0.01	3	170	110	0.05	<2

Number	Ag ppm	Al %	As ppm	B ppm	Ba ppm	Be ppm	Bi ppm	Ca %	Cd ppm	Co ppm	Cr ppm	Cu ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Mo ppm	Na %	Ni ppm	P ppm	Pb ppm	S %	Sb ppm	ppm
28/3	100.0	0.38	<2	<10	40	<0.5	Intf*	0.01	1	<1	25	0000	15.00	<10	<1	0.08	20	0.01	15	9	<0.01	<1	Intf*	0000	1.88	22
29/2	1	0.26	12	<10	100	<0.5	<2	<0.01	<0.5	1	106	41	0.94	<10	<1	0.19	10	0.01	50	<1	0.03	2	40	352	<0.01	<2
29/3	8.4	3.98	604	<10	110	0.5	<2	0.06	1.5	11	94	451	6.29	<10	<1	0.01	<10	2.49	180	27	<0.01	95	1320	1650	0.03	4
29/4																										
29/5	<0.2	0.81	18	<10	160	<0.5	<2	0.12	<0.5	5	216	10	1.62	<10	<1	0.14	<10	0.38	405	1	0.03	7	310	36	<0.01	<2
29/6	0.8	1.8	6	<10	190	<0.5	<2	0.65	<0.5	7	74	21	2.68	<10	<1	0.12	<10	1.25	330	1	0.03	9	850	138	0.04	2
29/7	1.4	1.12	14	<10	320	<0.5	<2	0.28	0.5	6	170	31	1.9	<10	<1	0.16	30	0.92	155	17	0.01	30	580	40	0.2	<2
29/8	0.8	2.08	6	<10	180	<0.5	<2	1.07	0.5	17	72	41	3.48	<10	<1	0.14	30	1.63	605	4	<0.01	24	830	28	0.01	<2
29/9	0.8	1.32	22	<10	230	<0.5	<2	0.23	1	7	162	34	1.76	<10	<1	0.11	20	1.3	170	15	<0.01	37	910	20	0.08	<2
29/10	0.6	1.5	22	<10	170	<0.5	<2	0.19	<0.5	5	79	12	2.57	<10	<1	0.11	20	1.23	395	5	<0.01	7	640	14	0.03	<2
30/1	<0.2	0.7	<2	<10	180	<0.5	<2	<0.01	<0.5	1	125	3	0.62	<10	<1	0.17	<10	0.5	75	<1	0.01	3	20	8	<0.01	<2
30/2	<0.2	0.96	<2	<10	280	<0.5	<2	0.03	<0.5	<1	98	4	0.56	<10	<1	0.14	10	0.93	60	<1	0.01	1	20	18	<0.01	<2
30/3	<0.2	0.27	4	<10	140	<0.5	<2	0.03	<0.5	<1	113	3	0.51	<10	<1	0.19	<10	0.01	30	1	0.02	3	30	24	<0.01	<2

Number	Sc ppm	Sr ppm	Ti %	Tl ppm	U ppm	V ppm	W ppm	Zn ppm
15/1	<1	49	<0.01	<10	<10	1	<10	8
15/2	<1	1	<0.01	<10	<10	<1	<10	16
15/3	<1	23	<0.01	<10	<10	9	<10	96
15/4	1	16	0.03	<10	<10	1	<10	42
15/5	2	15	<0.01	<10	<10	30	<10	134
15/6	6	6	<0.01	<10	<10	44	<10	214
20/1	6	17	0.11	<10	<10	47	<10	96
20/2	8	18	0.07	<10	<10	61	<10	92
20/3	4	22	0.1	<10	<10	27	<10	52
20/4	8	47	0.11	<10	<10	68	<10	82
20/5	4	78	<0.01	<10	<10	35	<10	70
20/6	7	42	0.09	<10	<10	65	<10	112
20/7	1	15	0.01	<10	<10	16	<10	14
20/8	1	8	<0.01	<10	<10	7	<10	8
26/1	1	10	<0.01	<10	<10	1	<10	26
26/2	5	152	<0.01	<10	<10	2	<10	44

Number	Sc ppm	Sr ppm	Ti %	Tl ppm	U ppm	V ppm	W ppm	Zn ppm
27/1	<1	4	<0.01	<10	<10	1	<10	12
27/2	2	20	<0.01	<10	<10	44	<10	90
27/3	6	59	<0.01	<10	10	72	<10	186
27/4	2	54	<0.01	<10	<10	23	<10	98
27/5	2	10	<0.01	<10	<10	3	<10	16
27/6	1	245	<0.01	<10	<10	3	<10	26
27/7	<1	259	<0.01	<10	<10	<1	<10	4
27/8	1	28	<0.01	<10	<10	21	<10	52
27/9	1	1965	<0.01	<10	<10	<1	<10	70
27/10	1	180	<0.01	<10	<10	12	<10	144
27/11	<1	87	<0.01	<10	<10	<1	<10	18
27/12	<1	7	<0.01	<10	<10	<1	<10	14
27/13	<1	9	<0.01	<10	<10	4	<10	30
27/14	2	230	<0.01	<10	<10	6	<10	28
27/15	<1	8	<0.01	<10	<10	<1	<10	12
28/1	9	82	<0.01	<10	<10	73	<10	84
28/2	<1	20	<0.01	<10	<10	<1	<10	14

Number	Sc ppm	Sr ppm	Ti %	Tl ppm	U ppm	V ppm	W ppm	Zn ppm
28/3	1	30	0.03	<10	<10	11	<10	982
29/2	2	4	<0.01	<10	<10	2	<10	12
29/3	3	8	<0.01	<10	10	42	<10	206
29/4								
29/5	<1	11	0.01	<10	<10	5	<10	34
29/6	2	27	0.06	<10	<10	17	<10	74
29/7	1	35	<0.01	<10	<10	25	<10	74
29/8	2	71	<0.01	<10	<10	14	<10	106
29/9	1	17	<0.01	<10	<10	34	<10	116
29/10	1	39	<0.01	<10	<10	5	<10	72
30/1	1	3	<0.01	<10	<10	<1	<10	42
30/2	<1	10	<0.01	<10	<10	<1	<10	34
30/3	1	9	<0.01	<10	<10	1	<10	16

KLONDIKE SOURCE LIMITED **SOIL GEOCHEMISTRY - SAMPLE REGISTER 1999**

GRAND FORKS 1:50,000 115-0/14

RIDGE TRAIL - TRAVERSE 1

Sampled 29 July 1999 (RGA, CMT)

Sample interval approx. 50m. Analyses: Chemex, Vancouver.

Codes: preparation 210, gold 100, other elements G132.

SAMPLE No	LOCATION	DESCRIPTION		SAMPLE ID	10+80# Au ppb
11	E584 320 N7 094 710 (NW end)	Moss 10cm. Brown soil & rk frags.	pH dry	011-80	<5
12		Mosss 15cm. Yellow brown soil & rk frags.	pH dry 7	012-80	<5
13			pH dry 7.5	013-80	<5
14	E584 470 N7 094 680	Moss 20cm. Orange brown soil & rk frags.	pH dry 7.0-7.5	014-80	<5
15		Moss 25cm. Yellow grey soil.	pH dı	015-80	<5
16		Moss 15cm. Orange brown soil & rk frags.	pH	016-80	<5
17	E584 560 N7 094 610 (SE end)	Moss 25cm. Yellow brown soil &clay (few rk frags).	pH 7.0	017-80	<5

RIDGE TRAIL - TRAVERSE 2

Sampled 30 July 1999 (RGA, CMT)

Sample interval approx. 50m. Analyses: Chemex, Vancouver.

Codes: preparation 210, gold 100, other elements G132.

SAMPLE No	LOCATION	DESCRIPTION	SAMPLE ID	10+80# Au ppb
10	E587 730 N7 091 980 (NW end)	Moss 15 cm. Rocky greyish 10cm. Yellow grey stony clay.	010-80	<5
9		Moss 20cm. Rocky yellow brown clay.	009-80	<5
8		Moss 25cm. Grey, rocky 20cm. Grey yellow sandy clay & rock.	008-80	<5
7		Moss 25cm. Grey sandy clay, thin. Yellow brown rocky clay.	007-80	<5
6		Clayey moss 25cm. Grey stony over yellow brown rocky clay.	006-80	<5
5		Moss 15cm, Grey, stony 10cm. Yellow brown rocky clay	005-80	<5
4		Moss 10cm. Rocky with grey clay over yellow brown clay.	004-80	<5
3	E587 920 N7 091 740	Moss 10 cm. Yellow-brown very rocky soil.	003-80	<5
2		Moss 10cm. Yellow brown v shallow soil, much rock.	002-80	<5
1	(SE end)	Moss 15 cm. Yellow brown-grey sandy clay& rk frags	001-80	<5

SAMPLE No	-80# As ppm	-80# Ba ppm	-80# Mn ppm	-80# Ag ppm	-80# Hg ppm	-80# Sb ppm	-80# Be ppm	-80# Bi ppm	-80# Cu ppm	-80# Pb ppm	-80# Zn ppm	-80# Ga ppm	-80# Cd ppm	-80# Cr ppm
11	10.6	160	175	0.12	0.01	0.5	0.3	0.18	10.8	22	32	4.8	0.1	23
12	12.4	150	105	<0.02	0.03	0.5	0.25	0.2	9.2	16	30	4.8	0.08	23
13	9.4	340	140	<0.02	0.03	0.5	0.55	0.22	11	12	40	5.6	0.02	31
14	10	220	155	<0.02	0.03	0.6	0.65	0.24	13	14	36	6.5	0.14	28
15	4.2	200	135	0.02	0.04	0.4	0.35	0.19	5.6	36	22	3.6	0.06	15
16	7.2	140	105	<0.02	0.03	0.3	0.25	0.15	6.2	22	18	3.6	0.08	10
17	9.4	210	140	<0.02	0.01	0.5	0.55	0.22	11	16	40	4.7	0.08	25

SAMPLE No	-80# As ppm	-80# Ba ppm	-80# Mn ppm	-80# Ag ppm	-80# Hg ppm	-80# Sb ppm	-80# Be ppm	-80# Bi ppm	-80# Cu ppm	-80# Pb ppm	-80# Zn ppm	-80# Ga ppm	-80# Cd ppm	-80# Cr ppm
10	136.5	170	70	<0.02	0.01	0.5	0.25	0.26	5	26	24	2.6	0.04	8
9	247	130	85	0.02	0.01	0.8	0.35	0.19	6.4	16	32	3.8	0.16	8
8	17.6	130	35	<0.02	0.01	0.1	0.2	0.11	1.2	10	14	2	<0.02	3
7	12.4	70	165	<0.02	0.05	0.5	0.3	0.22	9	14	36	6.1	0.1	19
6	4.8	80	205	0.02	0.02	0.3	0.2	0.14	5	2	30	3.8	0.06	7
5	127	190	155	0.1	0.02	0.8	0.35	0.15	6.8	12	38	4	0.12	12
4	30.6	120	120	0.02	0.03	0.3	0.25	0.16	3.8	12	30	5.1	0.1	10
3	13	210	555	0.2	0.01	0.5	0.35	0.27	6.8	18	48	7.2	0.18	20
2	22	100	140	<0.02	0.01	0.4	0.3	0.16	5	14	28	5	0.12	9
1	42	120	95	<0.02	0.01	0.4	0.25	0.12	5.2	14	34	3	0.08	9

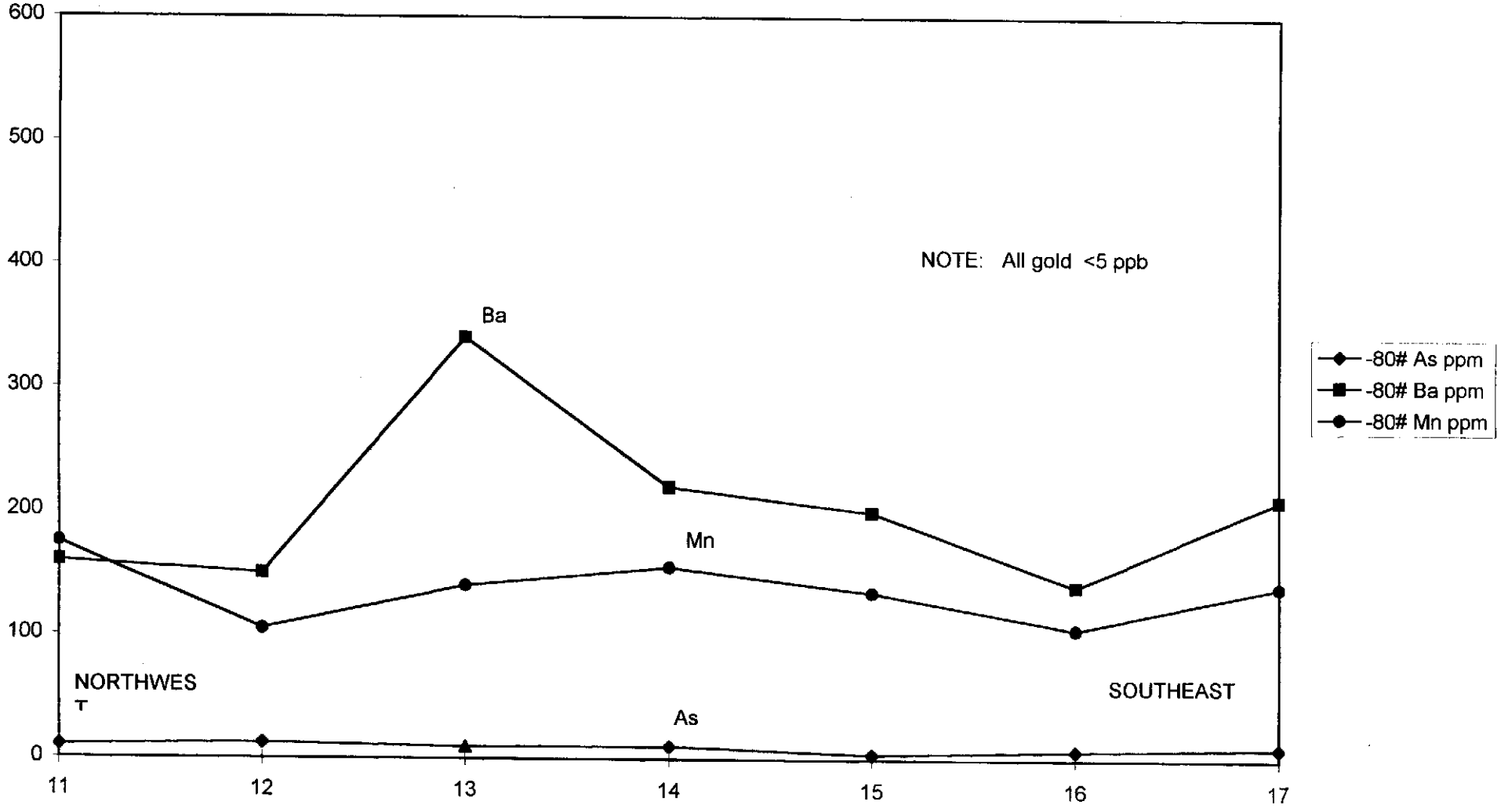
SAMPLE No	-80# Co ppm	-80# La ppm	-80# Mg %	-80# Sc ppm	-80# Tl ppm	-80# Ti %	-80# W ppm	-80# U ppm	-80# V ppm	-80# Al %	-80# B ppm	-80# Ca %	-80# S %	-80# Te ppm
11	4.6	10	0.32	1	0.1	0.05	0.2	0.6	44	1.63	<10	0.04	<0.01	<0.05
12	4.4	10	0.29	2	0.08	0.05	0.2	0.65	45	1.63	<10	0.04	<0.01	<0.05
13	5.6	10	0.4	3	0.12	0.05	0.2	0.95	52	2.23	<10	0.06	<0.01	<0.05
14	5.4	10	0.32	3	0.1	0.05	0.3	0.8	58	1.89	<10	0.06	<0.01	<0.05
15	2.6	10	0.18	1	0.08	0.03	0.15	0.55	31	1.12	<10	0.09	<0.01	<0.05
16	2.4	<10	0.11	1	0.1	0.03	0.15	1.25	25	1.2	<10	0.02	<0.01	<0.05
17	5.2	10	0.37	3	0.12	0.04	0.2	0.8	40	1.91	<10	0.06	<0.01	<0.05

SAMPLE No	-80# Co ppm	-80# La ppm	-80# Mg %	-80# Sc ppm	-80# Tl ppm	-80# Ti %	-80# W ppm	-80# U ppm	-80# V ppm	-80# Al %	-80# B ppm	-80# Ca %	-80# S %	-80# Te ppm
10	2.2	30	0.26	<1	0.08	0.01	0.1	0.65	18	1.03	<10	0.03	<0.01	<0.05
9	1.8	40	0.17	1	0.12	0.01	0.15	1.1	19	1.23	<10	0.01	<0.01	<0.05
8	0.8	50	0.25	<1	0.08	<0.01	0.05	0.8	6	0.78	<10	0.02	<0.01	<0.05
7	3.6	10	0.3	2	0.12	0.06	0.25	0.5	50	1.37	<10	0.03	<0.01	<0.05
6	2.8	<10	0.29	1	0.08	0.04	0.1	0.55	18	0.92	<10	0.02	<0.01	<0.05
5	2.8	20	0.28	1	0.1	0.03	0.15	0.7	28	1.18	<10	0.03	<0.01	<0.05
4	2	10	0.21	1	0.08	0.03	0.15	0.6	29	1.2	<10	0.01	<0.01	<0.05
3	20	10	0.25	1	0.14	0.05	0.3	0.4	65	1.58	<10	0.04	<0.01	0.05
2	2	10	0.13	<1	0.08	0.04	0.2	0.65	40	0.89	<10	0.03	<0.01	<0.05
1	2.6	10	0.26	1	0.1	0.01	0.1	0.75	17	0.99	<10	0.02	<0.01	<0.05

SAMPLE No	-80# Na %	-80# Sr ppm	-80# Se ppm	-80# Ge ppm	-80# Fe %	-80# Mo ppm	-80# Ni ppm	-80# P ppm	-80# K %
11	0.01	8	<0.5	<0.1	2.24	1	11	120	0.05
12	0.01	7	<0.5	<0.1	2.35	0.8	11	140	0.05
13	0.01	10	<0.5	<0.1	2.81	0.8	14	140	0.03
14	0.01	9	<0.5	<0.1	3.13	1.2	12	270	0.04
15	0.01	9	<0.5	<0.1	1.63	0.6	6	130	0.05
16	<0.01	6	<0.5	<0.1	2.21	0.6	6	240	0.09
17	0.01	9	<0.5	<0.1	2.67	0.8	12	160	0.07

SAMPLE No	-80# Na %	-80# Sr ppm	-80# Se ppm	-80# Ge ppm	-80# Fe %	-80# Mo ppm	-80# Ni ppm	-80# P ppm	-80# K %
10	<0.01	7	<0.5	<0.1	1.37	0.6	6	110	0.08
9	<0.01	6	<0.5	<0.1	2	0.8	5	270	0.08
8	<0.01	8	<0.5	<0.1	0.74	0.2	2	130	0.11
7	<0.01	6	<0.5	<0.1	3.32	1	8	300	0.06
6	<0.01	7	<0.5	<0.1	1.33	0.6	3	140	0.05
5	<0.01	6	<0.5	<0.1	2.06	1	7	200	0.06
4	0.01	5	<0.5	<0.1	2.16	0.6	5	280	0.05
3	0.01	7	<0.5	<0.1	2.85	1.4	8	340	0.04
2	<0.01	6	<0.5	<0.1	1.92	0.8	5	350	0.05
1	0.01	5	<0.5	<0.1	1.63	0.6	5	160	0.06

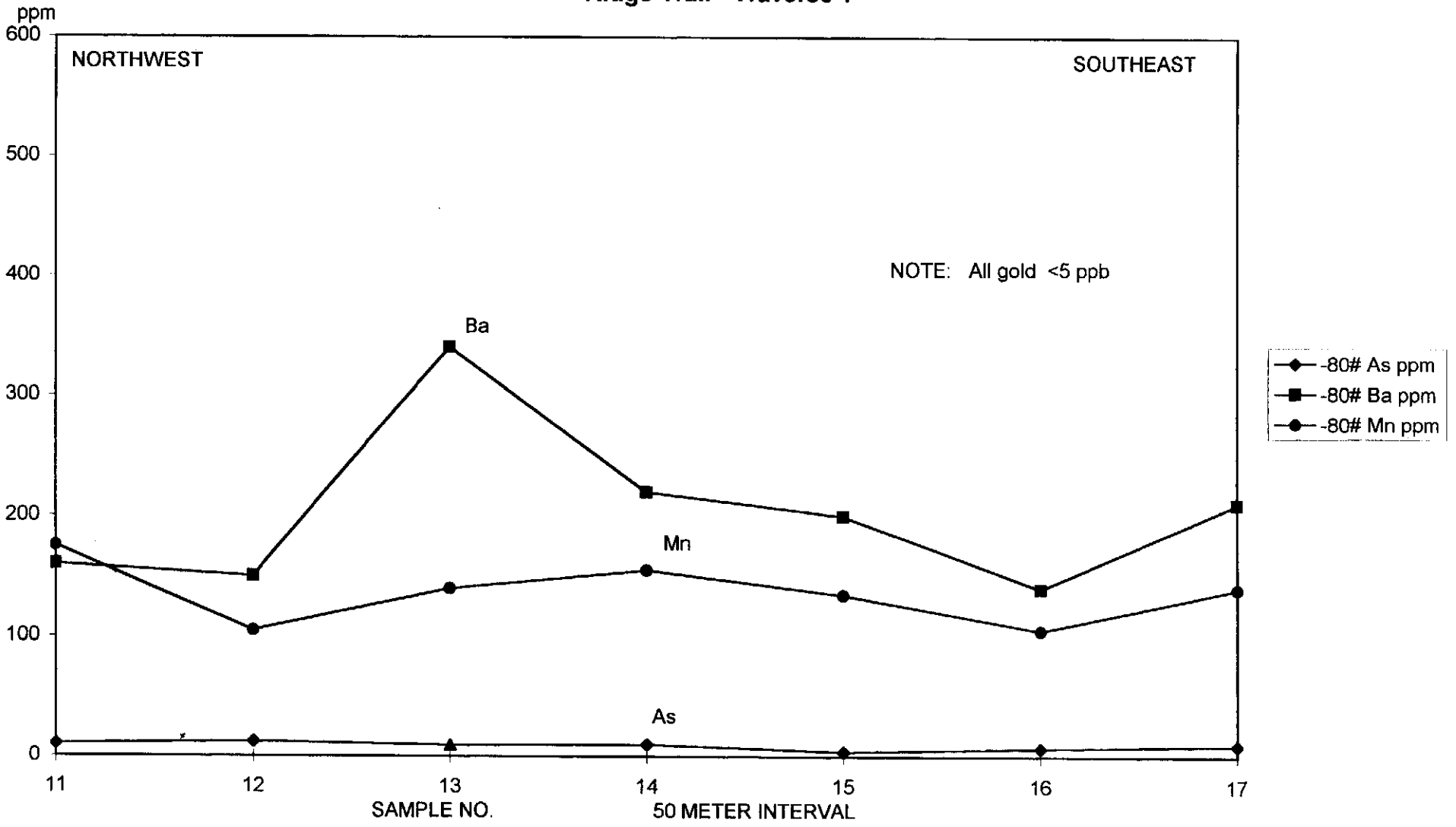
KLONDIKE SOILS -10/+80
Ridge Trail - Site 1



