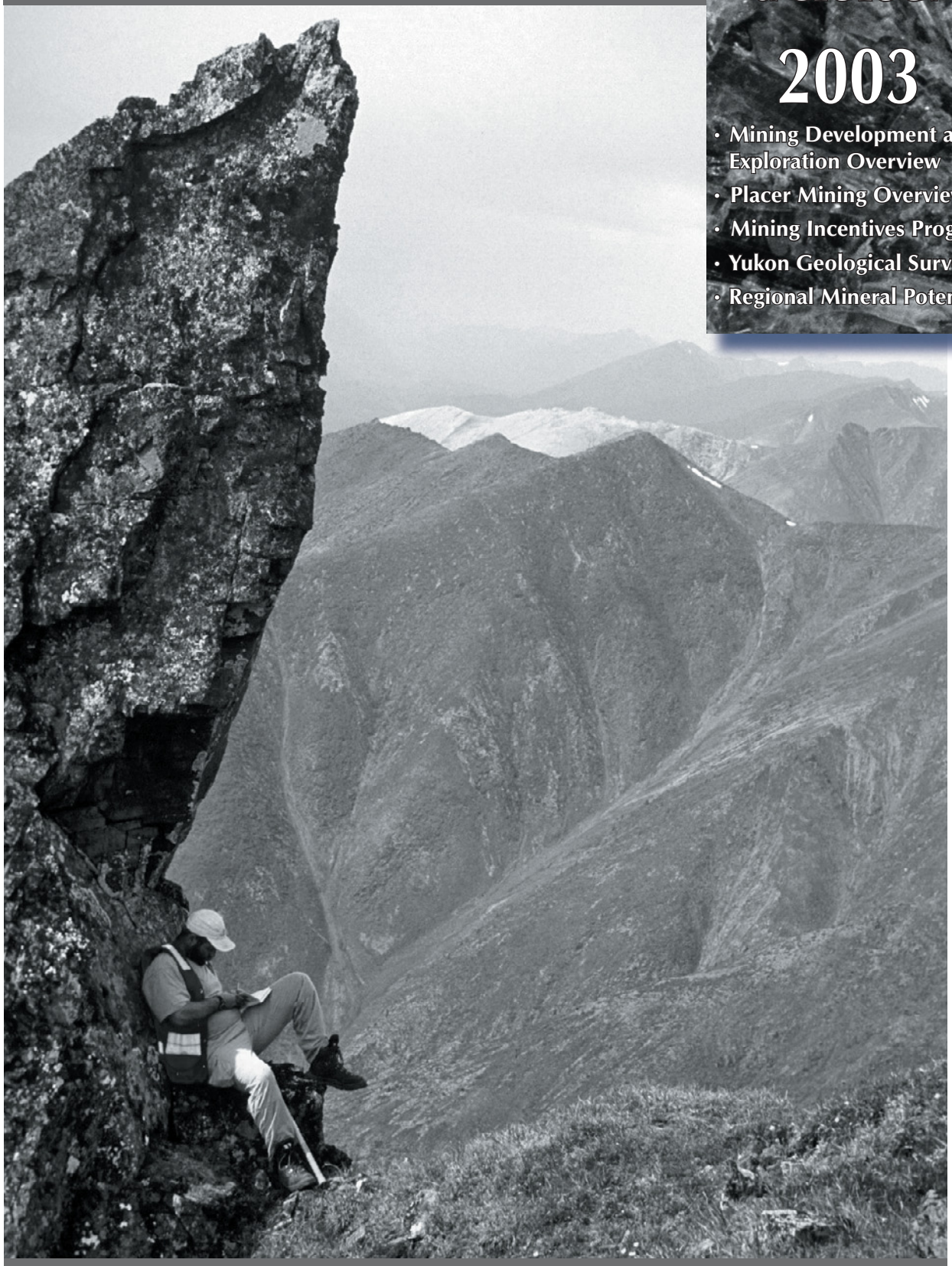
Yukon Geological Survey

Energy, Mines and Resources • *Yukon Geological Survey*

YUKON EXPLORATION & GEOLOGY 2003

- Mining Development and Exploration Overview
- Placer Mining Overview
- Mining Incentives Program
- Yukon Geological Survey
- Regional Mineral Potential



Yukon
Energy, Mines and Resources

YUKON
EXPLORATION & GEOLOGY
2003

Edited by
D.S. Emond and L.L. Lewis

Yukon Geological Survey
Energy, Mines and Resources
Yukon Government

Published under the authority of the Minister of Energy, Mines and Resources, Yukon Government

http://www.emr.gov.yk.ca

Printed in Whitehorse, Yukon, 2004.

ISBN 1-55362-179-4

This, and other Yukon Geological Survey publications, may be obtained from:

Geoscience and Information Sales
c/o Whitehorse Mining Recorder
102-300 Main Street
Box 2703 (K102)
Whitehorse, Yukon, Canada Y1A 2C6
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In referring to this publication, please use the following citation:

Yukon Mining, Development and Exploration Overview, 2003. *In:* Yukon Exploration and Geology 2003, D.S. Emond and L.L. Lewis (eds.), 2004. Yukon Geological Survey, 70 p.

Production by K-L Services, Whitehorse, Yukon.