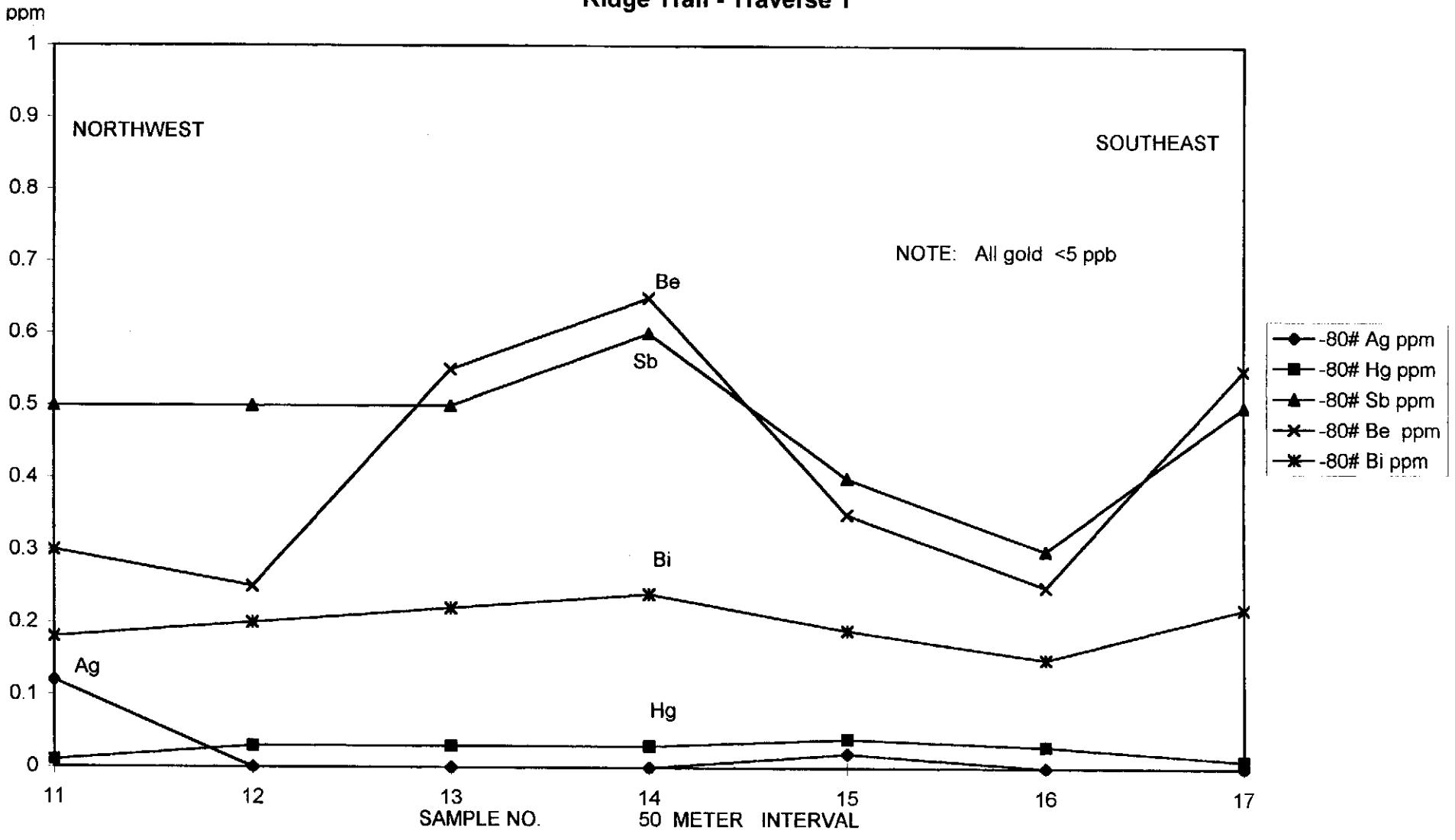
APPENDIX V

SOIL GEOCHEMICAL PROFILES

KLONDIKE SOILS -10/+80
Ridge Trail - Traverse 1

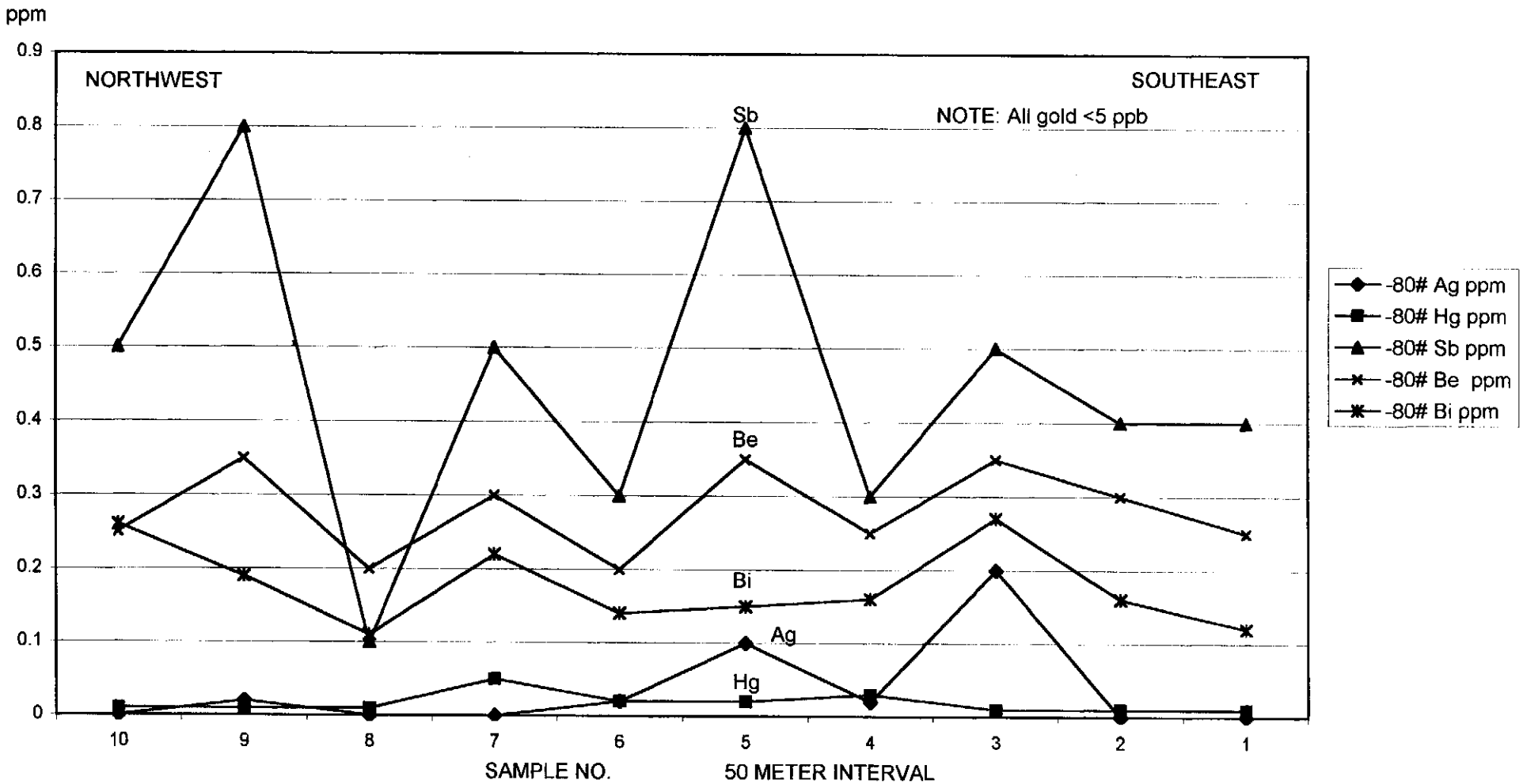


KLONDIKE SOILS -10/+80
Ridge Trail - Traverse 1

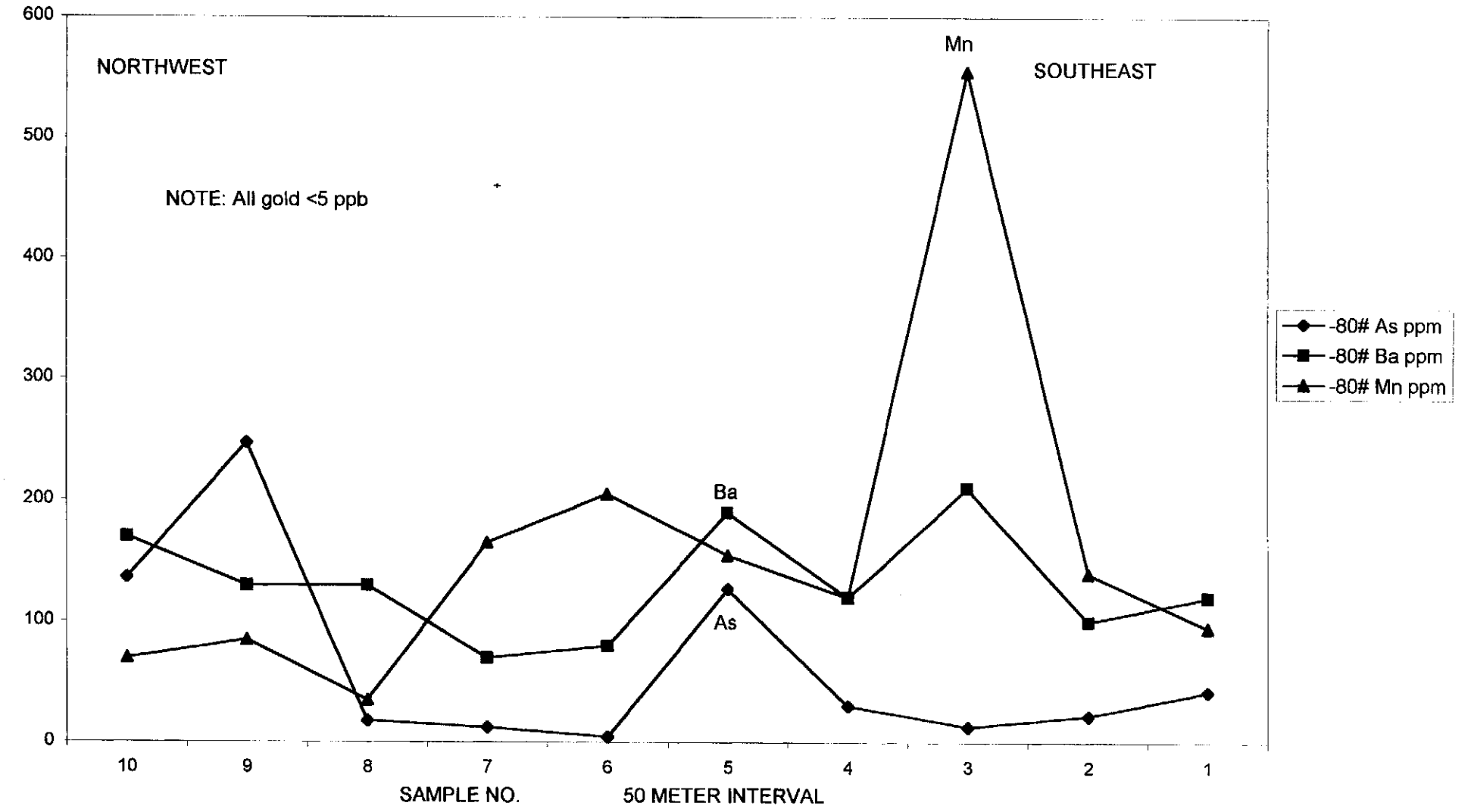


KLONDIKE SOILS -10/+80

Ridge Trail - Traverse 2



KLONDIKE SOILS -10/+80
Ridge Trail - Traverse 2



APPENDIX VI

LITHOGEOCHEMICAL STATISTICS

KLONDIKE SOURCE LIMITED — **AVERAGE GEOCHEMISTRY OF MAIN ROCK TYPES**

Description	Au ppb	Au g/t	Ag ppm	Al %	As ppm	B ppm	Ba ppm	Be ppm	Bi ppm	Ca %	Cd ppm	Co ppm	Cr ppm	Cu ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm
Foliated metaquartzite (2)	<5		0.5	0.3	8	<10	120	<0.5	<2	0.02	<0.5	<1	110	22	0.7	<10	<1	0.19	<10
Quartz-musc-(py) schists (11)	<5		0.2	0.6	15	<10	392	<0.5	<2	0.55	<0.5	2	117	11	1.5	<10	<1	0.14	18
Chloritic qtz-(musc)-(py) schists (7)	<5		0.3	1.4	22	<10	201	<0.5	<2	0.32	<0.5	6	105	27	2.4	<10	<1	0.15	<10
Qtz-musc schist +Au sid'te veins (3)	125		<0.2	0.5	473	<10	283	<0.5	<2	1.39	<0.5	1	91	6	1.4	<10	<1	0.21	17
(relative to q-m-(p) schist)																			
Carbonaceous quartz schists (11)	<5		1.2	1.2	138	<10	224	<0.5	<2	0.98	0.7	5	138	63	2.5	<10	<1	0.14	14
(relative to all other schists)																			
Cntry rock Mitchell Vein (10 - 50m)(2)	143		1.0	2.5	96	<10	80	<0.5	<2	1.07	0.3	15	80	89	4.5	<10	<1	0.17	<10
Wall rocks Mitchell vein (0-1.5m)(4)	726		0.5	2.4	116	<10	115	<0.5	<2	0.61	<0.5	19	53	56	5.3	<10	<1	0.48	<10
(relative to cl-q-(m)-(p) schists)																			
Mitchell quartz vein (2)	10000	16.7	1.9	0.3	301	<10	65	<0.5	<2	0.03	<0.5	4	213	26	3.0	<10	<1	0.14	<10

Anomalously HIGH
Anomalously LOW

?calc sil schist; foliated, ?Mn stained,carb pits	535	-----	<0.2	0.25	48	<10	360	<0.5	<2	1.73	<0.5	<1	180	4	0.3	<10	<1	0.28	100
15/1																			

KLONDIKE SOURCE LIMITED

Description	Mg %	Mn ppm	Mo ppm	Na %	Ni ppm	P ppm	Pb ppm	S %	Sb ppm	Sc ppm	Sr ppm	Ti %	Tl ppm	U ppm	V ppm	W ppm	Zn ppm
Foliated metaquartzite (2)	0.01	40	<1	0.03	3	35	133	<0.01	<2	2	7	<0.01	<10	<10	2	<10	14
Quartz-musc-(py) schists (11)	0.37	155	2	<0.01	6	221	37	0.03	<2	<1	47	<0.01	<10	<10	2	<10	30
Chloritic qtz-(musc)-(py) schists (7)	1.07	477	1	0.01	8	369	35	0.03	<2	2	43	0.01	<10	<10	15	<10	60
Qtz-musc schist +Au sid'te veins (3)	0.59	163	<1	0.03	3	137	11	0.09	<2	2	136	<0.01	<10	<10	2	<10	32
(relative to q-m-(p) schist)																	
Carbonaceous quartz schists (11)	1.10	279	11	0.01	29	547	169	0.15	<2	2	218	<0.01	<10	<10	26	<10	106
(relative to all other schists)																	
Cntry rock Mitchell Vein (10 - 50m)(2)	2.31	585	2	0.01	14	295	4	0.48	2	6	60	0.05	<10	<10	50	<10	91
Wall rocks Mitchell vein (0-1.5m)(4)	2.02	1235	1	<0.01	7	580	8	0.15	2	7	26	0.10	<10	<10	51	<10	81
(relative to cl-q-(m)-(p) schists)																	
Mitchell quartz vein (2)	0.12	115	3	0.01	4	20	5	0.14	<2	1	12	0.01	<10	<10	12	<10	11
Anomalously HIGH																	
Anomalously LOW																	
?calc sil schist; foliated, ?Mn stained,carb pits 15/1	0.03	5970	1	<0.01	6	60	20	<0.01	4	<1	49	<0.01	<10	<10	1	<10	8

APPENDIX VII

GEOLOGICAL NOTES

GEOLOGICAL NOTES

Klondike River E-W Fault Zone / Hunker Creek Fault Zone

The northern boundary of this domain is the straight line escarpment defining the southern boundary of the lower Klondike River valley. Outcrop at the northern end of Jackson Gulch (start of the Ridge Trail), at the base of the escarpment, shows Nasina Formation occurring along a steep N-dipping surface against Klondike Schist to the south with significant ferroan carbonate (siderite or ankerite) and argillic alteration in the footwall Klondike Schist, with cross-cutting quartz-minor pyrite veinlets. Exactly similar stratigraphic relationships and low temperature alteration has been examined and sampled due east along strike in lower Quigley Gulch and the western side of lower Bear Creek.

The escarpment is considered by us to be evidence of younger normal down-faulting to the north defining this part of the Klondike River valley as a half graben. The E-W Klondike River fault zone follows the trend of the mid-Cretaceous Tintina Goldbelt intrusives and gold deposits (Brewery Creek, Dublin Gulch, etc.). A set of minor NW-striking dextral faults would appear to be related, including dextral displacements at the heads of both Bonanza and Hunker Creeks.

Other E-W normal faulting and associated NW-striking dextral shears are interpreted along the Indian River, and cross-cutting the Tintina Trench controlling the west-flowing Klondike River .

The lower Klondike River faulting described above may well follow a much older (? late-Palaeozoic) left lateral strike-slip fault zone displacing the Moosehide volcanics of the Leotta domain from the similar volcanics cropping out north of the river. Sinistral faulting along the valley can be linked to the major NW-dipping thrusts defined in the structural study of Appendix I (Marjoribanks pers. comm.). A primary E-W vertical fault zone along the lower Klondike River would displace Mortensen's (1996, 1997) S-dipping thrust, substantial evidence for which is lacking in the field or photographs. This faulting scenario would explain the virtual absence of Klondike Schist in the Klondike River dredge tailings.

This alternative scenario to Roger Marjoribanks' interpretation of major basement structures needs to be considered also in the framework of:

(i) the **regional magnetic data**, which suggests a major domain boundary between magnetic (Moosehide Volcanics) terrain and essentially non-magnetic which is arcuate from the lower Klondike, along Hunker Creek to Gold Bottom Creek and thence southerly in an arc in the footwall of Marjoribanks' Gold Bottom Creek (W-dipping) thrust.

(ii) the **stress** regime which could provide right lateral shear faulting along lower and middle (WNW strike) Hunker Creek linked to W-dipping thrusts on Gold Bottom Creek and upper Hunker Creek.

- if the W-dipping thrusts are compressional, i.e. resulting from W-directed compression, then shear displacement along Hunker Creek between the Bonanza and Leotta domains should be sinistral, which appears unlikely, however,

- extensional doming and major strain along an E-W axis could provide for dextral displacement along the WNW-trending section of Hunker Creek.

Klondike Source Ltd

Relevant to this scenario and the structural framework of the Pogo and Klondike districts is the interpretation of Mid Cretaceous extensional tectonics in the Yukon-Tanana terrain of east-central Alaska (Pavlis and Sisson, 1993) .

It is a much more attractive view to consider plutonic mineralising processes being developed in an extension regime.

?Late Tertiary Block Rotation

Detailed photograph interpretation suggests a number of fault/fracture displacement can best be explained by clockwise rotation of blocks:

A. Dominion domain

- sinistral displacement along a NE-trending fault of the lowermost part of Dominion Creek appears likely, providing the observed kink in the Indian River drainage line,
- the Indian River also abruptly changes direction at the Quartz Creek confluence with, albeit less convincing, N-striking sinistral displacement (NB: ENE-striking dextral displacement along Toronto Creek is more probable, but perhaps earlier,),
- the Quartz Creek-Allgold Creek magnetic and topographic lineament with the extension of a sinistral NE-fracture system across the Tintina Trench and buckling of the Trench escarpment in the vicinity of the North Klondike and Klondike rivers confluence.