Front cover photos

Main photo: Mike Burke with the Yukon Geological Survey writing geological field notes in the mountains of the Hart River area. Photo by Ken Galambos.

Photo in title tab: Aquamarine and quartz crystals on True North Gems Inc.'s True Blue property, Quiet Lake map area. Photo by T.J. Adell and Son Photography, Vancouver, British Columbia.

YUKON GEOLOGICAL SURVEY

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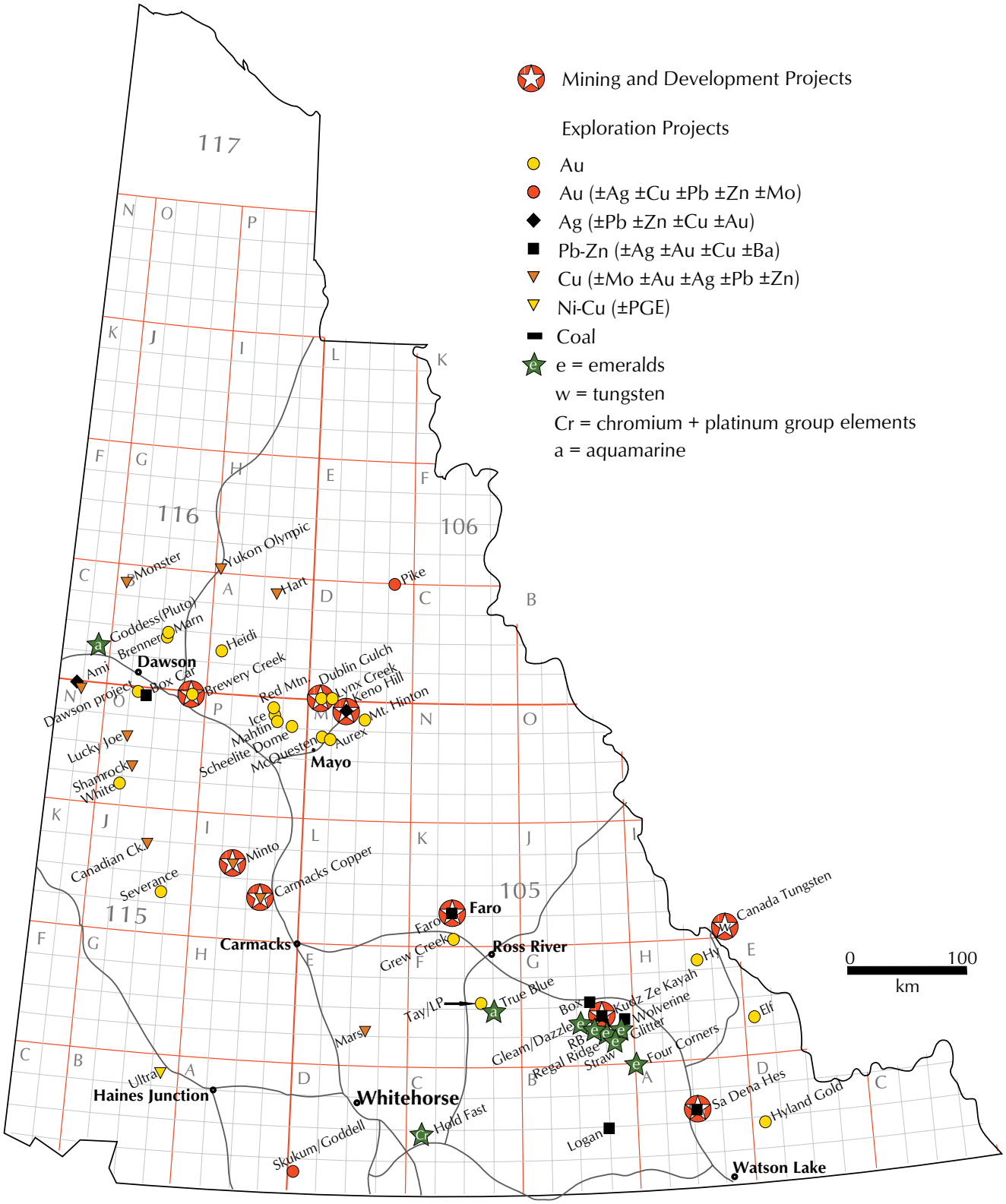

Figure 2. *Location of Yukon development projects (permitted or undergoing permitting) and exploration projects in 2003. Not all active projects are shown on the map. Background of the map showing the National Topographic System (NTS) grid.*

Yukon Mining, Development and Exploration Overview, 2003

***Mike Burke*[1]**
Yukon Geological Survey

Burke, M., 2004. Yukon Mining, Development and Exploration Overview, 2003. *In:* Yukon Exploration and Geology 2003, D.S. Emond and L.L. Lewis (eds.), Yukon Geological Survey, p. 2-26.

ABSTRACT

The search for emeralds and the rise in the price of gold has fueled an increase in mineral exploration expenditures in Yukon. Exploration for base metals was directed mainly toward copper (with significant gold credits), while zinc, lead and nickel received little attention. Expenditures are estimated at over $13 million, up from the $6.9 million spent in 2002. Claim staking remained healthy in 2003, with 2816 claims staked to the end of October, and for the first time in five years, claims in good standing posted an increase to 43 314 claims to the end of October. Unfortunately there has been no hard-rock mining or development taking place.

The largest exploration program in Yukon was the Regal Ridge project of True North Gems in which $2.1 million was dedicated to the evaluation of an emerald occurrence first discovered in 1998. Exploration for additional occurrences of emeralds in a similar geologic setting to Regal Ridge (intrusive-related quartz-beryl veins) was conducted mainly in the surrounding Finlayson Lake district. Several new areas have been identified; the most significant being the True Blue prospect. Deep blue-coloured beryl discovered at the True Blue property has been identified as a unique form of aquamarine and is currently being evaluated to determine if the stones may be a new species of gemstone.

Gold exploration in Yukon focused mainly on intrusion-related gold systems within the Tintina gold province, which comprises several mineral-rich districts that are coincident with extensive regions of mid-Cretaceous plutonism. The geological knowledge of intrusion-related gold systems has advanced dramatically over the last ten years while exploration for gold in these systems has been at historical lows. This has resulted in very few advanced exploration programs that have been able to adequately drill test the numerous targets within the Tintina gold province in Yukon.

The continued strengthening of the gold price, recent discoveries and positive results from current exploration programs all indicate that Yukon is poised for a return to healthy exploration levels.

RÉSUMÉ

La recherche d'émeraudes et la hausse du prix de l'or ont contribué à l'augmentation des dépenses d'exploration minérale au Yukon. L'exploration des métaux communs a été axée sur le cuivre (combinée à des crédits importants pour l'or); le zinc, le plomb et le nickel ont été, pour leur part, des cibles peu prisées. On estime les dépenses à plus de 13 millions de dollars, ce qui est 6,9 millions de dollars de plus qu'en 2002. Les jalonnements de claims ont continué d'être nombreux en 2003, 2816 claims ayant été jalonnés à la fin d'octobre, et pour la première fois en 5 ans, les claims en règle ont atteint le nombre de 43 314 à la fin d'octobre. Malheureusement, il n'y a pas eu d'exploitation ou de mise en valeur de mines de roche dure.

Le plus vaste programme d'exploration au Yukon a été celui de Regal Ridge de la société True North Gems qui a consacré 2,1 millions de dollars à l'évaluation de la minéralisation d'émeraude découverte en 1998. Des travaux d'exploration pour trouver des émeraudes dans un contexte géologique semblable à celui de Regal Ridge (filons de quartz-béryl associés à une intrusion) ont été menés principalement dans les environs du district de Finlayson Lake. Plusieurs nouvelles zones ont été relevées, la plus importante étant celle de True Blue. Le béryl bleu foncé découvert à la propriété de True Blue est en cours d'évaluation pour déterminer si les pierres constituent une nouvelle espèce de pierre précieuse.

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L'exploration de l'or au Yukon a surtout porté sur les systèmes aurifères associés à une intrusion dans la province aurifère de Tintina qui inclut plusieurs districts riches en minéraux qui coïncident avec des grandes régions de plutonisme du Crétacé moyen. La connaissance géologique des systèmes aurifères associés à des intrusions a fait des pas de géant au cours des dix dernières années alors que l'exploration visant à découvrir de l'or dans ces systèmes n'a jamais été aussi faible. C'est pourquoi les programmes d'exploration de pointe ont été peu nombreux à effectuer des forages d'essai dans les nombreuses cibles situées dans la province aurifère de Tintina au Yukon.

Le raffermissement ininterrompu du prix de l'or, les récentes découvertes et les résultats positifs obtenus par les programmes d'exploration indiquent que le Yukon reconnaîtra des activités d'exploration prospères.

INTRODUCTION

Mineral exploration expenditures in Yukon rose to over $13 million in 2003, nearly double the 2002 total (Fig. 1). The increase in exploration was driven by the rise in the price of gold and the increased activity of companies exploring for emeralds (Fig. 2, page 2). New discoveries continue to be made by companies and prospectors active in Yukon. Hinterland Metals and Firestone Ventures both discovered gold mineralization on their claims while exploring for emeralds in the Finlayson Lake district. Prospector Shawn Ryan rediscovered a high-grade gold vein on his White claims, first noted in an 1897 report by William Ogilvie. True North Gems identified three new emerald-bearing zones on their Regal Ridge property and announced the discovery of a blue-coloured beryl, identified as a unique form of aquamarine, on their True Blue property. The number of projects involving diamond drilling did not increase in 2003, however, the total drilling footage increased by 50% (Appendix 1) illustrating the ability of companies to raise enough funds to complete sizeable exploration programs. No percussion drilling was carried out this year.

Claim staking in 2003 remained healthy with 3571 claims staked, resulting in an increase in the number of claims in good standing to 44 022 (Figs. 3, 4).

The Yukon government continued to support the mineral exploration industry in Yukon by funding the Yukon Mining Incentive Program. In 2003, $987,000 was offered to 61 successful applicants (Galambos, this volume). The function of the program is to provide a portion of the risk capital required to locate and explore for mineral deposits in Yukon. The Yukon government also supports the industry through the Yukon Mineral Exploration Tax Credit, which provides a 25% tax refund on eligible exploration expenditures (effective until March 31, 2004).