B. Bonanza Creek domain

- left lateral westerly displacement of the northern domain along upper Bonanza Creek to explain the geometry of the Grand Forks locality, and
- a NNE-striking fracture across the lower Klondike Valley from Quigley Gulch to Wood Gulch, and
- minor left lateral displacement along NW- and E-trending fractures and E-trending in the Tintina Trench north and northwest of the North Klondike and Klondike rivers confluence.

ENCLOSURE 1

Plan of Wedge and
Klondike Claim Blocks

094119

Enclosure 1

Plan of Wedge and
Klondike Claim Blocks

ENCLOSURE 2

Klondike Goldfield — Major structural,
Landsat and magnetic (alteration)
features; 1:100,000

Enclosure 2
Klondike Goldfield — Major structural, Landsat and magnetic (alteration) features; 1:100,000

094119

1:100,000

Klondike District

Legend

Photo Geology Structures

- Major vertical faults / fractures
- Inferred major thrusts
- Major normal faults

Landsat Features

- Lineaments
- Major geomorphology boundary of Dominion domain (Brimstone-Portland creeks structure)
- Tv — Inferred Tertiary tuff cover defined by colour and volcanics of Last Chance Creek area
- Horizontal summit (weathering) profile defined by colour
- Ridge colour boundary with direction of dip: ?volcanic flow
- Granitoid rocks inferred: colour defined
- PN / KIT — Inferred (approx) boundary between Nasina Formation and Cretaceous Tantalus Formation and Tertiary volcanics of Indian River domain

Landsat Features

- Boundary of magnetic defined domain
- Magnetic lineament
- Magnetic low
- Magnetic high
- N-trending magnetic lows correlated with reversely magnetised feldspar-phyric gabbro-dolerite dykes

Gravity

- GH — Inferred shallow sourced gravity high

ENCLOSURES 3 to 6

Dawson, Flat Creek, Grand Forks andGranville; 1:50,000 scale photo-interpretation sheets

Enclosure 3: Photogeology compilation;
Dawson 1:50,000 116 B/3

Enclosure 4: Photogeology compilation;
Grand Forks 1:50,000 115-O/14

Enclosure 5: Photogeology compilation;
Flat Creek 1:50,000 115-O/15

Enclosure 6: Photogeology compilation;
Granville 1:50,000 115-O/10

Attachments to Enclosures 3 - 6:

Attachment 1: Legend

Attachment 2: Flight Diagram

0002 1 of 4 **1:50,000**
Klondike #4086 **116 B/3**
Dawson 1993
Topographic Second edition

'Metric' topographic map, Dawson, Yukon Territory

Enclosure 3:
Photogeology compilation
Dawson 1:50,000 116 B/3

DAWSON
1:50000

094119

116 B/3 EDITION 2 **METRIC** Canada **MÉTRIQUE** ÉDITION 2 116 B/3

DAWSON
116 B/3
EDITION 2 ÉDITION

Military users, refer to this map as: / Référence de cette carte pour usage militaire:	SERIES A 722 SÉRIE MAP 116 B/3 CARTE EDITION 2 MCE ÉDITION

Digital Mapping — Cartographie numérique

METRIC/MÉTRIQUE

Use diagram only to obtain numerical values
APPROXIMATE MEAN DECLINATION 1992
FOR CENTRE OF MAP
Annual change decreasing 10.7'

N'utiliser le diagramme que pour obtenir les valeurs numériques
DÉCLINAISON MOYENNE APPROXIMATIVE
AU CENTRE DE LA CARTE EN 1992
Variation annuelle décroissante 10.7'

ONE THOUSAND METRE
UNIVERSAL TRANSVERSE MERCATOR GRID
ZONE 7
QUADRILLAGE UNIVERSEL TRANSVERSE DE MERCATOR
DE MILLE MÈTRES

GRID ZONE DESIGNATION. DÉSIGNATION DE LA ZONE DU QUADRILLAGE:	100 000 m SQUARE IDENTIFICATION IDENTIFICATION DU CARRÉ DE 100 000 m
7 W	EM / EL 71

EXAMPLE OF METHOD USED TO GIVE A REFERENCE TO NEAREST 100 METRES
EXEMPLE DE LA MÉTHODE EMPLOYÉE POUR FIXER DES REPÈRES À 100 MÈTRES PRÈS

REFERENCE POINT / POINT DE REPÈRE	CHURCH - ÉGLISE	(as above) (ci-dessus)
EASTING: Read number on grid line immediately to left of point; ABSCISSE: Noter le chiffre de la ligne du quadrillage immédiatement à gauche du repère:		97
Estimate tenths of a square from this line eastward to point; Estimer le nombre de dixièmes du carré entre cette ligne et le repère en direction est:		5
		975
NORTHING: Read number on grid line immediately below point; ORDONNÉE: Noter le chiffre de la ligne du quadrillage immédiatement en dessous du repère:		98
Estimate tenths of a square from this line northward to point; Estimer le nombre de dixièmes du carré entre cette ligne et le repère en direction nord:		4
GRID REFERENCE: / RÉFÉRENCE AU QUADRILLAGE:		984 975984

Nearest similar grid reference 100 000 metres
La référence similaire la plus près est à 100 000 mètres

140°00' 64°30'	138°30' 64°30'
116 B/5	116 B/6	116 B/7
116 B/4	116 B/3	116 B/2
115 O/13	115 O/14	115 O/15
140°00' 63°45'	138°30' 63°45'

Index to adjoining Maps of the National Topographic System
Tableau d'assemblage du Système national de référence cartographique

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Roads: / Routes:

hard surface	revêtement dur	dual highway, double chaussée 2 lanes 2 voies	more than 2 lanes plus de 2 voies
hard surface	revêtement dur		less than 2 lanes moins de 2 voies
loose or stabilized surface, all weather	gravier, aggloméré, toute saison	2 lanes or more 2 voies ou plus	less than 2 lanes moins de 2 voies
loose surface, dry weather	de gravier, temps sec		
unclassified road or street	route non classée ou rue		
cart track	de terre		
trail, cut line or portage	sentier, percée ou portage		

FOR COMPLETE REFERENCE SEE REVERSE SIDE — POUR UNE LISTE COMPLÈTE DES SIGNES, VOIR AU VERSO

DAWSON
YUKON TERRITORY TERRITOIRE DU YUKON

Scale 1:50 000 Échelle

Miles 1 0 1 2 3 Milles
Metres 1000 0 1000 2000 3000 4000 Mètres

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CONVERSION SCALE FOR ELEVATIONS
Metres 30 20 10 0 50 100 150 200 250 300 Metres
Feet 100 50 0 100 200 300 400 500 600 700 800 900 1000 Pieds

ÉCHELLE DE CONVERSION DES ALTITUDES

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

ÉQUIDISTANCE DES COURBES 20 MÈTRES
Altitudes en mètres
Système de référence géodésique nord-américain, 1983
Projection transverse de Mercator

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DAWSON
116 B/3
EDITION 2 ÉDITION

Energy, Mines and Resources Canada — Énergie, Mines et Ressources Canada

0004 2 of 2
Klondike #4086
Grand Forks
Topographic

1:50,000
115 O/14
1993
Second edition

'Metric' topographic map, Grand Forks, Yukon Territory

Enclosure 4:
Photogeology compilation
Grand Forks 1:50,000 115-O/14

115-O/14 EDITION 2 **METRIC** Canada **MÉTRIQUE** ÉDITION 2 115-O/14

GRAND FORKS
115-O/14
EDITION 2 ÉDITION

Military users, refer to this map as: / Référence de cette carte pour usage militaire:	SERIES A 722 SÉRIE MAP 115-O/14 CARTE EDITION 2 MCE ÉDITION

094119

Digital Mapping — Cartographie numérique

METRIC/MÉTRIQUE

KLONDIKE PLATEAU

(YUKON PLATEAU)

Sulphur Creek Gneiss

Boxcar

Grand Forks Creek

Bonanza Creek

Hunker Creek

Dominion Creek

Quartz Creek

Indian River

Sulphur Creek

Readford Creek

Gold Bottom 2 km

Grid Bottom 20 km

7098000m N

7072000m N

139°30′ 25′ 20′ 15′ 10′ 05′ E. 139°00′

64°00′ 55′ 50′ 45′ 63°45′

1°34′ or/ou 28 Mils

28°18′ or/ou 503 Mils

T.N. N.G.

Grid north – Nord du quadrillage

Magnetic north – Nord magnétique

Use diagram only to obtain numerical values
APPROXIMATE MEAN DECLINATION 1992
FOR CENTRE OF MAP
Annual change decreasing 10.7′

N'utiliser le diagramme que pour obtenir les valeurs numériques
DÉCLINAISON MOYENNE APPROXIMATIVE
AU CENTRE DE LA CARTE EN 1992
Variation annuelle décroissante 10.7′

ONE THOUSAND METRE
UNIVERSAL TRANSVERSE MERCATOR GRID
ZONE 7
QUADRILLAGE UNIVERSEL TRANSVERSE DE MERCATOR
DE MILLE MÈTRES

GRID ZONE DESIGNATION / DÉSIGNATION DE LA ZONE DU QUADRILLAGE:	100 000 m SQUARE IDENTIFICATION / IDENTIFICATION DU CARRÉ DE 100 000 m
7 V	EL

EXAMPLE OF METHOD USED TO GIVE A REFERENCE TO NEAREST 100 METRES
EXEMPLE DE LA MÉTHODE EMPLOYÉE POUR FIXER DES REPÈRES À 100 MÈTRES PRÈS

REFERENCE POINT / POINT DE REPÈRE	CHURCH - ÉGLISE	(as above) (ci-dessus)
EASTING: Read number on grid line immediately to left of point; ABSCISSE: Noter le chiffre de la ligne du quadrillage immédiatement à gauche du repère:		97
Estimate tenths of a square from this line eastward to point: Estimer le nombre de dixièmes du carré entre cette ligne et le repère en direction est:		5
		975
NORTHING: Read number on grid line immediately below point. ORDONNÉE: Noter le chiffre de la ligne du quadrillage immédiatement en dessous du repère:		98
Estimate tenths of a square from this line northward to point; Estimer le nombre de dixièmes du carré entre cette ligne et le repère en direction nord.		4
GRID REFERENCE: / RÉFÉRENCE AU QUADRILLAGE:		984 975984
Nearest similar grid reference 100 000 metres / La référence similaire la plus près est à 100 000 mètres		

Coordinate Conversion NAD 83 (WGS 84) to NAD 27
Mean values for this map

Geographic:	Latitude -	add	1.0"
	Longitude -	subtract	7.8"
Grid:	Northing -	subtract	163m
	Easting -	add	109m

Conversion des coordonnées NAD 83 (WGS 84) à NAD 27
Valeurs moyennes pour cette carte

Coordonnées géographiques :	Latitude -	additionner	1,0"
	Longitude -	soustraire	7,8"
Quadrillage :	Ordonnée (N) -	soustraire	163m
	Abscisse (E) -	additionner	109m

140°00′ 138°30′ 64°15′

116 B/4	116 B/3	116 B/2
115-O/13	115-O/14	115-O/15
115-O/12	115-O/11	115-O/10

63°30′

index to adjoining Maps of the National Topographic System
Tableau d'assemblage du Système national de référence cartographique

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Roads: / Routes:

loose or stabilized surface, all weather	gravel, aggloméré, toute saison	2 lanes or more / 2 voies ou plus	less than 2 lanes / moins de 2 voies
loose surface, dry weather	de gravier, temps sec		
unclassified road or street	route non classée ou rue		
cart track	de terre		
trail, cut line or portage	sentier, percée ou portage		

FOR COMPLETE REFERENCE SEE REVERSE SIDE — POUR UNE LISTE COMPLÈTE DES SIGNES, VOIR AU VERSO

GRAND FORKS
YUKON TERRITORY TERRITOIRE DU YUKON

Scale 1:50 000 Échelle

Miles 1 0 1 2 3 Miles
Metres 1000 0 1000 2000 3000 4000 Mètres

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Metres 30 20 10 0 50 100
Feet 100 50 0 100 200 300 400 500 600 700 800 900 1000 Pieds

ÉCHELLE DE CONVERSION DES ALTITUDES
150 200 250 300 Mètres

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GRAND FORKS
115-O/14
EDITION 2 ÉDITION

Energy, Mines and Resources Canada — Énergie, Mines et Ressources Canada

Klondike #4086 115 O/15
Flat Creek 1993
Topographic Second edition

'Metric' topographic map, Flat Creek, Yukon Territory

Enclosure 5:
Photogeology compilation
Flat Creek 1:50,000 115-O/15

115-O/15 EDITION 2 **METRIC** Canada **MÉTRIQUE** ÉDITION 2 115-O/15

FLAT CREEK

115-O/15

EDITION 2 ÉDITION

Military users, refer to this map as: / Référence de cette carte pour usage militaire: SERIES A 722 SÉRIE; MAP 115-O/15 CARTE; EDITION 2 MCE ÉDITION

094119

Digital Mapping / Cartographie numérique

METRIC/MÉTRIQUE

Dawson 37 km

Dominion 15 km

Dominion 13 km

Stewart Crossing 256 km

Grand Forks 20 km

TINTINA TRENCH

KLONDIKE PLATEAU

YUKON PLATEAU

DEMPSTER HIGHWAY

KLONDIKE HIGHWAY

KLONDIKE RIVER

Flat Creek

Hunker Creek

Sulphur Creek

Jerome Creek

Carmacks

Hunker Summit

Mount Leota

Mount Pluto

Mount Monahan

Mount Mansfield

Mount Mackay

Mount Mackenzie

Mount Mackintosh

Mount Mackinnon

Mount Mackinlay

Mount Mackinnon

Mount Mackinlay

Mount Mackinnon

Mount Mackinlay

Enclosure 6:
Photogeology compilation
Granville 1:50,000 115-O/10

115-O/10 EDITION 2 METRIC Canada MÉTRIQUE ÉDITION 2 115-O/10

GRANVILLE
115-O/10
EDITION 2 ÉDITION

Military users, refer to this map as: / Référence de cette carte pour usage militaire:	SERIES A722 SÉRIE MAP 115-O/10 CARTE EDITION 2 MCE ÉDITION

094119

Digital Mapping / Cartographie numérique

METRIC/MÉTRIQUE

KLONDIKE PLATEAU

(YUKON PLATEAU)

Sulphur 1 km

Jensen Creek 3 km

Use diagram only to obtain numerical values
APPROXIMATE MEAN DECLINATION 1992
FOR CENTRE OF MAP
Annual change decreasing 10.8'

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DÉCLINAISON MOYENNE APPROXIMATIVE
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7 V	FA / FA / 6

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139°30' 64°00'			138°00' 64°00'
	115-O/14	115-O/15	115-O/16
	115-O/11	115-O/10	115-O/9
	115-O/6	115-O/7	115-O/8
63°15' 139°30'			63°15' 138°00'

Roads: / Routes:

	2 lanes or more / 2 voies ou plus	less than 2 lanes / moins de 2 voies
loose or stabilized surface, all weather ... gravier, aggloméré, toute saison		
loose surface, dry weather ... de gravier, temps sec		
unclassified road or street ... route non classée ou rue		
cart track ... de terre		
trail, cut line or portage ... sentier, percée ou portage		

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YUKON TERRITORY TERRITOIRE DU YUKON

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Miles 1 0 1 2 3 Milles
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GRANVILLE
115-O/10
EDITION 2 ÉDITION

Energy, Mines and Resources Canada / Énergie, Mines et Ressources Canada

3516

Attachment 1
(Enclosures 3 - 6)

LEGEND
to 1 : 50,000 GEOLOGICAL MAPS

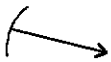

Inferred lithological boundary

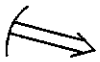

Air photo center point and flight line / photo no

094119

SURFACES

Horizontal *(terraces along drainages; old erosion surface on ridges; volcanic valley fill flows of Last Chance Creek)*


Shallow dip of unstructured or unfoliated terrain


Thrust sole with consistent dip and 'polished' appearance on aerial photography

STRUCTURES - Metamorphic basement rocks


Dip of major foliation

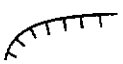

Trace and inferred dip of minor thrust fault or fracture


Trace of subtle break of slope; possible listric slump fault with tick on downthrow side

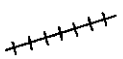

Major metagabbro or metadiorite intrusive

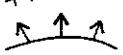
STRUCTURES - Post-metamorphic rocks


Linear steep slopes due to recent downcutting along present drainage


Arcuate change to steep slope along ridge lines and along major drainages *(e.g. Upper Bonanza Creek)*; of possible volcanic origin

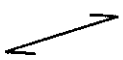

Inferred volcanic breccia pipes / craters with evidence of central piercement feature, sometimes represented as an inferred pingo (p)


Linear negative topographic feature, inferred dyke


Volcanic cone morphology


Inferred porphyry intrusive


Inferred volcanic breccia


Lineament; mainly trace of cleavage or (?) ductile shear related to late Tertiary dextral (Tintina) deformation


Metagabbro or metadiorite; <u>in the southwest inferred (?) Permian or Early Jurassic *(cf Jim Creek)* granitic rocks</u>

FAULTS


Dominantly vertical faults with probable multiple movement


Major basement thrusts with tick indicating dip


Strike-slip fault with inferred displacement

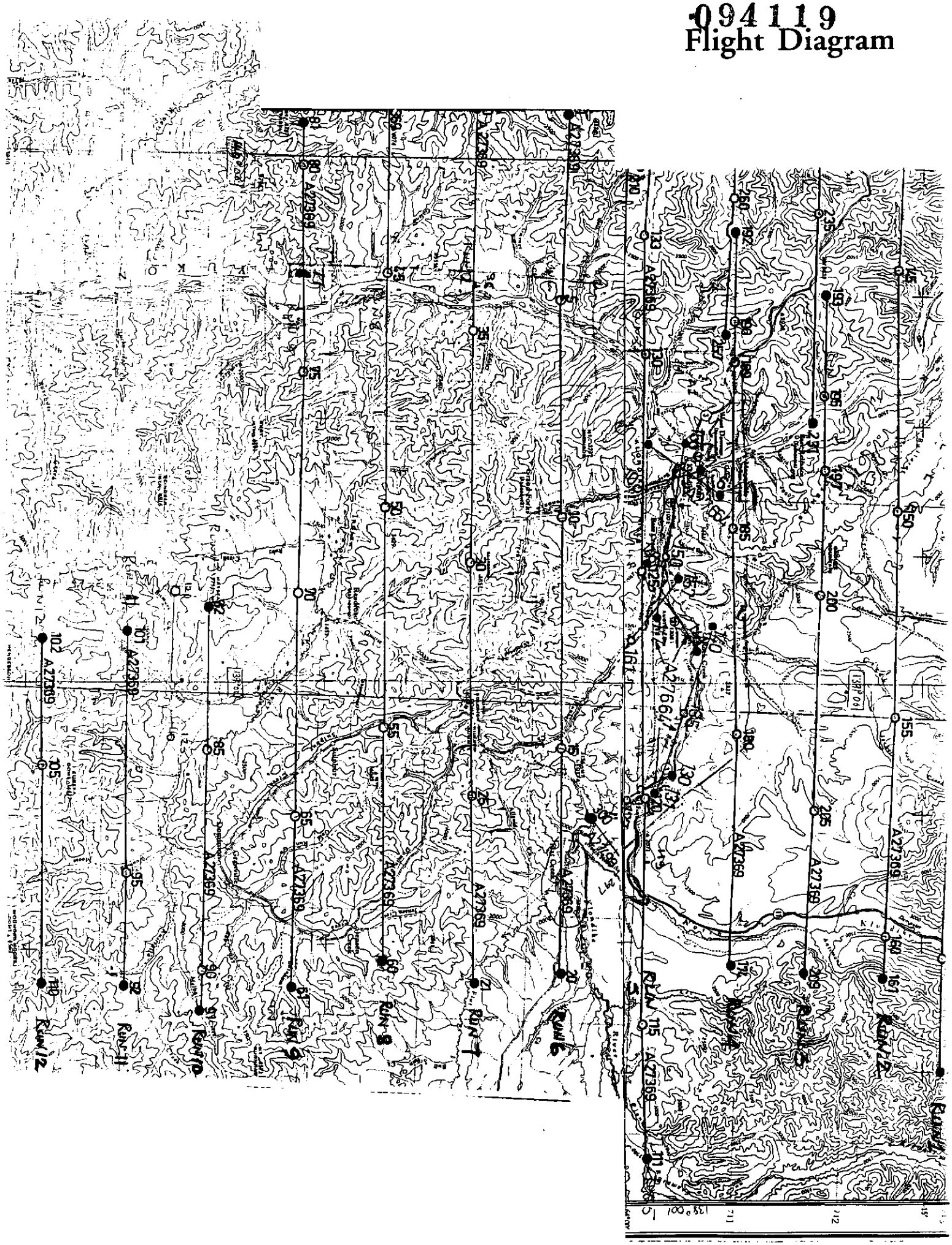

Normal Fault

T	Tertiary	P_N	Nasina Formation; carbonaceous-quartz schists
cg	Inferred conglomerate / erosion surface	Pk	Undifferentiated Klondike Schists
ʌ	Cretaceous or Tertiary acid volcanics	Pus	Ultramafic schist
s	Cretaceous or Tertiary sediments	Pvb	Mafic schists
K	Cretaceous	sl	Gravity slump

Prepared by RobSearch Australia Pty. Limited - May 2000

Attachment 2
(Enclosures 3 - 6)

094119
Flight Diagram



Klondike Source Ltd

APPENDIX VIII

DATA SUPPORTING WORK DONE ON CLAIMS SUBMITTED FOR RENEWAL

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DATA SUPPORTING WORK DONE ON CLAIMS SUBMITTED FOR RENEWAL

A. PERIOD FEBRUARY – MAY 1999

WORK DONE ON CLAIMS:

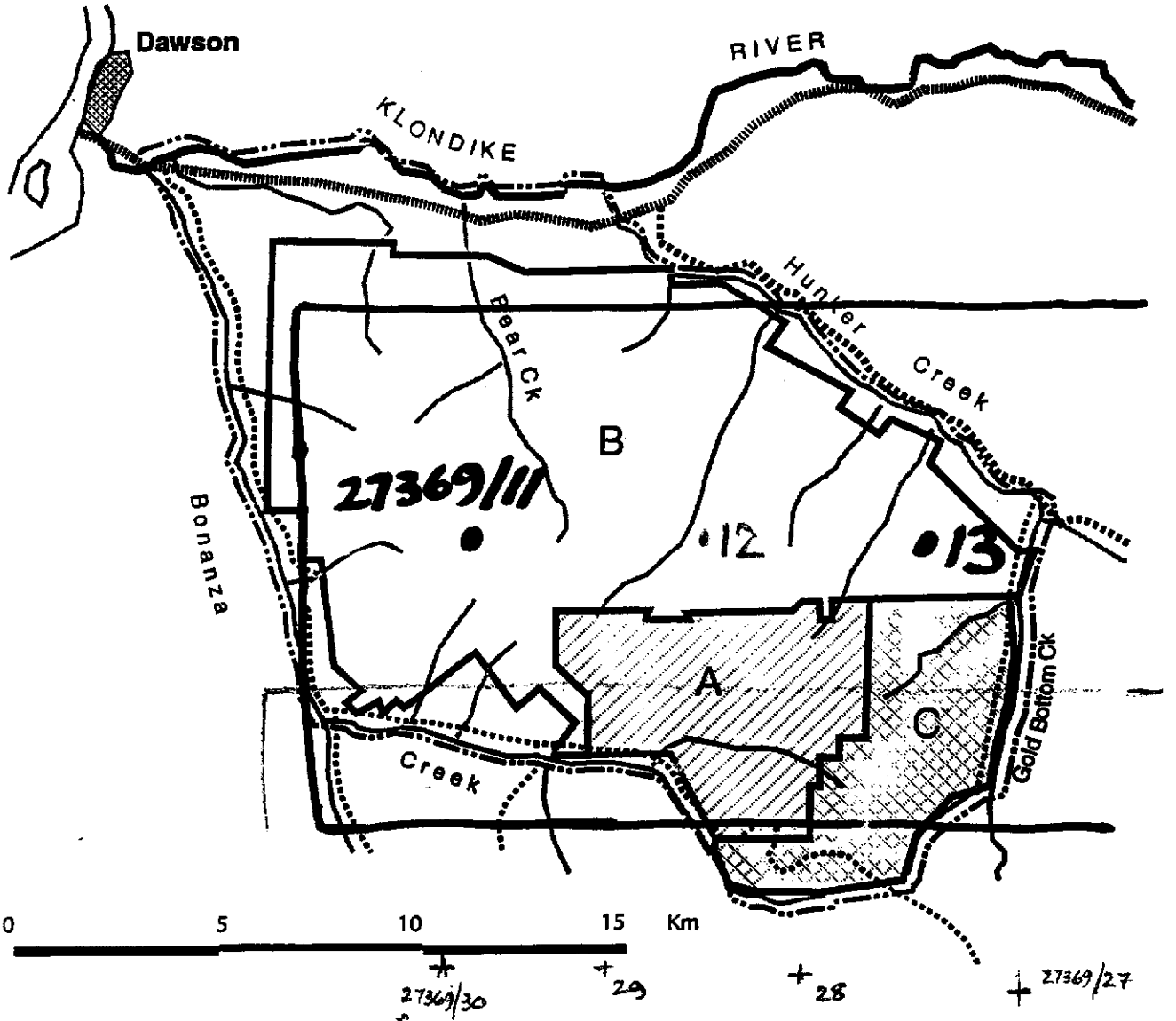
- Airphotograph Interpretation (Attachment 1)
  - location of work, as related to claims, is identified in Figure A1
  - detailed interpretation work on individual photographs included as Attachment 2
- Map Compilation
  - interpretive map (Attachment 3)
- Reporting
  - RobSearch Report No. 4086 (Attachment 7)

B. PERIOD JUNE 1999 – MAY 2000

WORK DONE ON CLAIMS:

- Airphotograph Interpretation
  - detailed interpretation work in the form of copies of airphotographs with overlay annotation (Attachment 4)
- Geological Mapping and Compilation
  - Attachment 5 is a compilation of field data from structural mapping by R. W. Marjoribanks and R. G. Adamson, July 1999, with additional data from mapping by G. W. Debiecki (1984, 1985).
- Landsat Interpretation
  - Specially processed Landsat was acquired and interpreted in the light of structural and other studies (Attachment 6).

APPROX LOCATION OF AERIAL PHOTOGRAPHS



Barramundi – Klondike Souce Joint Venture

CLAIM BLOCKS

A	Staked & Registered	KSJV CLAIMS
B	Staking completed - awaiting registration	KSJV CLAIMS
C	Excluded Area - 100% Barramundi Gold NL	

Total Area of JV Claims: ~ 200 sq km

Klondike Source Limited

Area of Interest

Figure A1

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ATTACHMENT 1

SA MAJESTE LA REINE DU CHEF DU CANADA MINISTERE DE L'ENERGIE DES MINES ET DES RESSOURCES

KLONDIKE WEDGE CLAIM BLOCK

KLONDIKE CLAIMS

WEDGE CLAIMS

UPPER BONANZA CREEK

ELDORADO CREEK

N

MAJOR WSW – ENE LINEAMENT throughout schist package related to Tintina Fault (chevron cleavage intersection)

27369/11A

I Proposed Geochem orientation (HpH) ABC: Rock sample localities

TINTINA

255 max dir. of compression

Cretaceous/ L. Tertiary Volcanics

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ATTACHMENT 3

HUNKER DOME & KLONDYKE GOLDFIELD

PHOTO SCALE (~1:50 000)

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Major ? silicified ridge - vertical feeder

KLONDIKE-WEDGE CLAIMS BLOCK

KEY CLAIMS HELD BY KG

KLONDIKE BLOCK

WEDGE BLOCK

Trend of mafic (high mag) "Footwall Mafics" in recent BAM mag survey

[good evidence for prospective key unconformity ? "Klondike Mine Sch" overlying "Footwall Mafics"]

massive bedded "Footwall Mafics" includes locally dm schist

P-M older basement

? staking target

100% Barramundi Claims V. complex structurally

Qu prospects UKHM/BAM JV (dogs)

large target for staking

Hunker Summit (Kigg Solomons Dome) V

NB dextral displac. of Cks

KG CLAIMS under negot. for JV

only geograph tie to Au

photogeology not fully revised

very sheared

unique dipole mag anomaly related to ? Cretaceous intrusives

Sulphur Ck (? ortho) gneiss

very complexly faulted

MAJOR LATE PALAEOZOIC THRUST RELATED TOCRATONIZATION

NB Qtz Ck drains large area of sheared/faulted monzonitic orthogneiss hence large amount of quartz in dredge tailings & name

(Late) Palaeozoic "basement" a'clinic same axial trend as Mt Burnham O'gneiss (cf Cordillera Vol)

major potential target inferred from RADARSAT & literature

Major placer operation Current 1.5 m^3 pa

exposed sole of thrust

NOTE:
KL MINE SCH. FOLD PATTERN

D2 DOME/ELLIPSE

D1?

feeder direction major dilation direction feeders largely eroded and form Creeks feeding Bonanza & Hunker drainage

NB

dip of stratigraphy

traces of schistosity ubiquitous and omitted

Cretaceous volcs porphyry intrus

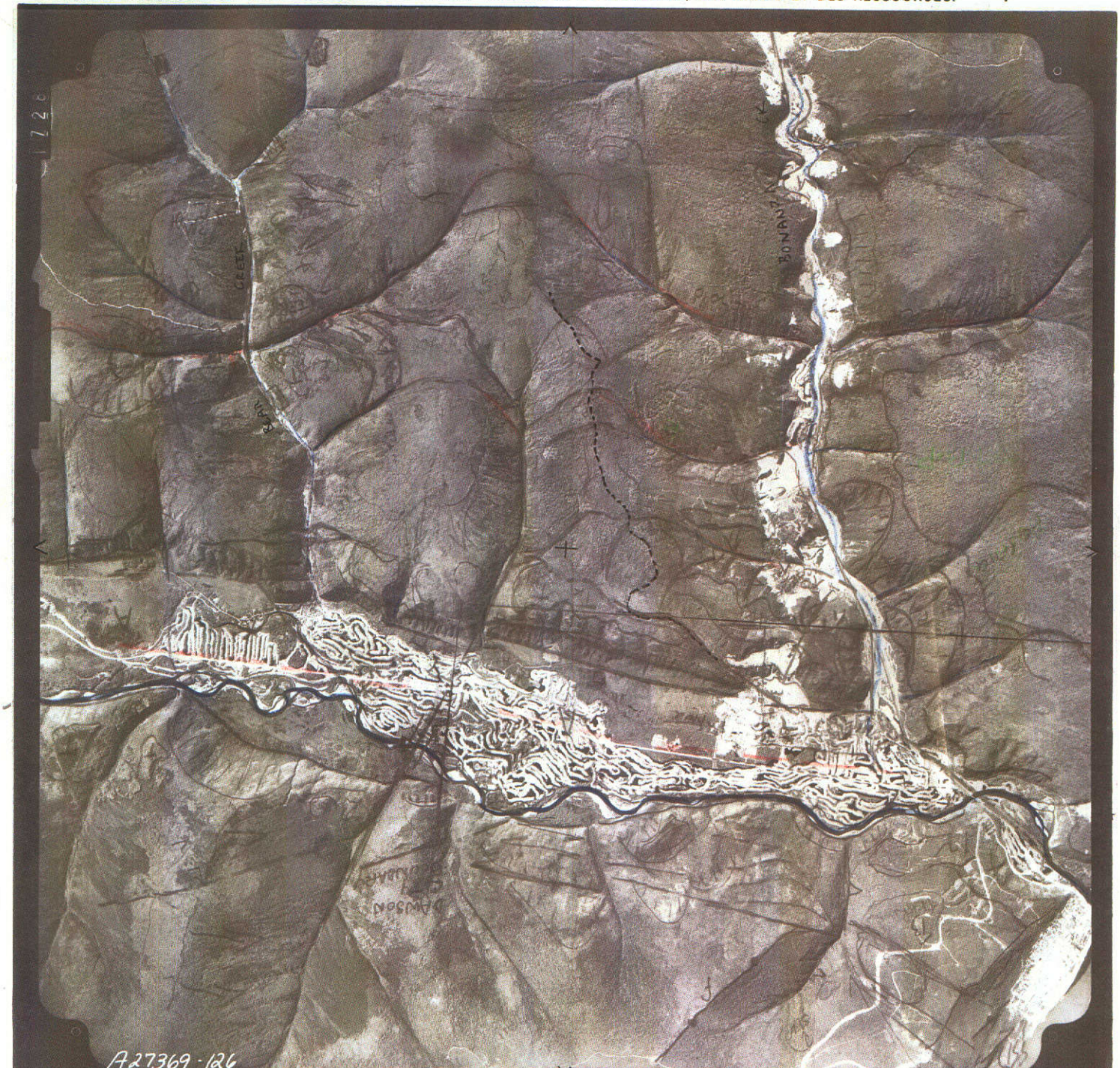
"Klondike Mine" Schists

"Footwall Mafic" schists

"Toronto Ck" clastic metaseds

Sulphur Ck gneiss

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R6

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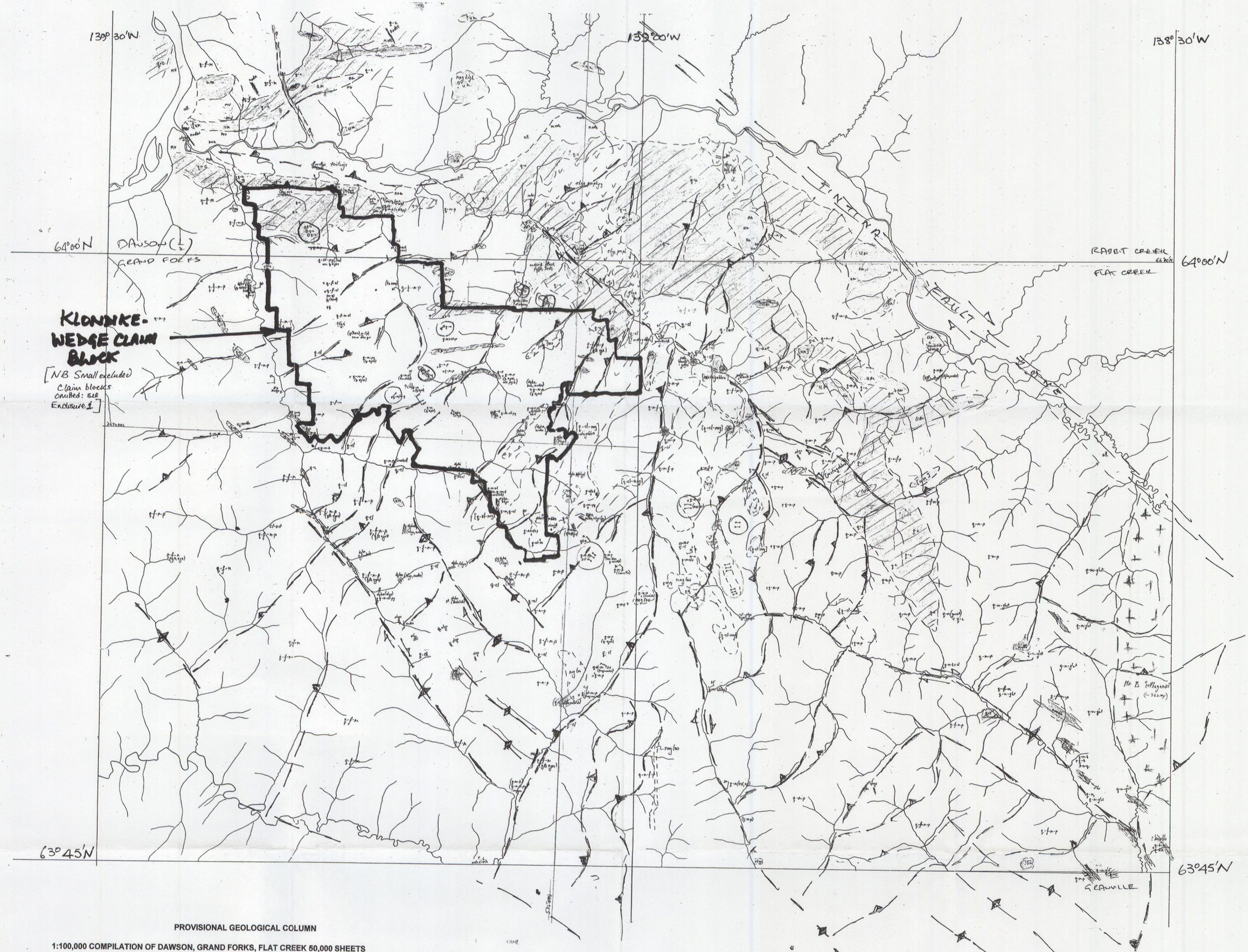
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PROVISIONAL GEOLOGICAL COLUMN

1:100,000 COMPILATION OF DAWSON, GRAND FORKS, FLAT CREEK 50,000 SHEETS

SYMBOL	LITHOSTRATIGRAPHIC NAME	DESCRIPTION	AGE
	Alluvium	river/stream gravels, black muck, Beringian fauna	Recent
	Klondike Gravels White Channel Gravels	glacio-fluvial outwash gravel braided channel/piedmont fluvial sand, gravel	Early Pleistocene; Reid Glaciation Late Miocene-Pliocene
rhyo andes		rhyolitic massifs and dykes andesitic dykes	Eocene
C Volc	Carmack Volcanics	andesitic flows, breccia, tuff, epiclastics	?mid Cretaceous
um	? Ultramafics	chrysotile serpentinite, peridotite,dunite	?Palaeozoic
mv	Moosehide Volcanics	metabasic volcanics	?Palaeozoic
q-c	Nasina Group	carbonaceous quartzite/quartz schist	upper Palaeozoic
MB + +	Mt Burnham Orthogneiss		?upper Palaeozoic
mbl	Klondike Schist	marble	?contact metam by MB?
q-m-gnt	Klondike Schist	quartz-magnetite-garnet ?schist	
q-m-p	Klondike Schist	quartz-muscovite-pyrite	Palaeozoic
q-f-m	Klondike Schist	quartz-felspar-muscovite	
q-f-m-p	Klondike Schist	quartz-felspar-muscovite-pyrite	
q-cl	Klondike Schist	quartz-chlorite	
q-cl-mag	Klondike Schist	quartz-chlorite-magnetite	
metadiorite/ metagabbro	?Klondike Schist	felspar-hornblende (granitic to gneissic textures)	

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ATTACHMENT 5

FIELD GEOLOGY COMPILATION

scale: 1:100,000

Geology compiled by R.G. Adamson; includes field data of R.G. Adamson & R. Marpaintet July, 1989 and G.W. Debicki (1984)

ATTACHEMENT 6
LANDSAT INTERPRETATION
1:100,000

BREWERY CREEK

KLONDIKE WEDGE CLAIM BLOCK

FLAT CREEK

GERMAN FORKS

Boulder Ck

Adams Ck

French G

Sourdough G

Rose Gulch

4916' REINDEER MTN

Eureka Dome 1327'

Wounded Moose Dome

4.5x5km

2.2x5km

=135

ML

RobSearch

ATTACHMENT 7

REPORT NO. 4086

KLONDIKE GOLDFIELD HARDROCK GEOLOGY AND PROPOSED EXPLORATION PROGRAM — A SUMMARY REPORT

PREPARED BY

COLIN M THOMAS
Chief Geologist (Minerals)
(Appendix on Budgets: R G Adamson)

May/June, 1999

Prepared for:
The Directors
Klondike Source Ltd
6/1 York Street
SYDNEY NSW 2000

RobSearch Australia Pty Limited
(formerly *Robertson Australia Pty Limited & Robertson Research (Australia) Pty Limited*)
ACN: 000 762 078
INDEPENDENT CONSULTANTS
NATURAL RESOURCES • SAFETY & ENVIRONMENTAL RISK MANAGEMENT • PROJECT IMPLEMENTATION
11th Floor, 80 Arthur Street, North Sydney, NSW 2060, Australia Phone: (02) 9957 3199 Fax: (02) 9954 4011
WebSite: www.robsearch.com.au E.Mail: info@robsearch.com.au

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I GEOGRAPHICAL NOTES

II EXPLORATION HISTORY

III GOLD OCCURRENCES AND NOTES ON RECENT EXPLORATION

IV PROGRAM BUDGETS AND NOTES

1. INTRODUCTION

1.1 Purpose of Report

This report is "Commercial in Confidence" to the directors of Klondike Source Ltd (KSL). Its purpose is to set out the "framework" of an original technical hypothesis for the bedrock source of the alluvial gold that formed the great Klondike Placer Gold Field of the Yukon Territory, NW Canada.

This hypothesis has been generated by Colin M Thomas using remote-sensing and aerial photographic interpretation in conjunction with published geological mapping and proprietary data supplied by Barramundi Gold Limited ("BAM").

1.2 Location and Definition of the Klondike Gold Field

The Klondike Gold Field lies in the west-central part of the Yukon Territory of Canada, adjacent to the town of Dawson, approximately 300 km south of the Arctic Circle.

The Klondike Gold Field placer is about 55 km long and 20 km wide. It comprises a number of creeks and steams which are tributaries of the Klondike and Yukon rivers.

The richest placer gold deposits in the world occurred in the basal sections of high-level fluvial terraces and at the base of presently active river and stream beds.

1.3 Previous Gold Production

Following discovery in 1896 of alluvial gold in tributaries of the Klondike River, the Klondike Placer Gold Field has recorded production of approximately 13 million oz of gold. It is the fourth largest placer gold "camp" in the world.