Eight Yukon First Nations (Nacho Nyak Dun, Teslin Tlingit Council, Champagne and Aishihik First Nation, Vuntut Gwichin First Nation, Little Salmon/Carmacks First Nation, Selkirk First Nation, Tr'ondëk Hwëch'in and the Ta'an Kwach'an Council) have finalized their land claims in Yukon, and have final and self-government agreements in

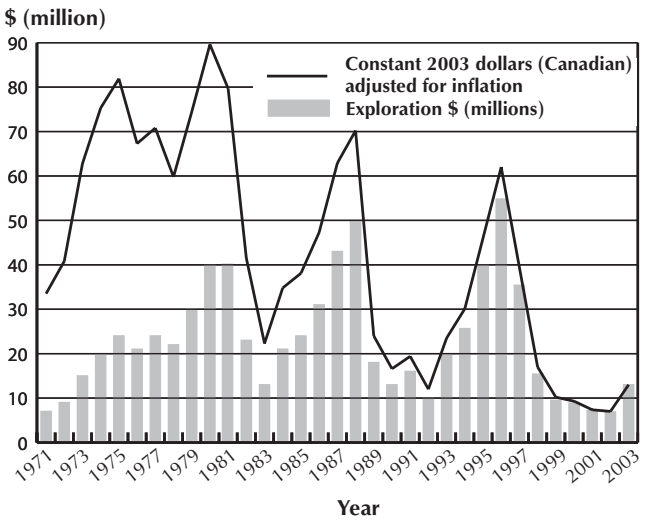

Figure 1. *Exploration expenditures 1971- 2003 (estimated). Inflation adjustment calculated using Bank of Canada inflation calculator (www.bankofcanada.ca/en/inflation_calc.htm).*

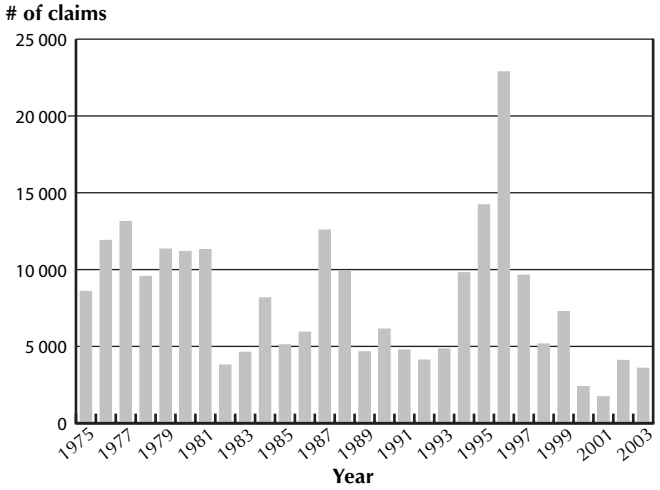

Figure 3. *Claims staked 1975 to 2003.*

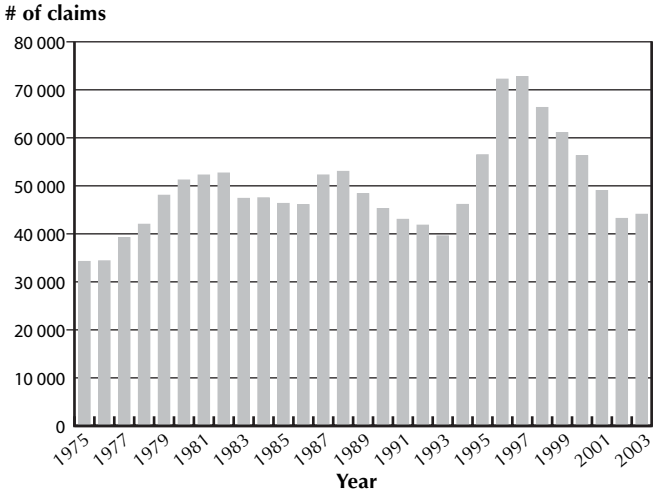

Figure 4. *Claims in good standing 1975 to 2003.*

effect. The Kluane First Nation has finalized its land claims, and its final and self-government agreements will come into effect on February 2, 2004. The Carcross/Tagish First Nation and the Kwanlin Dun First Nation have finalized their land claims, and will vote on ratification of their final and self-government agreements in 2004. The White River First Nation is working on completing the details of its claims so that it may finalize and move towards ratification in 2004. The Liard First Nation and Ross River Dena Council are not presently negotiating their claims with Canada and Yukon, and there is no timetable for reactivating the tripartite negotiation table, however, Yukon has entered into some interim measures agreements with those First Nations to facilitate development in the southeast Yukon.

This overview highlights a number of exploration projects conducted in Yukon during the 2003 field season, and is by no means a comprehensive review of the geology of the properties and of all exploration conducted in Yukon. Detailed property descriptions are commonly available on company websites, in documents filed electronically for the System for Electronic Document Analysis and Retrieval (SEDAR at www.sedar.com). Yukon MINFILE, the Yukon's mineral occurrence database, also contains detailed descriptions of many of the occurrences described herein (Deklerk, 2003); this is available on CD-ROM, and also on the Yukon Geological Survey's website at www.geology.gov.yk.ca. Several projects have not been included because of restrictions on disclosure for publicly traded companies, and for competitive reasons when companies and individuals choose not to openly share exploration results.

PRECIOUS METALS

GOLD

SpectrumGold Inc. (a subsidiary of NovaGold Resources Inc.) completed a major geologic compilation of the **Brewery Creek** mine property (Yukon MINFILE 2003, 116B 160, Deklerk, 2003). The property ceased heap leach production from oxide gold deposits which produced 8 694 695 g (279,541 troy oz) of gold from

1996 to 2002. Approximately 2 million tonnes of capacity remain on the heap leach pad and the Reserve Trend on the property contains indicated resources of 4.51 million g (145,000 troy oz) and inferred resources of 4.45 million g (143,000 troy oz) of oxide material. Previous work focused mainly on the near surface oxide reserves with very few holes testing the potential for deeper sulphide mineral targets. SpectrumGold feels the property's 15-km-long mineralized trend has similar geologic characteristics to NovaGold's 775 million g (25 million oz) Donlin Creek deposit in Alaska. Detailed structural mapping in 2002 and 2003 is helping to develop a more comprehensive structural model that incorporates known ore-controlling structures in the Reserve Trend into a more regionally consistent context. A program to test drill targets is planned for the 2004 season.

Canadian United Minerals restaked the **Marn** deposit (Yukon MINFILE 2003, 116B 147, Deklerk, 2003) as the Prune claims and conducted 22 km of ground-based magnetometer surveys, soil sampling and prospecting. Sulphide skarn minerals in the Marn deposit are mainly pyrrhotite and chalcopyrite (Fig. 5). The surveys produced a 150 by 400 m magnetic anomaly with coincident soil values up to 200 ppm Cu. Prospecting in the valley bottom near a weak magnetometer anomaly uncovered weak skarn mineralization that assayed up to 580 ppb Au, >10 000 ppm As and 0.6% Cu.

Four kilometres to the south of the Marn, Klondike Exploration (Shawn Ryan) conducted a ground-based magnetometer survey and prospecting on the **Brenner** claims which have potential to host similar mineralization to the Marn.

Regent Ventures Inc. upgraded the access road to their **Red Mountain** property (Yukon MINFILE 2003, 115P 006, Deklerk, 2003) near Mayo in central Yukon. This was followed by drilling a single deep diamond drill hole on the Treadwell structure (Fig. 6) at the south end of the property. Diamond drill hole DD03-39 was drilled to a depth of 442.5 m at a dip of -60° to test this structure. A number of quartz-calcite veins and stockwork zones were intersected within the hornfels aureole of a

Figure 5. *Trench on the main Marn Zone.*

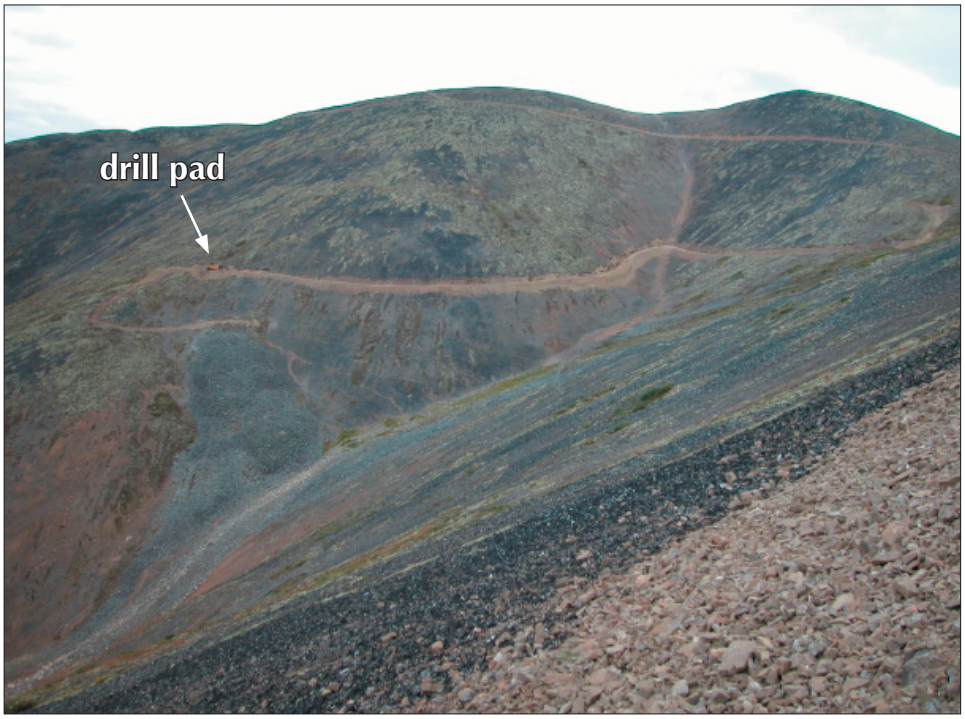

Figure 6. *Drilling the Treadwell structure at Red Mountain.*

Cretaceous Tombstone Suite biotite quartz monzonite intrusion, while the intersection from 440 to 441 m depth was in the intrusion itself. The more significant assay results from the drill hole are set out in the following table.