1.4. Data Sources

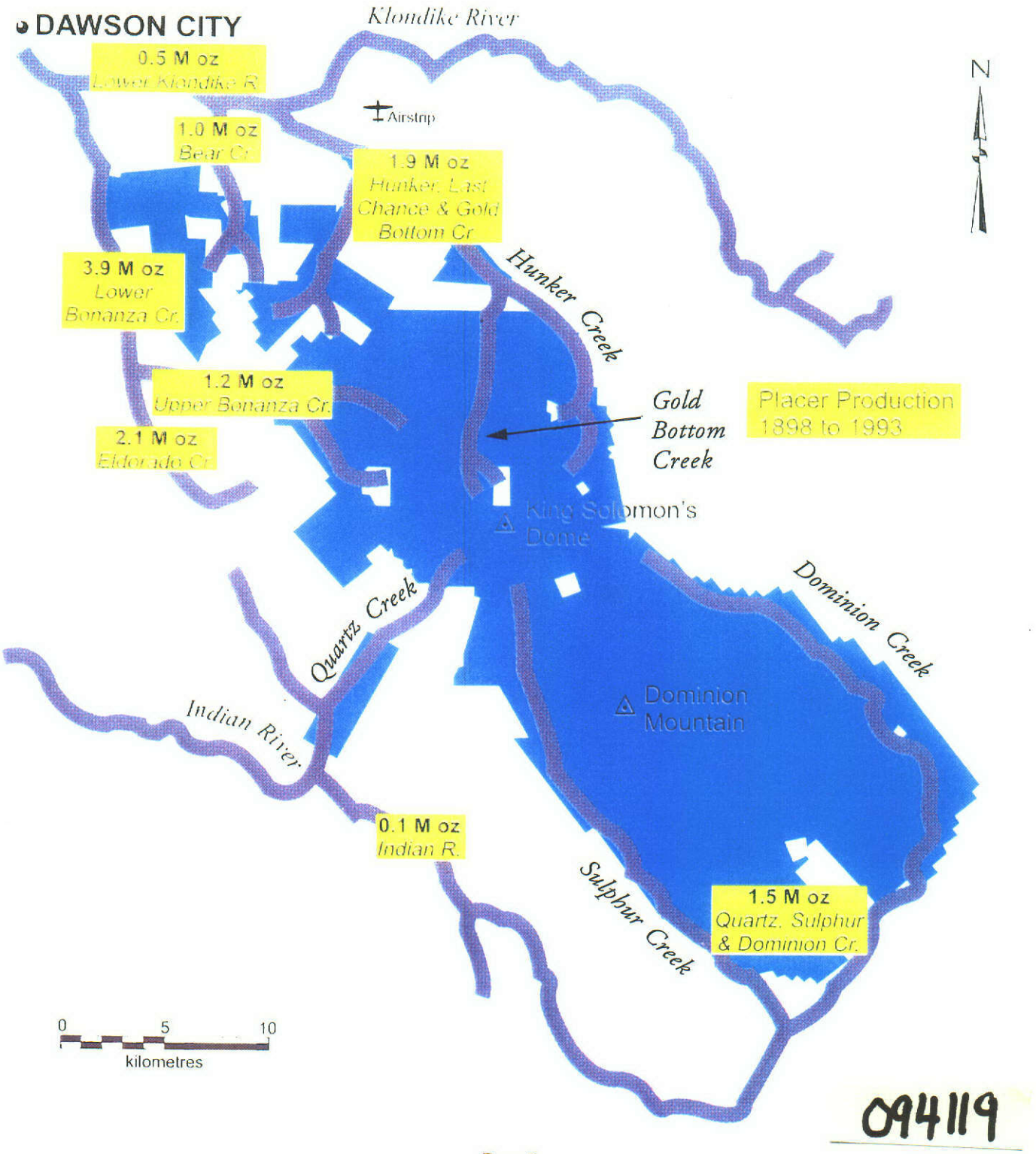
1.4.1 Reports

There is a major body of academic literature and other published data on the history and description of the placer gold workings. However, very little of this data is of immediate interest. The major references accessed to date and found useful in the initial work on the hardrock gold prospectivity of the district are:

- Barramundi Gold Limited, 1998 Annual Report
- Barramundi Gold Limited, Offering Memorandum, November 1997
- R W Boyle, "*The Geochemistry of Gold and its Deposits*", Geological Survey of Canada, Bulletin 280, 1979
- J K Mortensen, "*Geology and metallogeny of the Klondike District, Western Yukon Territory — Implications for a Mineral Exploration Strategy*", 31 March 1997.
- J McFaull & G S Davidson, "*Qualifying Report on the JAE and BAM Claims, The Hunker Dome Project, Dawson Mining District*", 6 May 1996.
- "*Geology of the Cordilleran Orogen in Canada, 1992*", (ed. by H Gabrielse and C J Yorath), Geology of North America Volume G-2 / Geology of Canada No. 4., Geol. Survey of Canada, (J O Wheeler, Gen. Ed.)

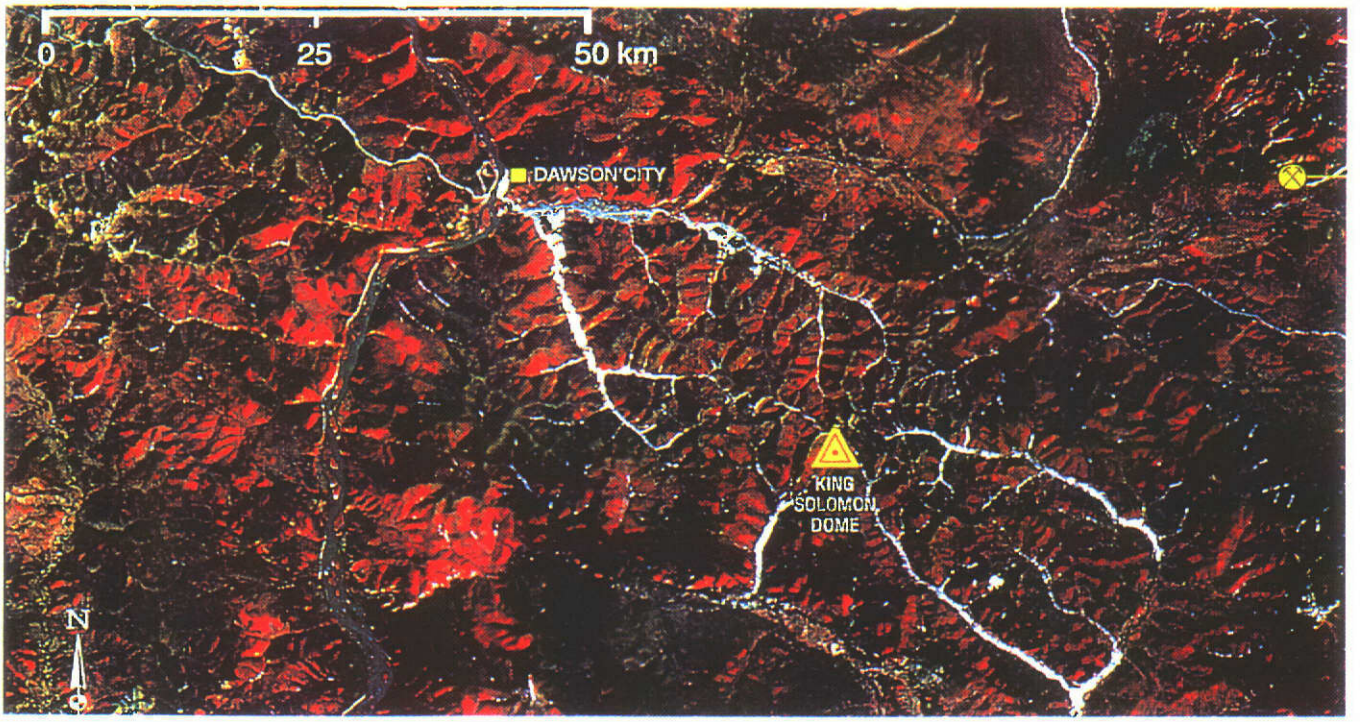
In addition, there are a number of potentially relevant and recent academic theses and maps/reports of the Geological Survey of Canada (GSC) which concern the superficial geology and geomorphology of the district and region. However, this data has yet to be accessed.

Figure 1 Klondike Goldfield Location, Area (Historic Placer Production)
Source: Barramundi Gold Annual Report, 1998



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Figure 2 LANDSAT Satellite Image of Klondike Goldfield, March 1997
Source: Barramundi Gold Annual Report, 1998



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1.4.2 Primary Data

Work to date has focussed on the interpretation of primary, public domain, data sources of the "remote sensing type":

- LANDSAT, 1:100,000 image of the Dawson Region;
- 1:50,000 black and white vertical, government aerial photography;
- a 1:250,000 scale RADARSAT image of the region; and
- GSC regional aeromagnetic contour maps (1:31,360; 1;250,000; 1965).

In addition to the above data (all provided by Ray Soper, then Chairman of Barramundi Gold Ltd (BAM), a gaudily coloured contour image of a detailed aeromagnetic/VLF EM survey over the Hunker Dome claims of BAM was acquired from a BAM-provided CD.

2. REGIONAL AND DISTRICT GEOLOGY

2.1 Lack of Glaciation and Oxidised Weathering Profile

2.2 Regional Terranes and Boundaries

The major structural framework of the Canadian Cordillera is described by Gabrielse and Yorath (1992). It should be noted that geological detail of the Yukon on the maps is largely based on very old recce data and is thus not totally reliable (Gordey, pers. comm.) It can be surmised that the GSC has used RADARSAT data to define some of the major faults (e.g. Sulphur Creek thrust) and it has almost certainly used data on age classification of terranes on the voluminous publications of Mortensen (op.sit).

The Klondike Goldfield is located in a sector or domain of the Upper Palaeozoic Tanana Terrane adjacent to the NW-striking Tintina Trench/Fault Zone. Largely (?) Post-Eocene displacement (Mortensen pers. comm.) along the right lateral Tintina Fault has been in the order of 400 km.

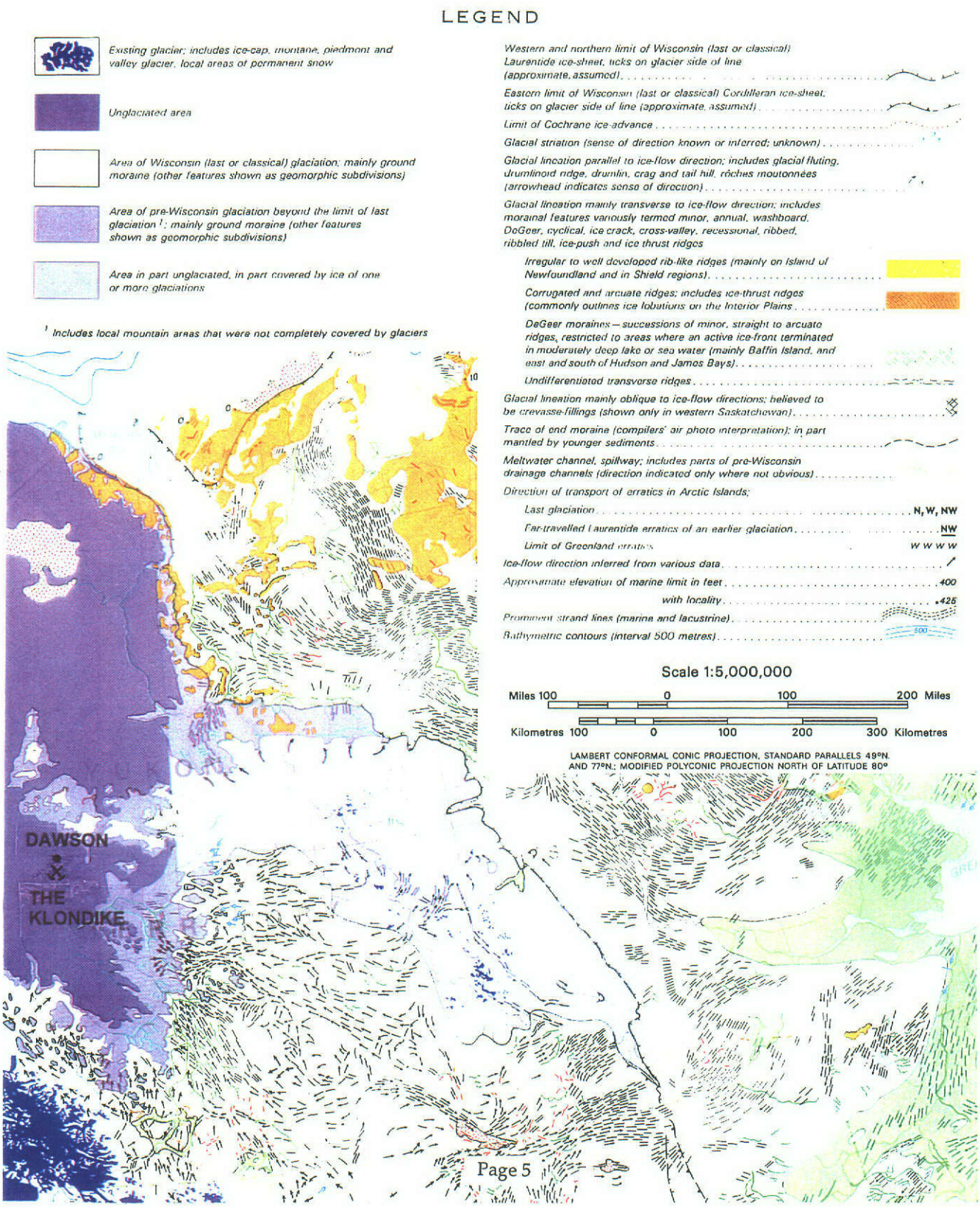
In SW Yukon on the northern border of the Tintina Trench, the Finlayson River/Wolverine district is considered to be an originally northerly sector of the Klondike rocks. The Finlayson River district is being mapped by Don Murphy (Yukon Geology Program) and his work on the stratigraphy has provided relevant information for interpreting the stratigraphy of the Klondike district (Figure 3; Murphy and Piercey, 1998).

2.3 Major Late Tertiary Strike Slip Faults

The Tintina Fault system is one of two very large NW-trending strike faults which traverse north westerly the northern Canadian Cordillera. The other fault zone is the Denali. Both zones extend into Alaska where they arch around to a SE-strike, paralleling in-board (Continental-side) of the active Aleutian volcanic arc (Figure 4, Hamilton....?)

The Klondike Goldfield is immediately adjacent to the Tintina Fault/Trench, with a 400 km dextral displacement, largely of Tertiary age.
The terranes (including the Klondike Goldfield) southwest of the fault were the actively-moving component (Archaean/Proterozoic Craton to the NE) and, therefore, must have been very severely affected. However, geological maps of the Goldfield district (e.g. Mortensen, 1996) do not reflect this deformation, although numerous geological reports allude to substantial faulting along the creeks or suggest that all the creeks follow fault lines.

Figure 3 Glacial Map of Canada 1:5 million 1968
Source: CMT Library



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Figure 4 Yukon-Tanana and Slide Mountain Terranes

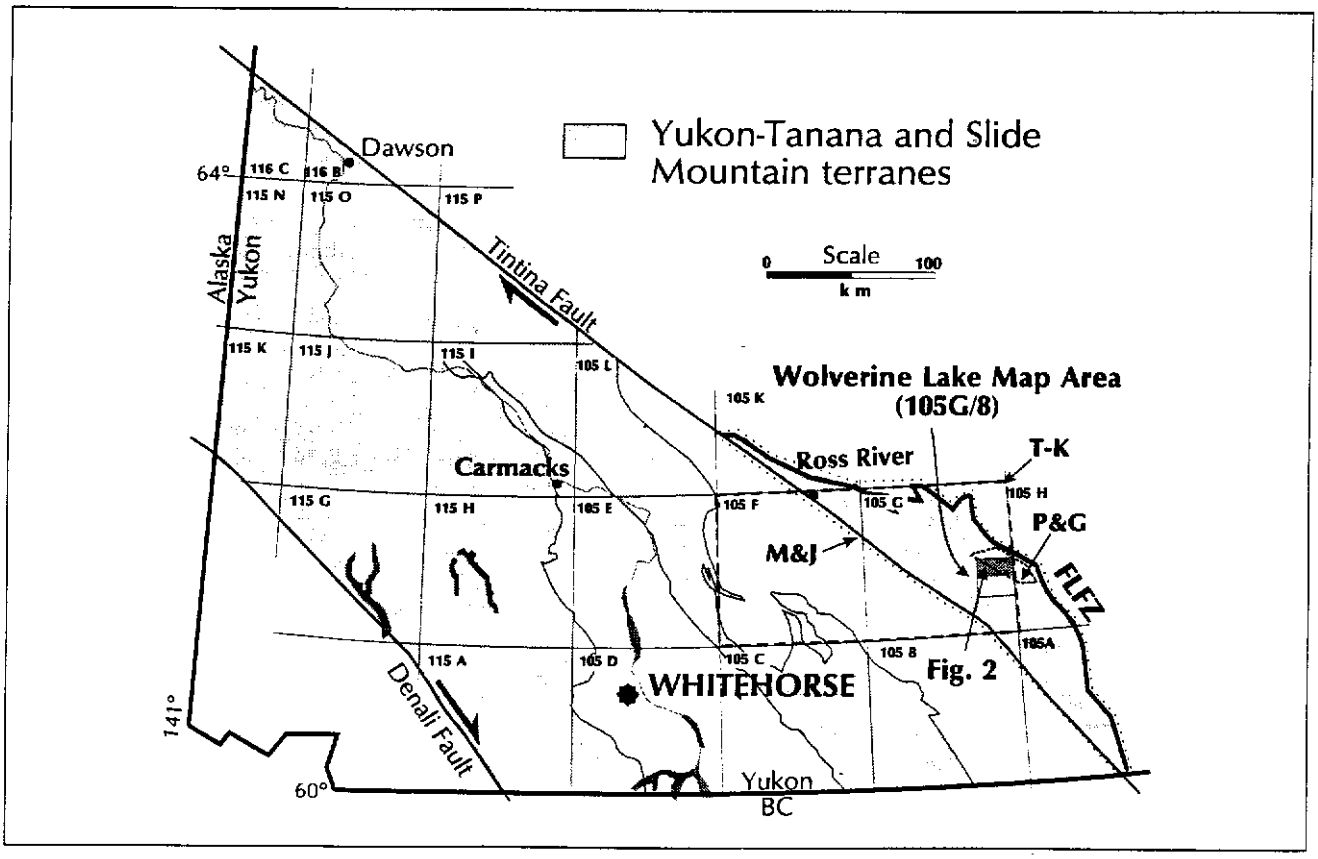
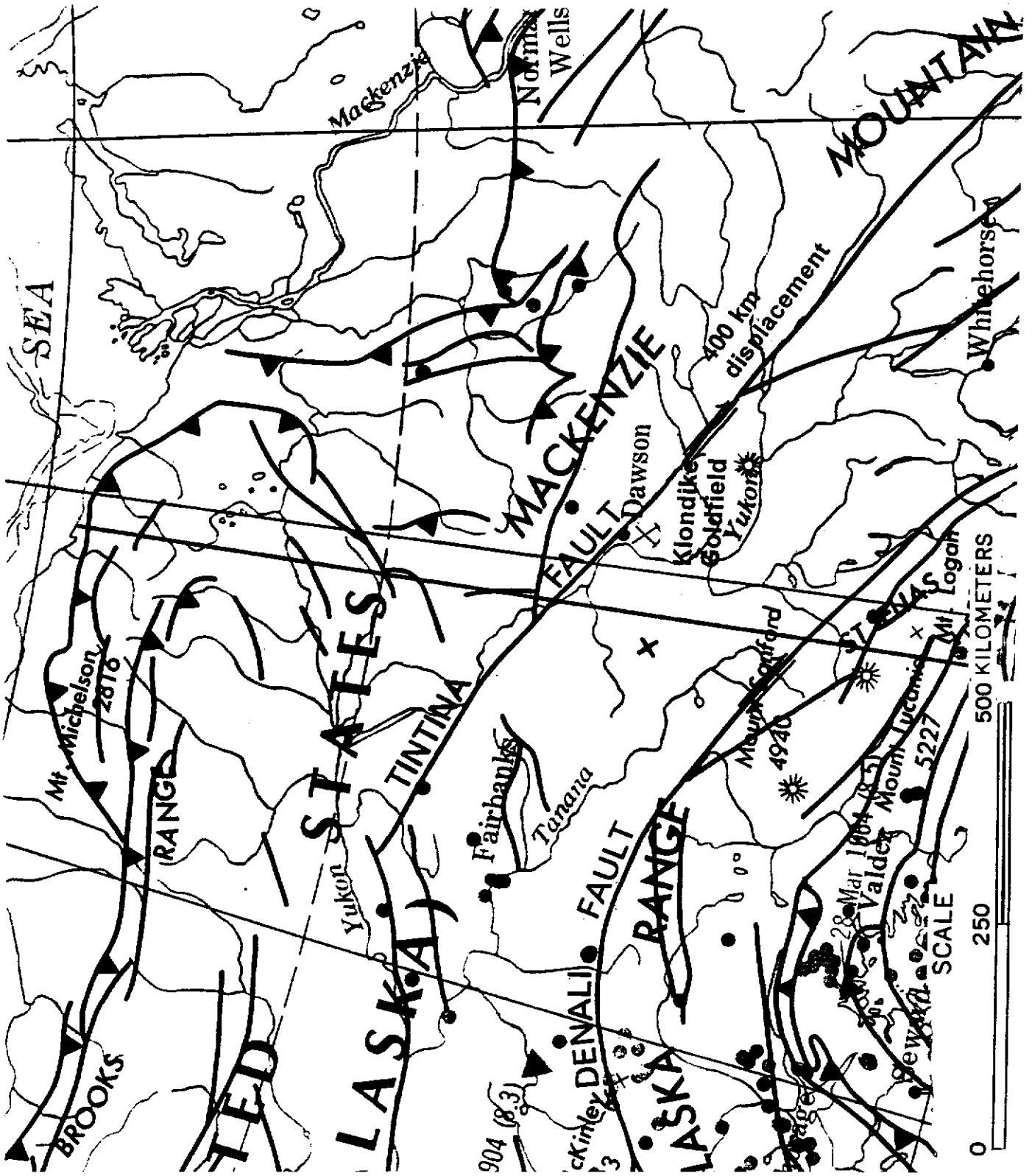
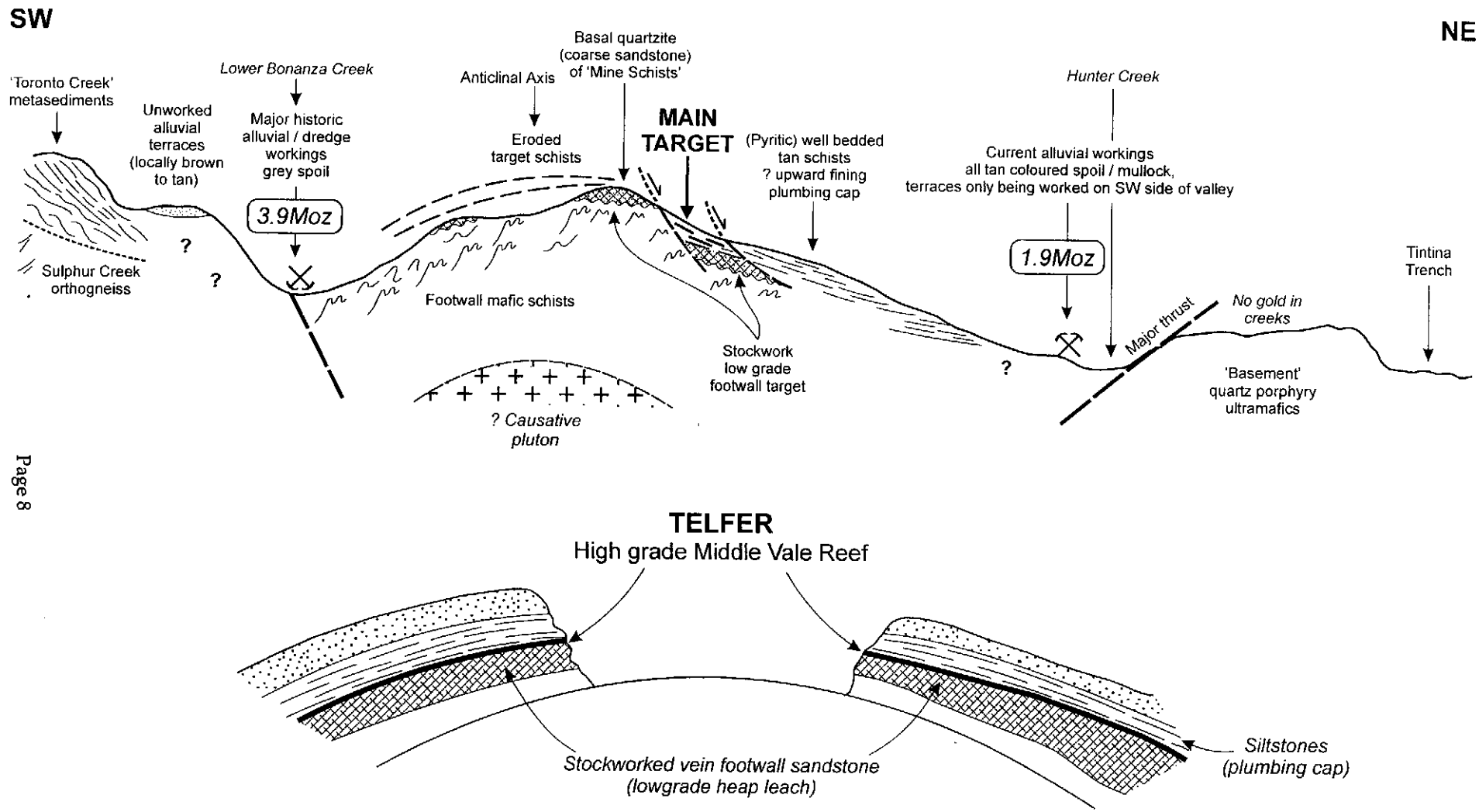


Figure 5 Regional Tectonic Framework

Source: Plate-Tectonic Map of the Circum-Pacific Region: Northeast Quadrant, Circum-Pacific Council for Energy and Mineral Resources, Circum-Pacific Map Project, 1981. Published by AAPG.