Depth (m)		Interval (m)	Gold (g/t)
from	to		
109.65	110.45	0.80	2.74
235.00	247.00	12.00	1.01
265.00	267.00	2.00	1.20
288.00	289.00	1.00	1.10
300.45	307.00	6.55	2.12
348.00	349.00	1.00	1.20
384.00	385.10	1.10	2.04
415.00	416.00	1.00	1.65
440.00	441.00	1.00	11.3

ASC Industries Ltd explored the **Ice** property (Yukon MINFILE 2003, 115P 006, Deklerk, 2003) which adjoins the Red Mountain property to the north. The program consisted of 1368.39 m of HQ core drilling in 10 drill holes. The drill program was directed at a number of targets associated with the Cretaceous Red Mountain Stock, a biotite quartz monzonite intrusion of the Tombstone Suite. Drilling tested the northwest-trending Jethro structure which was defined over a strike length of approximately 500 m. It is a well defined, wide and steeply dipping fault zone with only limited surface expression. The Midway zone is located in the middle of the Jethro structure and consists of a 500-m-long, 250- to 500-ppb gold-in-soil anomaly with a 250-m core of greater than 500 ppb Au. A number of surface rock samples within this anomalous zone returned values of greater than 1 g/t Au.

Figure 7. *Faulted quartz monzonite in Hole 8 on the Ice property assayed 1.12 g/t Au from 31.0 to 42.3 m.*

Four diamond drill holes (DD03-04, 06, 08 and 12; Fig. 7) intersected the Jethro structure over a strike length of 500 m. DD03-04 and -06 were drilled at the southeast end of the structure, and DD03-08 and -12 were collared 500 m to the northwest in the Midway zone. DD03-04 intersected a swarm of quartz monzonite sills and hornfelsed siltstone that assayed 311 ppb Au over the entire 171 m length of the hole. Nine intervals of greater than 1 g/t Au were returned in the hole, with the widest intersection returning 1.34 g/t Au over 3.5 m, and the highest grade assaying 4.56 g/t Au over 1.0 m. DD03-08 returned two intersections of 1.12 g/t Au and 1.24 g/t Au over 11.30 and 5.0 m, respectively in biotite quartz monzonite with zones of clay alteration and fault gouge. DD03-12, located 60 m northwest of DD03-08, returned 102 m of 0.88 g/t Au including 2.29 m of 15.35 g/t Au and 16.79 m grading 1.28 g/t Au in clay-altered, sheared, oxidized biotite quartz monzonite.

Klondike Exploration (Shawn Ryan) acquired the **Mahtin** property (Yukon MINFILE 2003, 115P 007, Deklerk, 2003) by staking early in 2003. The claims cover the Cretaceous Sprague Creek stock which intrudes Upper Cambrian-Ordovician limestones of the Rabbitkettle Formation. The property had been previously held since 1994 but had only seen sporadic work, consisting mainly of short property visits. Sheeted quartz-arsenopyrite veins (Fig. 8) occur within the intrusion near the margin; and skarn and mineralized calc-silicate rock is developed in several areas proximal to the intrusion. Ryan conducted a program of geophysics (28 line-km of magnetometer and 9 line-km of Induced Polarization) and geochemistry on a 1 by 2 km grid. Soil sampling outlined an anomalous zone of >40 ppb Au geochemistry, 1 km by approximately 150 m, with peak values in the 400 ppb Au range paralleling the intrusive contact. Geophysics outlined several magnetic highs with high chargeabilities that correspond to areas with skarn in float or subcrop. Grab samples of sheeted quartz-arsenopyrite veins assayed up to 2.8 g/t Au, and skarn/mineralized calc-silicate rock assayed up to 6.5 g/t Au.

Logan Resources conducted a program of geochemistry and geophysics (magnetic and Induced Polarization surveys) on the **Heidi** property (Yukon MINFILE 2003, 116A 037, Deklerk, 2003) northeast of Dawson. The Heidi property is underlain by Neoproterozoic to Lower Cambrian Hyland Group quartzites, sandstone and quartz-pebble conglomerates intruded by Cretaceous biotite-feldspar porphyry dykes. Disseminated to massive sulphide minerals replace calcareous units within the highly folded Hyland Group rocks and occur in quartz-arsenopyrite veins.

Golden Patriot Resources optioned the **Scheelite Dome** property (Yukon MINFILE 2003, 115P 003, Deklerk, 2003) from Copper Ridge Exploration and conducted 7.8 km of line grids, 7.8 km of ground magnetometer and 5.9 km of Induced Polarization surveying, geological mapping and sampling on the Tom Zone, followed by diamond drilling (Fig. 9). Property geology consists of siliciclastic metasedimentary rocks of the Neoproterozoic to Lower Cambrian Hyland Group intruded by the Cretaceous Scheelite Dome intrusion. The Tom Zone is characterized by mineralized calc-silicate skarn hosted within a lens of calcareous rocks and discordant quartz-arsenopyrite veins. Surface sampling of the skarn returned values of up to 32.8 g/t Au. Five holes totaling 310 m were drilled to target skarn and replacement mineralization in the Tom Zone. The final two holes of the program were not completed due to the onset of winter conditions which compromised access to the drill.

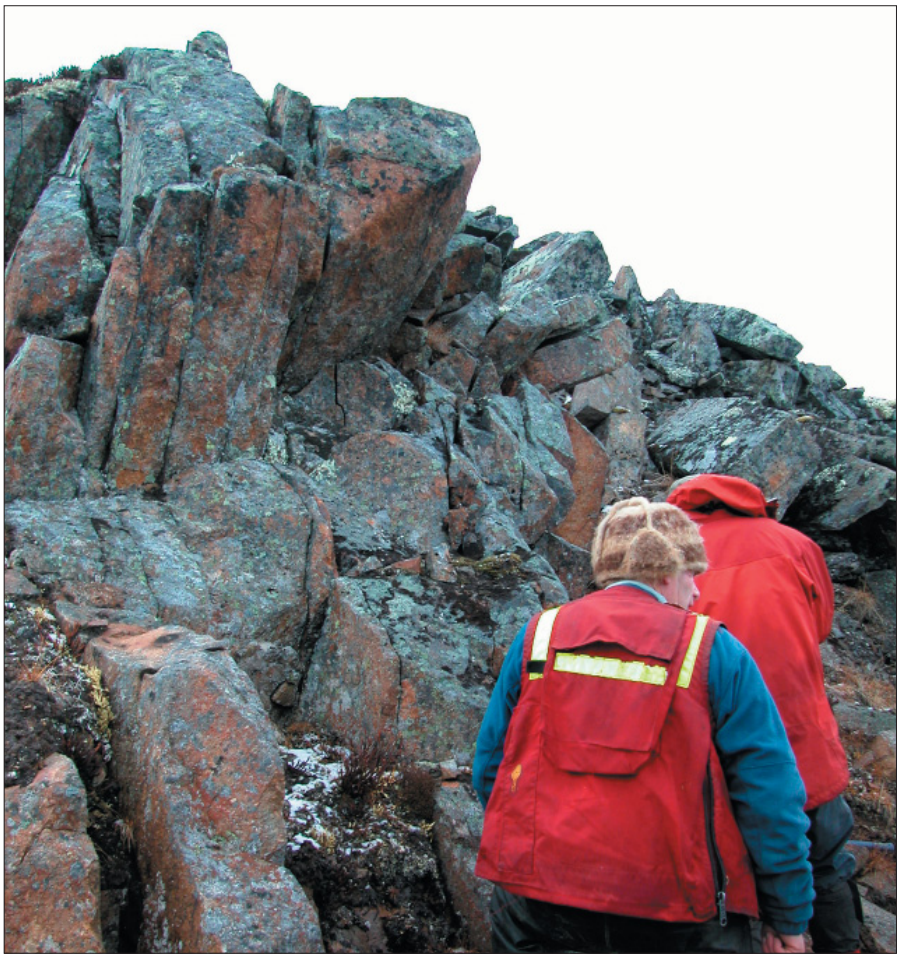

Figure 8. *Sheeted quartz-arsenopyrite veins hosted in quartz monzonite on the Mahtin property.*

Figure 9. *Drilling on the Tom Zone on the Scheelite Dome property.*

Highlights from drilling at the Scheelite Dome property.

Hole	Interval (m)	Gold (g/t)
SH03-29	1.22	5.06
SH03-30	6.40	7.09
SH03-32	5.80	2.55
SH03-33	0.61	3.53

Four of the holes intersected gold mineralization and one hole was abandoned before reaching the target depth.

StrataGold Corporation conducted a small program of geology, geochemistry and geophysics (ground magnetic and Induced Polarization surveys) on their **Lynx Creek** property (Yukon MINFILE 2003, 106D 020, Deklerk, 2003) north of Mayo in central Yukon. Gold at Lynx Creek is associated with a small granodiorite stock of the Cretaceous Tombstone Plutonic Suite. Previous work on the property partially outlined a quartz-sulphide mineral vein system hosted within the granodiorite which returned drill intersections up to 3.4 m grading 7.37 g/t Au. StrataGold is evaluating the property for a potential gold deposit proximal to the intrusive stock, and previous drilling returned up to 22.2 m grading 1.4 g/t Au in quartzite.

StrataGold Corporation also conducted an exploration program on the **Aurex** property (Yukon MINFILE 2003, 105M 060, Deklerk, 2003) which lies east of Mayo in central Yukon and is accessed by the Silver Trail Highway. Gold occurs in quartz-sulphide mineral veins and distal pyrrhotite skarn and calc-silicate rocks hosted in Neoproterozoic to Lower Cambrian Hyland Group metasedimentary rocks within the Tombstone strain zone. Skarn has returned values up to 8.87 g/t Au, and veins up to 9.31 g/t Au from surface exposures. StrataGold tested a number of targets on the property with 21 diamond drill holes totaling 2417 m. Drilling began in early November (Fig. 10) and results were not yet available by year-end.