Sketch Cross-Section between Lower Bonanza Creek and Hunter Creek; the Telfer analogy

Figure 6

Prepared by RobSearch Australia Pty Limited

2.4 District Geology

2.4.1 Mortensen's Map

This, to date, is the best of the geological maps of the district (cf. the "mud map" in Boyle, 1979), and is a synthesis of 20 years of geological fieldwork in the Yukon. However, it certainly was not based on any use of aerial photography. The major important stratigraphic components of the district noted by Mortensen and defined by Hunker Creek/Klondike River in the north and the Indian River in the south are tabulated below (Table 1).

Table 1 Major Important Stratigraphic Components

Post-Accretion		
	Eocene:	Quartz-feldspar porphyry stocks and dykes
	Late Cretaceous:	Andesite flows and breccias, undeformed intrusive rocks
		Massive quartz feldspar porphyry and hb-bio granodiorite
	Early Cretaceous:	Massive hb-bio granodiorite
Pre-Accretion		
	Mid-Late Permian:	Klondike Schist Assemblage - marble, quartz-feldspar-muscovite chlorite schists subdivided by major mineral component
	Middle Permian:	Sulphur Creek orthogneiss; quartz monzonite gneiss, moderate to strongly foliated
	Late Devonian - Early Mississippian (E. Carb.):	Greenstone/diabase, ultramafics
		Graphitic and non-graphitic quartz-muscovite-chlorite schists, mica quartzite amphibolite-facies equivalents (amphibolite, garnet)
		Mt Burnham Orthogenesis; quartz monzonite

The age classification has been largely based or confirmed by isotopic age dates: Rb/Sr, K/Ar and some zircon.

I am sceptical of all the age dates until we have confirmed or modified my photogeological interpretation, and I am therefore suspicious of the Assemblage Classification. However, there are obviously major rock assemblages of entirely different derivation: ophiolitic, shallow marine, igneous, etc.

2.4.2 KSL Photogeological Studies

In summary, I have developed a simple stratigraphy for the Klondike district with a very complex and probably long history of faulting.

Stratigraphy: The stratigraphy can be described simply and it is significantly based on a verbal summary of the Wolverine district given to me by Don Murphy on my recent visit to the Yukon. It is summarised with the tectonic history in Table 2.

There are alternative stratigraphic positions for some of these units, particularly the lower Sulphur Creek orthogneiss and overlying "Toronto Creek" metasediments. Also, the position of the marbles mapped by Mortensen in the district is unknown.

However, the carbonate rocks are located close to the granitoid "basement" of the district (Sulphur Creek and Mt Burnham Orthogneiss) and represent marginal marine facies of the

"Klondike Mine Schists" of more likely the "Toronto Creek metasediments". The latter metasediments are almost certainly mylonitised in the Toronto Creek are in the south, between Quartz and Sulphur Creeks), but thicken substantially in the north west, forming the non-auriferous hinterland west of Eldorado and Upper Bonanza Creeks.

Table 2: KSL's Initial Klondike District Stratigraphic Table

Age	Stratigraphy and important geological events	
Plio-Pleistocene	Two obvious erosion cycles resulting in placer gold deposits	
Late Tertiary	Nugget formation, predating last deformation/uplift	
Post-Eocene	Major episodic uplift and 400 km northerly displacement along the Tintina Fault Zone	
Cretaceous	Porphyry intrusions	
Age unknown ?Permian	"Klondike Mine Schists":	• tan (pyritic) quartz-muscovite schists • rusty weathering quartz-muscovite schist (includes pale brown coarse muscovite quartzite)
	MAJOR UNCONFORMITY: TAKANA TERRANE CRATONISATION	
?Devonian-Mississippian	"Footwall Mafic Schists":	• massive jointed, felsic metavolcanics, minor(?) inferred unconformity • well-banded and multiple folded (ductile; RWM pers. comm.) dominantly chloritic schists, some felsic schists; boudinaged quartz veins • massive, probably boninitic, mafic metavolcanics, chlorite schists and graphitic schists
	?MAJOR UNCONFORMITY?	
	"Toronto Creek metasediments"	• quartz feldspar-muscovite augen schists; (mylonitic) • Sulphur Creek Orthogneiss
	MAJOR UNCONFORMITY	
	Sulphur Creek paragneiss/Mt Burnham Orthogneiss	

Structure: The complexity of structural deformation, particularly that due to the post-Eocene uplift and displacement along the Tintina Fault zone has been identified. But it is by no means fully understood in terms of identifying specific faulting/deformation episodes (D1 to Dn).

There are, however, some structural elements which have been identified photogeologically, and which have been partly confirmed during the recent initial field visit in mid May 1999. These are:

- **Dip and Scarp Slopes:** Scarp slopes formed of older, more complex metamorphic rocks (e.g "Chlorite/Footwall Mafic schists"). Topographic maps and the LANDSAT (Fig. 2) clearly show that, between Eldorado Creek and Upper Bonanza Creek and the Bonanza and Hunker Creek drainages, the ridge line is asymmetrically located. Long creeks extend down the dip slope, and short creeks are on the scarp slope.
- **Two major domes:** Reference to Figure 2, the LANDSAT image clearly shows the major placer-worked creeks forming two domes: (1) bounded by the Bonanza and Hunker Creeks drainages and (2) in the SE by the Sulphur Creek and Dominion Creek drainages. Both domes are elongated, effectively elliptical, with the long axes parallel to the Tintina Fault.

  One can reasonably speculate that there could be a causative pluton at depth. There is very limited evidence, except for feldspar porphyry dykes and sills locally reported in the north western "Bonanza or Hunker" dome (a large acid porphyry has been mapped by Mortensen to the north of Hunker Creek). Photogeologically, these felsic intrusives are observed to intrude the older "Toronto Creek" and Footwall Mafic" schist units, and <u>not</u> the prospective "Klondike Mine Schists".
- **Thrust sole planes:** The RADARSAT image illustrates these features best and the major Sulphur Creek Thrust is almost certainly the major structure of the King Solomon Dome locality (Figure 2). This latter feature is the Goldfields district high spot, and clearly reflects the buttress effect of massive "basement". The basement is, I infer, massive boninitic lavas or meta-gabbroic rocks in the Upper Hunker area, which can be distinguished photogeologically and are reflected in NE-trending magnetically enhanced terrain (cf. Barramundi's low level aeromagnetic survey).
- **Two major thrust trends:** The RADARSAT shows dramatically a dominant NW-SE striking set of faults. The photogeology shows that these faults are most prominent in the southern part of the district immediately north of the India River.

  This direction is parallel to the Tintina Fault Zone and there is obviously some, perhaps locally significant, dextral displacement. But they are NE -directed thrusts almost certainly related to late-Palaeozoic cratonisation. The WNW-trend of foliation in the Sulphur Creek gneiss is obviously related.

  The second set of thrusts are arcuate, dominantly E to SE-directed/dipping features related to the Tintina right lateral shear system. The Sulphur Creek thrust is the most prominent. A pervasive 255° trending lineation on the photographs, and noted in the field as a chevron schistosity lineament, is an associated feature.

2.4.3 The Telfer Stratigraphic/Structural Analogy

These notes have not summarised older explanations for the lack of hardrock gold (cf. Boyle, 1979), or the possible hardrock source (e.g. VNS, Barramundi, 1998). These two theories in particular are geologically inadequate due to the lack of known processes for concentration of gold from very minor quartz-vein mineralisation or the obvious enormous volume of iron-rich, sulphides required. The latter would form a veritable upstanding gossanous Fe-deposit!

Consider the following facts:

- no major vein-quartz swarms (would form obviously high ground: Hans Madeisky, pers. comm.)
- no evidence for major Tertiary volcanism and erosion of a huge epithermal system — it would leave Taupo (NZ) district calderas easy to identify;
- the world's largest (by an order of magnitude) gold systems are sediment-hosted (Ballarat/Bendigo, Murantau and Sukoi Log in the USSR, Carlin in Nevada, and South Africa's Witwatersrand). NB: Different geological processes formed these giant gold fields.
- the major structural components of sediment hosted mineralisation are either dilational areas of folds (anticlinal saddle reefs) or reactive permeable rocks (cf. Nevada carbonates below the Roberts Mountain Thrust); these structural domains are essentially flat-lying or have a plumbing seal which is shallow-dipping.

The only new major goldfield discovered in Australia outside of Archaean terranes in the past 30 years is the Paterson Province's Telfer field. It is a sediment-hosted, multi-stacked hydrothermal mineralisation much more extensive than the single, multi-pit, mining operation of Main Dome and West Dome may suggest. Telfer stratigraphy and structure is well-known to us, having been defined initially by Bob Adamson, and is not discussed here. However, the Main Dome overlies a major gravity low, indicative of a plutonic (?causative) body at depth.

Figure 5 illustrates however, very simply, a cross-section of the key Klondike stratigraphy and structure defined by KSD and related alluvial workings.

In plan (1:50,000 prelim. compil.) the NW trending anticlinal structure is subtly defined on the aerial photography. The crest of the structure has been nearly completely eroded, leaving only vestiges of the lowermost quartz-muscovite schists of the "Mine" sequence, but there are extensive domains of the prospective tan (pyritic) schists on the north eastern flank. These schists are the major target for higher grade mineralisation.

In addition, there are two other targets, one smaller tonnage, high-grade, one low-grade but potentially very large:

- possible **feeder zone structures** — consisting of what appear to be (?)silicified ridges trending NE — the continuations of which are creeks (e.g. the aptly-named Last Chance Creek) draining north easterly down the dip slope into Hunker Creek; and
- the **basal quartzitic schists** which form the present day ridge crest — these metasediments would be an analogous target to the stock-worked (low-grade, heap leach) mineralisation in the sandstone below the high-grade Middle Vale Reef at Telfer.

2.5 District and Regional Gold Mineralisation

2.5.1 The Cretaceous Tintina Gold Belt

The Tintina Gold Belt relates metallogenetically to Cretaceous-age, granite-hosted gold mineralisation located on both sides of the Tintina Fault (Fort Knox and Pogo in the western Alaskan accreted-terrane sector and Brewery Creek plus other prospects along an east-west structure east of Dawson in Pre-Cambrian basement). Fort Knox is a low-grade gold (1-1.5 g/t) bismuth-molybdenum association similar to Ross Mining's (ex-Levu Gold) Timbarra (Tenterfield, NSW) gold mine.

2.5.2 The (?) Permian Klondike - Sediment-hosted model

The sediment-hosted, sulphidic gold mineralisation of the Klondike has about 2:1 to 3:1 gold-silver ratio, probably significant arsenic, minor base-metals, minor mercury, base-metals and barite. The reported wood tin may be derived from auriferous sulphides or VMS in the boninitic

Footwall Mafics, or most likely the younger Cretaceous quartz feldspar porphyry intrusives (cf. New England's Fort Knox-type gold deposit, Timbarra, in a stanniferous region).

I originally considered that the Klondike gold system was Cretaceous, and it still could be, if related to the porphyry intrusives found in the field. But metallogenetically, it is substantially different and an order of magnitude larger than the known Cretaceous/Tintina Belt deposits. I favour a late-Palaeozoic age (?Permian) with a boninitic (Komatitic type) substratum accreted, then extensional basin development, then plutonic doming and mineralisation.

There are some interesting geotectonic affinities to Archaean major goldfields (e.g. Kalgoorlie-Kambalda with a komatiitic substratum) episodically along major crustal fractures (Bouder-Lefroy/Tintina) for tens of kilometres, and/or occurring on "hinge zones" marginal to Archaean cratons (Telfer, ?Sukei Log).

3. NOTES ON PREVIOUS EXPLORATION

3.1 Hunker Dome: Barramundi / UKHM

Barramundi entered the Klondike district initially via a JV with United Keno Hill Mines (UKHM). The latter company had defined a number of vein-quartz prospects in the central Hunker Summit/King Solomons Dome district of the Klondike Gold Field.

UKHM's exploration work is ably described by McFaull and Davidson (1996). This work and subsequent soil geochemical surveys by BAM in this district have limited, if any, value to KSL's exploration model, because:

- vertical quartz veins are not our target, these hydrothermal veins are small throughout the Klondike and almost certainly relate to dilational focii in late Tertiary (Tintina Fault related) thrusting,
- BAM soil surveys are probably (not certainly known) located over the soles of thrusts, based on the photogeological interpretation, and
- the area of this exploration has been retained by BAM ("Excluded Area" of JV Agreement).

The only piece of data of unfortunately doubtful 'value' concerns a pyritic mica schist sample found as a 'floater' which assayed "30 g/t gold" and for which there are photomicrographs showing fine-grained (+/- 10 micron) native gold. It is best ignored — it is outside immediate JV area, exact location unknown, we have no idea of sampling etc., — and it certainly SHOULD NOT be reported in the public domain, until we have BAM permission in writing.

3.2 Stream Geochemistry

BAM, subsequent to the farm-in deal with UKHM, staked a large area of the Klondike Gold Field, including a substantial part of the area now re-staked for the KSL JV.

Exploration by BAM of these claim blocks was limited to a stream sediment sampling survey. The results were abysmal, with gold anomalism in the 15 to 25 ppb range for creeks draining into million ounce recovered placer workings. The full details of their survey have not been collated (the information: sample point plans and sample no. assay sheets are in RobSearch E-mail files which have caused a problem to download, but data are compiled in BAM report recently — June 7, 1999 — acquired from Ray Soper: **Stevens, R 1997, Stream Sediment Survey Report - 1996; A Geotechnical Report for the Hunker Dome Project.** Report prepared by Barramundi Gold Ltd for Dawson Mining Recorder's Office.)

However, values for Cu, Ba, Zn and the reported presence of wood tin in dredge tailings concentrates has led Barramundi to speculate that there is a VMS source for the gold (BAM, Annual Report, 1998). Other elements locally "anomalous" include Hg, As and Ag.

None of these anomalies have any obvious spatial coherence, although some clustering occurs perhaps notably in the Gold Bottom Creek - Upper Hunker Creek area.

What should interest us is an explanation for the poor gold values, notwithstanding our lack of knowledge of sampling procedures, etc. The following facts appear relevant:

- locally there are slopes in the order of 25° to 30°, but most of the hills have gentle 5°-15° dips,
- the hills have a blanket cover of moss with second generation spindly birch and alder; (the hills were all clear felled in the heyday of placer mining,
- there is no active erosion in the headwaters of the creeks, extraordinarily little evidence for landslips due to permafrost solifluction, and
- the district rainfall is low (almost 600mm), virtually all of which occurs as winter snow.

Thus there are very slow moving, peaty (high humic acids) waters moving down the creeks which are probably leaching gold and base metals rather than providing a precipitating mechanism. This suggests that hydro-geochemistry could be a better medium than the minimal sediments (?carbonaceous silt) in the creeks.

Once we find in-situ hardrock gold mineralisation of potentially economic grade, we must undertake well-designed geochemical orientation surveys to define appropriate methods for this region and probably elsewhere in the Yukon, i.e. a case history.

3.3 Other Ground Exploration Programs

Notes on the major gold occurrence, exploration work in the public domain and a location map are contained in Appendix III.

Kennecott: It is likely that the most significant exploration in the district undertaken over the past 20 years relates to Kennecott's work on or around the Lone Star hardrock workings (Appendix III: Minfile 115O 072) in Klondike Gold Ltd's (KG) ground between Upper Bonanza and Eldorado Creeks. Given the continuation of negotiations between KSL and KG, it is likely that we will sight, and find very useful, the primary exploration data held by KG. It would appear that Kennecott only spent in the order of C$0.5 million out of the total expenditure of $7 million KG says it has spent on their claims.

Cominco: This Canadian major undertook exploration in the northern part of the Hunker Dome, largely/partly over ground that is being currently staked for the KSL-BAM JV. The exploration data is in the public domain and remains to be accessed by KSL. BAM has not been able to find any evidence of any drilling by Cominco (BAM, Annual Report, 1998), but it is significant to note that Stevens (op. sit.) reported that a large arsenic soil anomaly occurred north of BAM ground and probably relates to KSL-BAM JV claims staked over the Cominco grids (cf. air photos, A1).

3.4 Aeromagnetic Surveys

The Yukon, including the Klondike district, has regional scale (1/2 mile spacing) aeromagnetic surveys dating from the 1960's. This analog data for the Yukon has only been converted to digital format from the original contour plans and not the primary flight lines or profile data.

The magnetics signature throughout the Klondike region (and neighbouring terranes to the SW) is in the order of 200 to 300 nanotesals. This is very subdued, but nevertheless there appear to be some interesting features. The regional magnetics, and in particular, the recent BAM detailed survey show NE-SW striking magnetic features, antipathetic to any major surficial geological structure and the NW-trending Tintina Fault Zone. The high magnetic domain of the BAM survey is closely related to the "Footwall Mafic Schist" unit of the KSL stratigraphy, and this magnetic structuring provides evidence that a major unconformity exists between the "Footwall Mafic Schists" and the "Mine Schists".

Another feature of interest is the presence of NE-orientated magnetic lows which could be the signature of de-magnetisation along feeder structures of the plumbing system. These NE-striking features are a re-working of a structural element in the "Footwall Mafic Schist" and in the overlying NW-trending "Mine Schists" (sedimentary basin/subsequently mineralisation causative plutonic body or episode) which would have been dilational throughout time.

It should be noted that only a small part of the KSL-BAM JV area is covered by BAM's low level detailed aeromagnetic survey, and, as such, is insufficient to be of significant use. If the thesis above about the magnetic low has validity, careful consideration should be given to:

- ground magnetic traverses along NW-SE lines, and
- future low-level aerial surveys similarly orientated

NB: We know that KG has recent (1990's) aerial magnetic data from a Kennecott survey (does KG have the original digital data?).

4. PROPOSED EXPLORATION PROGRAM

4.1 Exploration Strategy of the Phased Program

The following strategic requirements need to be met in this order:

- Land tenure control (100% of KSL or JV claims, JV agreements) over key geology,
- Cost-effective definition of drill targets: Geology (photo-interpretation), soil/rock geochemistry, ground magnetics ranking,
- Drill testing: early testing of geological/model ranking methods,
- Diamond drilling with strict attention to professional and company credibility on the bases of discovery ("Planning for Success"); early independent verification of drilling and sampling/assaying security procedures,
- Drill testing to **define resource potential** not resources/reserves (large, bold step-outs to confirm or kill geological/structural models),
- The **objective** has to be a group of, or single deposit, which has potential for:
  - 5 Moz (minimum size for the world's major miners), o/p low cost ($150-200/t) or
  - u/g mechanised: wide structure, medium to high grade.

NB: Underground-type targets need confirmation that the Klondike district is

- seismically inactive, and
- no foreseeable rock mechanics problems could ensue from major district rock strain problems.

Undoubtedly, diamond drilling of underground - likely feeder structures will provide more drilling challenges because of drilling across schistosity (hole deviation, recovery of postulated breccia-type material).

We can foresee some potentially major environmental conflict issues because of the presence of:

- small National Parks of Canada reserves over historic localities (Discovery Claim, Dredge 4, Bear Creek);
- a map showing proposed "Ecological Reserve" along Upper Hunker Creek (extensive current/recent placer gold operations); and

- a public notice (reserving an untouched creek section) on the Upper Bonanza road.

Also, the tourist guide to the Dawson district has a fold-out map of the Klondike Goldfield with a walking trail and camp grounds (2 localities) along the summit ridge, and centre of the KSL-BAM JV area. The old road, probably partially overgrown, extends along the potential low-grade footwall mineralised zone, a major exploration target. And, in addition, this track is the most obvious access for initial — and subsequent, we hope — drilling locations and water transport from the Klondike River.

Outline of Proposed Phases:

Phase 1 (July - end September, 1999)

Time available: 6 to 8 weeks

Primary objectives: Company, technical, administrative and social credibility in Dawson/Whitehorse

Technical Program:

A: Tenement acquisition / Control.

1. Staking major targets in southern "dome" and limestones (Dominion Creek - Gold Run Creeks).
2. Finalising JV's with:
   - Klondike Gold Ltd (requires KG data review)
   - Hawker Claims (Wayne Hawkes, Dawson placer miner)
   - Barramundi / UKHM.

B. Geological: ground truthing of KSL photogeology; structural mapping / interpretation.

C. Geochemistry: orientation soil and pH surveys with follow-up along preferred target zones.

D. Geophysics: orientation ground magnetics; follow-up grid if appropriate.

E. Drilling: possibility - decision end July depending upon progress re JVs, ground access, company strategy and rig availability, etc. (600 to 1000m: 4 to 6 holes); preparation of some drill sites and access must be done for an early year 2000 start.

F. Recce of other Yukon exploration targets:
   - identification
   - claim staking.

G. Statutory reporting.

Corporate/Admin. Program (concurrent):

A. Raise funds!

B. Establish/register, subsid. company in Yukon.

C. Locate Dawson accommodation.

D. Acquire <u>secure</u> premises in Dawson (industrial sub-division called Calliston).

E. Establish good and practical working relationships with Dawson community, in particular:
   - Placer Miners, and
   - National Parks

   NB: Placer miners provide access particularly from the Hunker Creek side and bulldozers for roads and drill pads.

F. Drilling companies (to contact Mike Burke, Yukon Geological Program and Alistair Parton for information) to negotiate drilling contract for late 1999 or early 2000.

G. Dawson office requirements: computer facilities, storage particularly for core, GPS, diamond saw.

Phase 2 (2000 field season):

Budget objective:	minimum 60% on diamond drilling
Exploration Objective:	drill defining Resource Potential
Constraints:	Budget!
Strategies:	Selective farm-outs, raising additional seed capital.

Technical:

Geology:	Drill target definition as in Phase 1, with better/improved cost effectiveness because methods well defined.
Drilling:	1. Complete(?)/commence work for defining Resource Potential of BAM/KSL JV areas, 2. Testing optioned/JV claims (KG, ?Hawker) 3. Testing of 100% KSL claim blocks
Recce:	Continue to identify and stake other exploration targets, and commence initial ground surveys; maximum of 3 areas with reasonable success; if we JV early, get clause for recce JV work.

4.2 Phased Field Program

NOTE: Contract staking has been omitted but not forgotten.

4.2.1 Acquisition of Ground in the Klondike Goldfield

4.2.2 Geological Mapping to Confirm Model

4.2.3 Commencement of Structural Studies

Personnel:	Colin Thomas and Roger Majoribank; John Martyn in reserve.
Time:	1 to 2 weeks field; 2 weeks reporting. Total: 4 man weeks.

4.2.4 Orientation Soil Geochemistry; Baseline Environmental Geochemical Studies

a) **Orientation:**

Personnel: Bob Adamson, Lynda Broughton

Time: 1 week, say 6 man days

b) **Systematic:**

Personnel: Ann Doyle/Peter Ledwidge (Dawson based geologists, undertook similar work for BAM)

Time: 2 weeks (completion: end July - early August) for KSL/BAM area
?2 weeks for other acquired areas (KG, KSL's Dominion dome claim blocks

4.2.5 Ground geophysical surveys

a) **Orientation:** (Over major target defined to date)

Personnel: Colin Thomas / Bob Adamson / AD / PL

Time: 1-2 days, 2 man days.

b) **Systematic:** Subject to orientation and CMT/RM suggesting other "feeder targets", other than major creek features. Ignore in costing.

4.2.6 Drill road and pad preparation

Putting drill roads (improving current tracks for water bowsers hauling from the Klondike River) and drill pads has to be undertaken in the summer months, post-the permafrost thaw. If we want a good start to 2000 drilling, this will need to commence in September for say first 3 - 6 holes; this will be undertaken with minimum damage to the environment using a traxcavator (backhoe) NOT a bulldozer.

Budget: ? $5,000

4.3 Phase 2: Major Diamond Drill Testing

4.3.1 Objectives and Strategy; Definition of Resource Potential for Open Pit Mining

a) **Downdip**
- establish/confirm play in primary sulphide zone
- depth extension to 150-200m below surface in primary zone
- No. of holes: 2, possibly 3

b) **Lateral extent:**
- wide step-out holes, 200-500m
- No. of holes: 2

c) **Establishing company credibility:**

- should we be moderately encouraged to wildly successful pre-assay, we <u>must</u> plan for independent verification (R Cox, Strathcona - BAM should really pay for their Canadian requirement) to observe the final hole in the program and core splitting/sampling. ONLY 2m splits for assay, less is not meaningful except for research.

- Thus, location and design of the first drilling program needs to be carefully thought out so that an observed hole will confirm and add information **before** BAM has to go public, I hope.

d) **The Nugget Problem**

Supergene enrichment and nugget formation probably occurred before the final heave up and along the Tintina Fault. Thus, we should be aware that we may well encounter nuggets/free gold; HQ core will partially assist good sampling, but avoiding sampling of obviously "nuggetty" core in the first instance except under an independent geologists supervision is obvious. It is worth noting that for "nugget evaluation" the obvious method based on my experience of kimberlite sampling, as systematic large diameter drilling can provide better/more relevant statistical results because of inherent irregularity of secondary enrichment of nuggets.

I think the primary zone should be fine grained gold (ref. 2% of visible nuggets in placers, BA Annual Report, 1998 — figure needs checking in literature; and other data, cf. Appendix III, Minfile 072 re Lone Star).

Testing Major Stratigraphic Play; HQ Core;

Vertical Feeder Structural Play

Only one such target well-defined to date (but evidence of others) with positive relief. I am coming to the view that this should be left for the latter 2000 field season, after we have established the prospective Telfer stratigraphic model.

Dealing with Gold Nuggets/Visible Gold

Any visible gold seen in core in the initial drilling should be carefully noted, but not sampled/assayed except under the supervision/sight of Auditing/Verification Consultants.

4.3.2 Drill Program Design

The design of the first exploration program needs to cover:

- down dip/depth continuity, and
- strike continuity.

As noted above in paragraph 4.3.1, wide spaced step-outs on the stratigraphic model are obviously necessary to establish:

- stratigraphic model and prospectivity thereof, and
- lateral variation.

My initial objective would be to test either side, along strike, of an ***internal*** (?) feeder structure, subject to surface geochemistry results. Then for an observed verification hole hit the target in the guts: stratiform and feeder.

4.3.3 Public Reporting and Verification of Results

Commented on in paragraph 4.3.1 (c) above.

5. THE BLUE SKY REWARDS

The dimensions of the Klondike Goldfield are large — 50 x 15 km (750 km^2) — and what was the total gold endowment is impossible to estimate. However, I think it can be argued that the size of the plumbing system and the total of alluvial gold production indicates a total gold endowment at least in the order of 50 to 100 million oz. The gold mineralisation is largely focussed on two domal structures. Structural geology evidence described in this report suggests a strong stratigraphic control with inferred focal point feeder structures.

I think there are good reasons to aggressively pursue exploration only because of the major potential targets which have not been totally eroded.

These targets have substantial dimensions, e.g. 10+ km of prospective "Mine Schist" unconformity in the northern part of the Bonanza Dome.

Thus one or more +5 million oz. gold deposits, consisting most probably as a local group of smaller deposits adjacent to higher grade feeder structures, is not unreasonable. Because of stratigraphic/structural geometry these deposits could be reasonably expected to have low stripping ratios in open pit mining, and given other favourable essential parameters (e.g. non-refractory gold; solution of environmental matters), a potential low-cost ($150-200 oz) for economic viability in the current and foreseeable low gold price regime.

6. THE MAJOR RISKS IDENTIFIED TO DATE

6.1 Erosion of the Major Anticlinal Apices/Hinges

These structural locations could have provided all the gold, but this is unlikely.

6.2 Structural Complications / Poor continuity

Structural complications leading to poor continuity locally due to intense faulting is to be expected; with some potential bonuses where there has been tectonic thickening.

6.3 Thrusting Post-Dating Nugget Formation

Aversion of structural complications.

6.4 Acid Mine Drainage; the Value of Local Limestone

Location of Waste Rock Dumps/Tailings in a notionally "sensitive" area will be a concern in the future. This initial baseline surveys will be necessary, including Klondike Creeks, and the major rivers (Klondike, Yukon).

6.5 National Parks, History and Tourism

A careful watching/information brief required to be pro-active, not retro-active, to exploration surveys and the successful conclusion of proposed major mines.

GEOGRAPHICAL NOTES

Location and Access

- The tenements over which KSL has negotiated farm-in arrangements are located in the **north western area of the Klondike**, some 10 km south east of Dawson. The Klondike area is within the Dawson Mining District on map sheets 115-0-14 and 15 at Lat 63 deg 52'N and Long 138 deg 57'W.
- **Dawson City** is a town of approximately 1,000 people with service and supply facilities, police, fire and medical personnel. There is a regular scheduled airline service to Whitehorse. Charter helicopters are also based in Dawson.
- The **Klondike goldfield** itself is a discrete area, measuring some 50 km in length and up to 20 km in width, with a total area of about 750 km^2.
- Most of the Klondike area can be **accessed readily** from the Klondike Highway, a two lane all weather road from Dawson to Whitehorse, a distance of 535 km. Local roads are usually 1.5 lane gravel roads that are maintained from April to October each year. These 4-wheel drive roads allow reasonable access along the ridges and spurs or along major creek beds to most of the areas of interest.

Climate

- The climate of the Dawson area is typical **northern continental climate**, with low precipitation and a wide range of temperatures.
- The **average annual precipitation** is about 30 cm per year and most of this falls as rain during the summer.
- The **summers** are short and very warm while the **winters** are long and can be extremely cold. Ridge tops are clear of snow by late June and frost can occur at any time during the summer nights.
- Daytime **temperatures** can vary from 40 deg C to -57 deg C.

Topography

- The Klondike district is a thoroughly dissected upland marked by rounded hills and a multitude of small streams tributary to the main watercourses. It is part of the Yukon plateau, an old peneplain that has been uplifted repeatedly. These uplifts have incised the drainages to substantial depths of up to 300m.
- The streams in the Klondike are generally small, averaging about 5m in width with steep gradients at the headwaters, but much lower gradients in the lower reaches.
- The valleys are flat and wide (up t0 750m) in their lower reaches, but gradually narrow towards their heads into steep sided narrow gulches ending abruptly in broad amphitheatres.
- Parts of the old valley bottoms are covered by heavy gravel accumulations, and these also occur as prominent benches or terraces on the lower slopes of the valleys.
- From a distance, the Klondike has a hilly to mountainous appearance, but is in fact a series of long branching ridges. Many of these ridges meet at a central point of land known as King Solomon's Dome. While the Dome is the highest point, it is not appreciably higher than the surrounding ridge tops radiating from it. The ridges are well rounded with slopes of 10-20 degrees.

- King Solomon's Dome has an elevation of 1295m, nearly 1000m higher than Dawson City that has an elevation of 320m.
- Although the ridges are cut repeatedly by deep tributary valleys, the ridges themselves remain unbroken, and it is possible to travel from one side of the Klondike to the other without having to descend into a valley.

Drainage and Structure

- The drainage in the Klondike area is dominated by the Yukon River on the western boundary of the Klondike. To the north, the Klondike River flows west into the Yukon. To the south, the Indian River also flows west into the Yukon River.
- The eastern side of the Klondike is bounded by the Tintina Fault, a north west striking fault with a 450 km right-lateral strike slip displacement. This is one of the largest faults in the Yukon and it has no doubt broken adjacent ground in the Klondike.
- The drainage pattern appears to reflect this, as the main Klondike streams run either parallel or perpendicular to the Tintina Fault. The smaller tributaries tend to favour 45 degree trends to the Tintina Fault, running north-south, or east-west. This gives good reason to suspect that many of the Klondike drainages are structurally controlled.

Vegetation

- Most of the Klondike area was extensively logged and/or burned over during the Klondike gold rush and almost all forest cover in this region is new growth within the last 80 or 100 years.
- The tree line is found at approximately 1200m so almost all of the Klondike is forest covered.
- Forest cover consists of white and black spruce and scrub aspen, balsam and birch. The white spruce is the most common tree in the region and is small on the ridge tops, generally less than 0.3m in diameter to occasionally larger on the valley floors, up to 0.6 m in diameter.
- The higher ridge tops are open or covered by "buckbrush" thickets of aspen, willow, etc.
- Most of the Klondike area is covered by a ubiquitous 0.5m thick moss cover.

EXPLORATION HISTORY

Initial Discovery 1896

- The Klondike has had a long and colourful history of mining for over 100 years, from the discovery of the exceptionally rich placer creeks Bonanza and Eldorado in 1896. The history of the Klondike has been written about extensively and many accounts can be found including "The Klondike Stampede" by Tappan Adney, "The Gold Hustlers - Dredging the Klondike 1889-1966" by Lewis Green, and "Klondike" by Pierre Berton. Officers of the Geological Survey of Canada have also written extensively about the geology of the Klondike since the beginning of this century.
- Gold was discovered in Bonanza Creek in 1896 and thence began a gold rush that rivalled the Californian rush of 1849 and the Victorian gold rush of 1855.
- The sub-arctic conditions immortalised the Klondike in North American legend, with eager gold-seekers travelling to the site under the most appalling conditions. Some 150 river boats serviced Dawson during its heyday.

Alluvial Gold Production

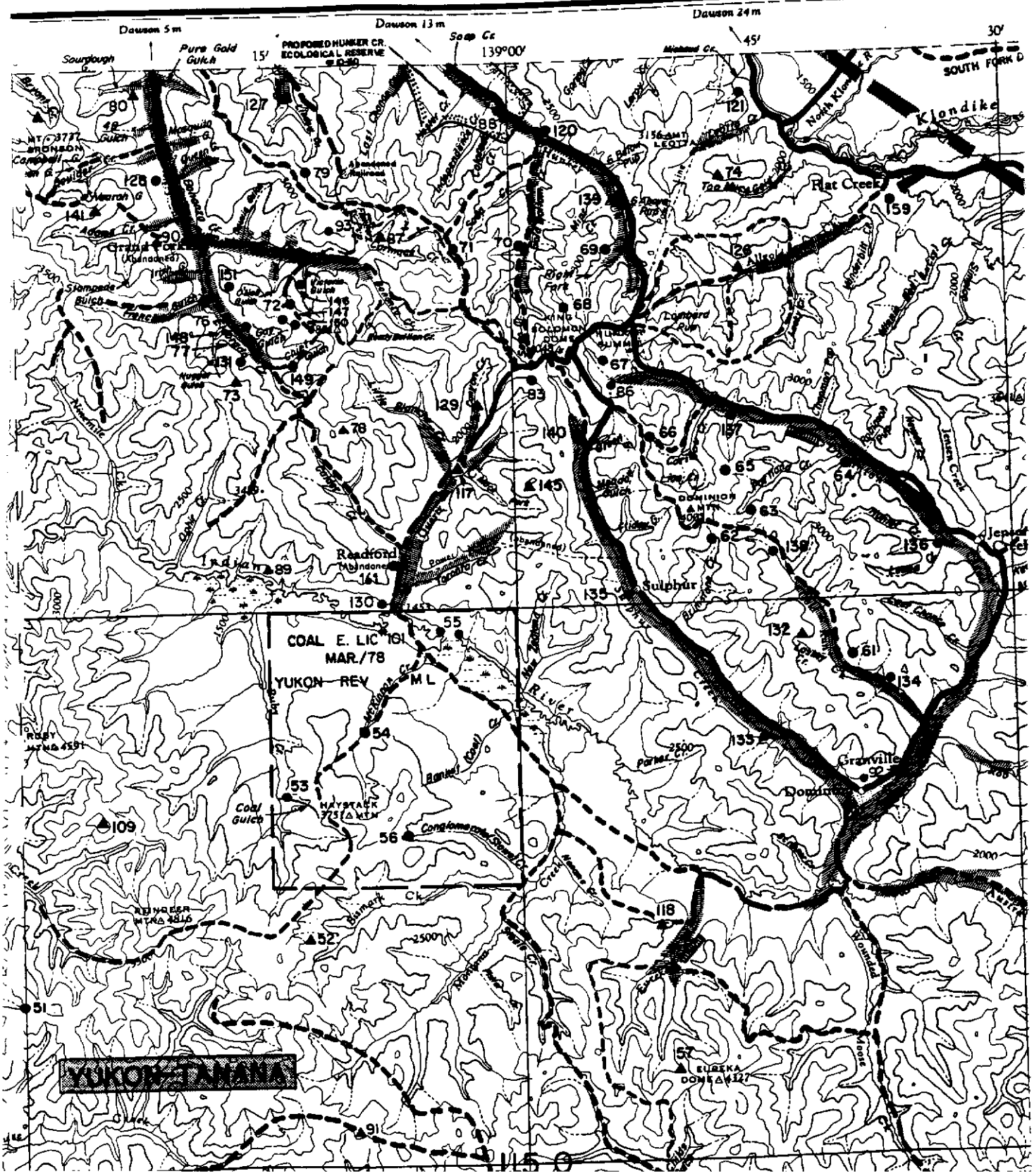
- Hand mining soon gave way to large scale dredging and up until the cessation of dredging in the mid-1950's numerous bucket ladder dredges were employed on the placer operations. There are still some small hydraulic and bulldozer operations on some of the streams
- The Klondike is the location of the fourth largest placer gold camp in the world. Recorded production to date is 13 million ounces of gold, more than half the placer gold production of the Western Cordillera of Canada.
- It is generally accepted that this is likely to understate the amount of gold that shed from the Klondike Hills. Two reasons:
  - Early on in the Gold Rush the Canadian Government imposed a royalty of first 10%, and then 20% of production.
  - To this day the main method of gold recovery is sluicing. However sluices are ineffective at recovering fine gold of less than 200 microns. There is evidence that a lot of the Klondike gold is fine-grained.

  It is estimated that as much as 30 million ounces might have shed from the Klondike hills.
- The bulk of production came from 6 creeks or rivers (Bonanza, Hunker, Dominion, Gold Run, Sulphur and Quartz) which all drain the central hill complex dominated by King Solomon's Dome, with nearly 60% coming from the Bonanza Creek drainage system in the north west sector of the field.
- The primary sources for the placer gold have not been located to date.

APPENDIX III

GOLD OCCURRENCES AND NOTES ON RECENT EXPLORATION

Source: Yukon Minfile, 115 N and O — Stewart River. Exploration and Geological Services Division, Indian and Northern Affairs, Canada and the Mineral Resources Branch of the Yukon Territorial Government (Yukon Geology Program).


Dawson 5m
Dawson 13m
Dawson 24m
PROPOSED HUNKER CR. ECOLOGICAL RESERVE
139°00'
Sourdough
Pure Gold Gulch
Soap Cr
Klondike
Flat Creek
Grand Forks
Abandoned
Stampede Bench
Readford
Abandoned
Sulphur
Dominion
Granville
Dawson
COAL E. LIC 101
MAR./78
YUKON REV M L
HAYSTACK 775 ELEV'N
Conglomerate Summit
Bismark Ck
Coal Gulch
Eureka Dome
YUKON TERRITORY

YUKON MINFILE
YUKON GEOLOGY PROGRAM
WHITEHORSE

NAME(S): Lone Star
MINFILE #: 115O 072
MAJOR COMMODITIES: Au,Ag
MINOR COMMODITIES: Pb,Zn,Cu
TECTONIC ELEMENT: Yukon Tanana Terrane

NTS MAP SHEET: 115 O 14
LATITUDE: 63°53'34"N
LONGITUDE: 139°13'21"W
DEPOSIT TYPE: Vein
STATUS: Underground Past Producer

CLAIMS (PREVIOUS AND CURRENT)

LONE STAR, ROBIN, MOON, BON, DN

WORK HISTORY

Staked as Lone Star, etc cl (9) in Nov/1897 by Messrs. Chute, Corthay and Stewart, who completed a 15 m adit and 16 m shaft by 1903. In 1909, control was acquired by Dr Wm. Catto & Edgar Searle, who formed Lone Star, L and developed the property with an opencut 105 m long and up to 10 m deep, 225 m of drifting and 30 m of shafts, an 1100 m tramway and a 4 stamp mill (which treated 20 to 30 TPD) between 1909 and 1912 at a cost of $42,000. From 1912 to 1914, the mill treated 7650 tonnes of ore with a recoverable value of $25,000. The adjoining Robin, etc claims to the southwest were explored with a 15 m shaft and an open cut in 1912 by Eldorado Dome Quartz Mg CL.

The company reorganized as Cons Lone Star, L in 1925 and drove a 195 m adit and 30 m raise below the old workings in 1929-31. The property then lay idle until 1941, when Pioneer Mg CL optioned the property and sent 27.2 tonnes to a mill for testing. After Yukon Cons Gold Corp L trenched, drilled 6 Keystone holes (205 m) and drifted 60 m in 1946, the property was acquired by F.G. Caley for taxes.

Klondike Lode Gold ML added 185 Moon, etc cl (78700) to the northeast and southeast in 1960 and explored with extensive bulldozer trenching and sampling in 1960 and 1961 and 180 m of core drilling and 84 m of churn drilling in 1961. L. Miller tied on the Bon cl (Y99819) in Jun/75.

In 1979, Caley sold the nine Crown Grants comprising the Lone Star property to a new company, Dawson Eldorado Gold Exploration Ltd, which optioned the adjoining DN etc claims (YA32783) of Klondike Ken Ventures Inc., enlarged the property and explored with geochemical sampling, a resistivity survey and trenching in 1980-81, geological mapping in 1983 and 1984 and geochemical sampling and rock sampling of nearby old workings in 1984. In 1985, Dawson Eldorado drilled 6 percussion holes (183 m).

In June 1986, Arbor Resources optioned the property, performed linecutting, mag, VLF and EM surveys and drilled 12 diamond holes (1 094 m) and 2 rotary holes (320 m). In 1987, Arbor performed an airborne mag and EM survey, grid geochemistry, ground EM and IP surveys, bulldozer trenching and drilled 1 rotary hole (121.92 m).

In 1990 Arbor performed further trenching and sampling and drilled 17 holes (882.4 m). All of this work was carried out in the immediate Boulder Lode area, and forms a small part of Arbor's work on its entire Klondike property, which in August, 1990 consisted of more than 3000 claims covering approximately 1200 square kilometres. Work on the entire property between 1986 and 1990 included trenching, airborne and ground geophysical surveys, geochemical surveys and 69 diamond drillholes (4 518.7 m) and 110 reverse circulation holes (9 919.7 m). Arbor performed more geochemical and geophysical work and trenching in 1991.

In Aug/92, Kennecott Canada Inc optioned the property and drilled 20 reverse circulation holes (1 212 m) on the south edge of the Lone Star zone, and followed up with another 3 100 m of RC drilling (41 holes) in 1993.

Kennecott carried out a GPS survey of the entire Lone Star property at the beginning of the 1994 exploration season. The survey allowed the company to tie in all previous exploration work and allowed meaningful interpretation of all mapped features. Kennecott then carried out a reconnaissance assessment of the entire Lone Star property consisting of geological mapping, rock sampling, trenching and backpack soil

WORK HISTORY (CONTINUED)

augering. Soil samples were collected across the entire property. The soil auger was able to penetrate up to 1 m in depth and samples were collected every 25 m on approximately 1 km spaced lines. Two diamond drill holes (397.6 m) were drilled on the Buckland Shear Zone located 3 km to the southwest (minfile occurrence #115O 077). In Jan/95 Kennecott terminated the option. In Jan/96 Arbor changed its name to Klondike Gold Corp.

GEOLOGY

The Lone Star property encompasses the Boulder Lode occurrence which produced 6940 tonnes grading 5 g/t Au from underground workings in the early 1900's, and also a large low-grade, possibly syngenetic deposit, which contains estimated reserves of 907 200 tonnes grading 2.4 g/t Au.

The claims are underlain by quartz and feldspar augen-bearing quartz-muscovite schist (unit Psa) and muscovite-quartz schist (unit Psqm) of the Permian Klondike Schist Assemblage. First-phase foliations in schistose rocks in the area are strongly deformed into northwest-trending, tight to isoclinal second phase folds which are overturned to the northeast. Plagioclase-phyric mafic dykes and quartz-feldspar porphyry dykes have intruded NNE-trending extensional fractures within the schists. High-angle normal faults with modest amounts of displacement have been mapped on the property as well.

Workings at the Boulder Lode include a small open pit as well as extensive underground workings. Ore was mined from a series of discordant quartz and pyrite-quartz veins and stringers hosted mainly in muscovite and quartz-muscovite schist. The dominant set of veins dips northeast at a shallow angle, and another set strikes north. Quartz also occurs as concordant foliaform lenses, which are unmineralized. The largest vein in the Boulder Lode strikes 120 and dips 40 NE. Visible gold occurs along the vein margins and in narrow pyrite veinlets. Muscovite schist alongside the vein is silicified. A second parallel vein 4.6 m west of the main vein was chip sampled in 1990 and assayed 51.4 g/t Au across 0.3 m.

The Lone Star adit intersected the Boulder Lode at about 30 m, and drifted along it for about 100 m. The workings penetrated below the leached zone and showed clearly that the younger gold-quartz veins contain most of the gold. A large pocket of sulphide ore was found in the opencut, but this could not be treated with the amalgam method used in the mill. Production records show that 7 650 tonnes were milled with a recoverable grade of 5.1 g/t Au and an average gold to silver ratio of about 4:1. Farrell concluded that recovery by the amalgamation method was probably only 75% and that the quartz ore probably averaged about 6.9 g/t Au. The true grade of the showing would have been raised to more than 6.9 g/t Au with inclusion of the sulphide mineralization that was present. A hand-picked sample of sulphides weighing 844 kg was shipped in 1913 to the Selby Smelting Works, San Francisco, and returned $2009 in gold, a grade of about 368.6 g/t.

Ten sacks of waste from the dump shipped to the Trail smelter in 1930 as a test averaged 2.12 g/t Au, with a recovery of 97%. Two selected sulphide specimens collected in 1925 from a shaft below the floor of the open cut returned assays of 11 725.4 g/t and 11 108.3 g/t Au and 2648.4 g/t and 3017.1 g/t Ag. Old records from the Lone Star property indicate that gold is erratically distributed and that the true grade is very difficult to determine. The various geologists who chip sampled this property over the years all obtained assays that averaged less than mill grade, and each concluded that such sampling did not adequately account for the presence of occasional high-grade veinlets or sulphide patches. For example, chip samples of the 1929 adit averaged less than 0.34 g/t Au but muck sampling of 24 drift rounds (about 32 m of drift) in 1930 gave average assays of 6.5 g/t. The following year, 38 rounds averaged 5.8 g/t Au while 14 raise rounds below the floor of the open cut averaged 4.5 g/t Au.

Arbor's drilling and trenching between 1986 and 1990 outlined a concordant, rusty zone 200 m long and up to 31 m thick beneath the Lone Star workings. This zone has potential as a bulk tonnage oxide gold deposit. Trench samples taken in 1988 returned up to 150 g/t Au over 1.8 m. In drillholes, grades range from 2.1 g/t to 24.7 g/t Au over widths of 1 to 25 m. In 1990, drilling within a 250 m section of the anomaly indicated 1 million tonnes grading 2.47 g/t Au across widths up to 30 m. Several high grade intersections assayed up to 27.0 g/t Au.

Kennecott's 1992 drilling was confined to an area of 150 by 250 m in the area of the old mine. Twelve of the 20 drillholes intersected mineralization grading better than 1.5 g/t Au over widths of more than 1.5 m. Hole 92LS20 intersected 19.8 m averaging 3.2 g/t Au, and hole 92LS5 hit a high grade section grading

GEOLOGY (CONTINUED)

10.76 g/t over 4.6 m.

Associated with the Lone Star zone is a broad northwest-trending gold soil anomaly 3 km long and up to 700 m wide, and a coincident 500 x 100 m geophysical anomaly which appears to be located at the intersection of the Lone Star thrust fault and a north-striking vertical fault. A parallel geochemical anomaly covers the Buckland Shear Zone, which crosses Gay Gulch 2 km to the southwest.

In 1994, soil sampling over the main Boulder Lode showing yielded generally higher results than 1982 shallow samples however, direct comparisons are difficult as 1982 soil samples were collected at 122 m intervals. The auger soil gold anomalies lie uphill of the 1982 soil gold anomalies, closer to the source. Geological mapping, rock sampling and remapping of previous trenches on the property failed to uncover new mineralized zones.

Kennecott completed a similar exhaustive exploration program on the adjoining minfile occurrences (115O 073, 077, 131, 146, 147, 148, and 150) which are part of the Lone Star property. The program's failure to outline any new significant new mineralization led Kennecott to drop its option.

J. Mortensen obtained a Permian lead isotopic age from a composite gold-pyrite-chalcopyrite-sphalerite grain from the Lone Star property and has suggested that the mineralization is syngenetic.

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YUKON MINFILE
YUKON GEOLOGY PROGRAM
WHITEHORSE

NAME(S): Buckland
MINFILE #: 115O 077
MAJOR COMMODITIES: Au
MINOR COMMODITIES: Ag
TECTONIC ELEMENT: Yukon Tanana Terrane

NTS MAP SHEET: 115 O 14
LATITUDE: 63°52'35"N
LONGITUDE: 139°15'42"W
DEPOSIT TYPE: Vein
STATUS: Drilled Prospect

CLAIMS (PREVIOUS AND CURRENT)

ELDORADO REEF, HOPE, ROD, JOE, ND

WORK HISTORY

Heavily staked in 1898-1905 and explored with shallow shafts and trenches. Several claims in the Eldorado Reef group, immediately southeast, were later surveyed and taken to lease. Restaked in Mar/60 as Hope, etc cl (78766) by Klondike Lode Gold ML, which conducted limited bulldozer trenching in 1960 and 1961 and drilled one hole (43 m) in 1962.

Restaked as Rod cl (Y65296) in May/72 by R.G. Hilker on behalf of Sullivan and Rogers, who carried out mapping and geochem sampling later in the year and bulldozer trenching in 1973. The adjoining Joe cl (Y65536) to the southeast were staked in Jul/72 and May/75 by J. Lamontagne, who trenched in 1976, and transferred them in May/78 to G. Hakonson, who trenched in 1980. The Rod group was restaked as Ron cl (YA10300) in Jul/77 by G.J. McGinn and transferred in May/78 to Klon ELC, which performed mapping in 1979.

Klondike Ken Ventures Inc tied on the ND cl (YA49724) to the east in May/80 and optioned the claims to Dawson Eldorado Gold EL in 1981. Dawson Eldorado explored with geochem sampling and rock sampling of old workings nearby in 1984 and bulldozer trenching in 1985. In Jun/86 the property was optioned to Arbor Res L, which explored with linecutting, mag, VLF-EM surveys and percussion drilling in 1986, and an airborne mag and EM survey, grid geochem, EM and IP surveys, bulldozer trenching, one diamond drill hole and 3 rotary drill holes in 1987, and geochemistry, geophysics and trenching in 1988.

Faith ML optioned 50% of Arbor's interests in Jun/89 and performed geochem surveys and trenching later that year. In 1990, Arbor performed an IP survey and drilled a rotary hole at the intersection of Gay Gulch and Eldorado Creek, and trenched in the area of the 1987 drilling. In Dec/92 the Joe claims were transferred to Klondike Reef ML.

Kennecott Canada Inc. optioned the property in 1992, and drilled 4 reverse circulation holes (540 m) in 1993. In 1994 Kennecott carried out a reconnaissance assessment of the entire Lone Star property (minfile occurrences #115O 073, 131, 146, 147, 148, and 150). The program included digitizing of previous exploration data, geological mapping, rock sampling, trenching and backpack soil augering. Two diamond drill holes (397.6 m) were drilled on the Buckland Shear Zone. In Jan/95 Kennecott terminated the option agreement. In Jan/96 Arbor changed its name to Klondike Gold Corp.

GEOLOGY

This showing is similar to the Lone Star (minfile occurrence #115O 072) to the northeast and consists of locally gold-bearing quartz veins cutting strongly deformed muscovite and muscovite-quartz schist (unit Psqm) of the Permian Klondike Schist Assemblage. The veins contain scattered grains of pyrite and galena and traces of visible gold. Assays by Klondike Lode Gold ranged up to 96.0 g/t Au over 0.7 m. A grab sample collected by Gleeson (1970) assayed 62.7 g/t Au and 13.7 g/t Ag. The 1987 diamond drill hole at the mouth of Gay Gulch cut quartz augen-bearing quartz-muscovite schist (unit Psa) and a mafic dyke or sill. Several major and minor shear zones were intersected and core recovery was poor. A few thin quartz veins with some pyrite cut the schist, but all assays were low.

GEOLOGY (CONTINUED)

Sampling in 1985 returned assays of 5.8 g/t to 10.3 g/t Au from zones up to 1.5 m wide exposed in three trenches along a length of 32 m. The percussion drilling returned inconclusive results. The 1987 work reaffirmed that mineralization is best developed in the previously known area further east on Gay Gulch, with the highest assay (7.2 g/t Au over 3 m) coming from the diamond drill hole.

The 1989 IP survey outlined a 300 m long anomaly at the junction of Gay Gulch and Eldorado Creek. Narrow quartz veins from this area returned assays up to 42.5 g/t Au. Arbor's 1990 drillhole intersected 2.8 g/t Au over 3.0 m.

Four trenches in the area of the 1987 drilling exposed a gold-bearing vein over a strike length of 900 m. Assays ranged from 36 g/t Au to 46.6 g/t Au over an average width of 0.5 m. Subsequent trenching showed that the vein is associated with a vertical northwest-trending shear zone, referred to as the Buckland Shear Zone. The zone is 10 to 20 m wide and has been traced for 1.4 km. A sample from trench 90-20, near the southeast end, assayed 1.9 g/t Au across 4.0 m. Trench 90-4, one km further to the northwest, returned an assay of 1.6 g/t Au across 12.5 m. Two drillholes that intersected the shear zone at depth assayed 6.51 g/t Au across 4.5 m and 3.57 g/t Au across 16.8 m.

Ladder-style quartz veins fill tension gashes in the shear zone and extend 150 m or more into the adjacent wall rocks. Crushed, bleached material within the shear zone is quartz-sericite altered and carbonatization extends 10 m or more into the wall rock. Schist within the carbonatized zone contains micron-sized gold particles and has assayed up to 8.6 g/t Au. The shear zone is associated with a series of magnetic lows which project 7 km northwest into Eldorado Creek.

Placer mining operations in the 27 Pup area are reported to have uncovered narrow pyritic quartz stringers with visible gold, with assays ranging from 1714 to 4457 g/t Au.

Kennecott used a backpack soil auger to carry out property wide reconnaissance soil sampling. A soil sampling line running from the Lone Star ridge down across the Buckland Zone identified a 400 m interval with anomalous Au values up to 355 ppb. Chip samples from a 350 m long trench on the anomaly returned consecutive assays of 2.35 g/t Au over 12.0 m and 26.5 g/t Au over 2.0 m. The mineralized interval coincides with a concentration of quartz veins which cut metamorphic foliation. Visible Au on pyrite was noted within the high grade Au sample.

Two diamond drill holes (397.6 m) were drilled to verify intersections of 4.5 g/t Au over 6.7 m and 3.5 g/t Au over 15.2 m reported from 1987 diamond and reverse circulation holes drilled on the Buckland Shear Zone. Hole 94LS-07 tested the mineralized zone at a vertical depth of 60 m and produced a 4.7 m intersection grading 4.6 g/t Au and 4 597 ppm As. Hole 94LS-06 tested the mineralized zone 100 m down dip from hole 94LS-07, and returned peak values for Au and As of 65 ppb and 858 ppm respectively. The discontinuity in mineralization down dip, combined with its variability along strike was judged by Kennecott to severely limit the potential for a bulk tonnage target.

Three trenches near the Buckland Shear were cleaned out and/or extended and resampled. The best results were from Trench 90GGTR-06 which returned 3.71 g/t Au, 3.01 g/t Au, 1.25 g/t Au and 1.17 g/t Au from non-consecutive 2 m chip samples of quartz feldspar augen schist. All were associated with crosscutting quartz veins containing up to 2% pyrite. Visible Au was observed as a 1 mm crystal on the surface of a weathered pyrite cube within a quartz vein from this trench. The other 2 trenches did not return significant Au values.

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YUKON MINFILE
YUKON GEOLOGY PROGRAM
WHITEHORSE

NAME(S): Flannery
MINFILE #: 115O 093
MAJOR COMMODITIES: -
MINOR COMMODITIES: -
TECTONIC ELEMENT: Yukon Tanana Terrane

NTS MAP SHEET: 115 O 14
LATITUDE: 63°55'31"N
LONGITUDE: 139°10'55"W
DEPOSIT TYPE: Unknown
STATUS: Uncertain

CLAIMS (PREVIOUS AND CURRENT)

CENTENNIAL, HF, BON, TOP

WORK HISTORY

Staked as Centennial cl (6583) by A. Johnson and J.H. Richardson in Mar/03. Restaked as HF cl (Y82497) in May/74 by H.C. Fromme, and as Bon cl (YA84632) in Jun/84 by a joint venture between United Keno Hill ML and Falconbridge L.

Faith ML tied on 79 Top cl (YB31025) to the east in Jul/90 and trenched and sampled in 1991. Hastings Management Corp. soil sampled on the Top claims in 1992. Wealth Resources Ltd purchased a 50% interest in the Top claims in Sep/92. In May/93 the Top claims and adjoining Cab claims were included in a package of claims optioned to Kennecott Canada Inc by Arbor Resources Ltd (the parent company of Wealth Resources and Faith Mines).

In 1994 Kennecott Canada Inc carried out a large program of ground geophysics, auger soil sampling, prospecting, rock sampling and mapping on Arbor's claim holdings in the Klondike region. In Jan/95, Kennecott dropped its option. In Jan/96 Arbor Resources changed its name to Klondike Gold Corp.

GEOLOGY

The area is underlain by the Permian Klondike Schist Assemblage. Quartz-muscovite-chlorite schist (unit Psq) and minor interlayered chlorite schist (unit Psc), are overlain to the southeast by rusty weathering muscovite-quartz schist (unit Psqm). Old newspaper accounts report that a gold-bearing quartz vein was discovered on the Centennial No. 1 claim in 1906 but this was never confirmed.

Hastings Management's work did not return any significant soil anomalies from the Top claims.

In the Flannery Pup area of Upper Bonanza Creek, Kennecott found a cobble of quartz-arsenopyrite that assayed 2.64 g/t Au but could not locate a bedrock source. Reconnaissance auger soil lines west of Flannery Pup on and around the Lone Star occurrence (minfile occurrence #115O 072) revealed three spot anomalies of up to 150 ppb Au. No follow-up work was performed.

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YUKON MINFILE
YUKON GEOLOGY PROGRAM
WHITEHORSE

NAME(S): Lindow
MINFILE #: 115O 127
MAJOR COMMODITIES: Au
MINOR COMMODITIES: -
TECTONIC ELEMENT: Yukon Tanana Terrane
NTS MAP SHEET: 115 O 14
LATITUDE: 63°59'09"N
LONGITUDE: 139°13'19"W
DEPOSIT TYPE: Vein
STATUS: Showing

CLAIMS (PREVIOUS AND CURRENT)

HOMESTAKE, FORTUNE, BEA, ZIP, KLOT, COMET, SKI, POD, MOON, PENIBE, FISH, ALPHA, ZIP

WORK HISTORY

The Homestake, Fortune, etc cl (12125) were staked in this vicinity in Jul/11 by J. Nicholas. Restaked as Bea cl (YA80654) in Jun/84 by a joint venture between United Keno Hill ML & Falconbridge L. Dawson Eldorado Gold EL tied on Klot cl (YA80622) to the east in Jun/84. Dawson Syndicate staked the Moon, Fish, Alpha, Q-T, Pod and Penibe claim groups in the area in 1983 and 1984, and tied on Zip cl (YA84428) to the west in Aug/84, and restaked the Klot group as Comet cl (YA87834) in Feb/86. United Keno explored with trenching and sampling and Dawson Synd conducted mag, VLF-EM and geochem surveys and mapping in 1986. Avanti Mls added Ski cl (YB23395) to the north in Dec/88.

Restaked Apr/90 as Pod claims (YB30095) by Arbor Resources Ltd. The Comet 1-42 cl, Moon 1-55 cl (YA79671), Fish 1-24 cl (YA84476), Alpha A-P and Q-T cl (YA79850, YA84286), Pod 1-20 cl, Zip 1-40 cl (YA84428) and Penibe 1-31 cl (YA84296) were optioned to Kennecott Canada Inc in May/93. In Jun/93 Kennecott performed geological mapping on the Penibe claims. In 1994 Kennecott intended to follow up magnetic anomalies identified from aerial surveys over the Pod claims and cut a grid but cancelled the work after poor results obtained elsewhere on Arbor's property. Kennecott prospected the neighbouring Gus claims. In Jan/95 Kennecott cancelled its option. In Jan/96 Arbor Resources Inc changed its name to Klondike Gold Corp.

GEOLOGY

The area is underlain by quartz and feldspar augen-bearing quartz-muscovite-chlorite schist (unit Psa) and overlying and/or interlayered rusty weathering muscovite and muscovite-quartz schist (unit Psqm). Carbonaceous quartz-muscovite schist occurs locally along the contact between the two units. The metamorphic rocks are deformed into tight, north-trending, second-phase folds. Quartz veins are abundant and are mainly foliaform metamorphic sweats.

At least 20 claims were staked in the area in 1911 following the discovery of gold-bearing quartz on the Fortune claim. A newspaper account reported assays of 26.4 g/t Au and 6.9 g/t Ag from a rock in which no gold was visible. Cairnes examined the occurrence in 1911 and observed quartz veins with pyrite and visible gold, some of which was quite crystalline. Crystalline gold is relatively common in placer deposits in Bear Creek and may be derived in part from this occurrence.

While prospecting on the neighbouring Gus claims owned by F. Burkhard, Kennecott discovered visible gold in quartz-veined schist within an old trench. A sample of this material assayed 33.3 g/t Au. Kennecott drilled 32 auger soil samples along the Pod/Gus claim boundary to test for extensions of the gold mineralization. Three of the holes returned weakly anomalous Au values which Kennecott decided did not merit follow-up work.