Figure 10. *Winter drilling at StrataGold Resources' Aurex property near Mayo.*

SpectrumGold Inc. (a NovaGold subsidiary) conducted an 18-hole, 3050-m diamond drilling program on the **McQuesten** property (Yukon MINFILE 2003, 105M 029, Deklerk, 2003) optioned from Eagle Plains Resources. The property is adjacent to the Aurex claims. Gold is hosted within calcareous metasedimentary rocks of the Neoproterozoic to Lower Cambian Hyland Group and a quartz monzonite dyke, likely of the Tombstone Plutonic Suite, within the Tombstone strain zone. Gold occurs with disseminated to semi-massive sulphide minerals in skarn and calc-silicate horizons (Fig. 11). Previous drilling and geophysical surveys by Eagle Plains and Newmont have indicated a mineralized system that has at least a 3-km strike length.

Strategic Metals Ltd. tested the **Pike** property (Yukon MINFILE 2003, 106E 040, Deklerk, 2003) with four diamond drill holes totaling 295 m. The claims located north of Mayo in the Wernecke Mountains cover a large Proterozoic 'Wernecke Breccia' which hosts iron-oxide-copper-gold occurrences. A talus slope on the property contains high-grade float

Figure 11. *Gold-bearing semi-massive pyrrhotite in core from the McQuesten property.*

specimens with native gold, pitchblende and brannerite in quartz. Drilling targeted the apparent source of high-grade, mineralized quartz fragments that contain up to 10 to 30% Au. Anomalous values of copper and gold were intersected by the drilling but nothing approaching the tenor of the mineralization found at surface.

Klondike Gold Corp. renewed its exploration efforts in the historic Dawson mining district by acquiring additional claims in the area and conducting a first-phase program of trenching and bulk sampling on the **Lone Star** and **Buckland** shear zones (Yukon MINFILE 2003, 115O 072, 077, Deklerk, 2003).

Fjordland Exploration Inc. optioned the contiguous **Flume** and **Ten** properties (Yukon MINFILE 2003, 115N 110, 163, Deklerk, 2003) from Phelps Dodge Corporation and Teck Cominco Ltd. The properties are located approximately 75 km south of Dawson City. Mid-Cretaceous biotite quartz monzonite stocks and later quartz-feldspar porphyry dykes intrude Devono-Mississippian schist, gneiss and minor marble of the Yukon-Tanana Terrane. Previous exploration by Phelps Dodge and Teck Cominco outlined gold-bearing veins and stockwork within intrusive and metamorphic rocks, as well as skarn. Previous trenching returned up to 1.6 g/t Au over 25 m including 11.1 g/t Au over 3 m from quartz veins hosted in quartz monzonite. Fjordland conducted a short program of geology and geochemistry on the property, but it was cut short by the onset of winter conditions.

Klondike Exploration (Shawn Ryan) conducted a small program of prospecting and soil geochemistry on the **White** claims (Yukon MINFILE 2003, 115O 011, 012, Deklerk, 2003), approximately 100 km south of Dawson. The claims were previously subjected to small exploration programs by Teck Corporation from 1999 to 2000, which concentrated on the Teacher epithermal gold-silver showing hosted by feldspar porphyritic dykes in the northern part of the claim block. Ryan collected a float specimen of massive white quartz with minor limonite and malachite staining

Figure 12. *Partially exposed high-grade gold-quartz vein in an old hand trench on the White claims.*

which returned just over 50 g/t Au. Follow-up prospecting located a partially exposed quartz vein in what appeared to be a very old hand trench. The vein is exposed for approximately 10 m in strike length and over a 1-m width (Fig. 12). The true thickness of the vein was not determined. Mineralization in the vein consists of trace amounts of galena, tetrahedrite, malachite, limonite and visible gold.

Eagle Plains Resources optioned the **Severance** property (Yukon MINFILE 2003, 115J 003, Deklerk, 2003) located in the Dawson Range approximately 120 km west of Carmacks in south-central Yukon. Results from the property in 2002 outlined a coincident gold-copper-molybdenum-arsenic-in-soil anomaly with gold results up to 2680 ppb. A grab sample of silicified and quartz-veined granodiorite with disseminated pyrite returned 1.2 g/t Au and 0.35% Cu. The 2003 program consisted of prospecting, soil and silt sampling and a small ground electomagnetic survey.

Northgate Exploration funded an exploration program that included two phases of diamond drilling (Fig. 13) on StrataGold Corporation's **Hyland Gold** property (Yukon MINFILE 2003, 095D 011, Deklerk, 2003) located 70 km northeast of Watson Lake in southeastern Yukon. The property is underlain by phyllites, quartzites, quartz-feldspar pebble conglomerate and limestone of the Neoproterozoic to Lower Cambrian Hyland Group. These rocks are folded into an overturned east-verging antiformal structure. No large intrusive bodies are exposed on the property, however, the property is underlain by a prominent magnetic low feature, and a few narrow intrusive dykes are exposed on the claims. Previous percussion drilling on the property was directed at the near-surface iron-oxidized rock which returned values up to 2.65 g/t Au over 16.7 m and 1.19 g/t Au over 129.7 m. Diamond drilling of 12 holes totaling 2417 m tested approximately 2 km of the north-trending Quartz Lake lineament, a prominent topographic lineament which approximates the axial trace of the antiformal structure. All drill holes intersected significant mineralized rock along the west-dipping structurally controlled zone consisting of intense silicification and silica replacement of phyllites and quartzites with 5 to 20% total sulphide minerals. Sulphide minerals consist of pyrite-arsenopyrite with minor chalcopyrite, sphalerite, bismuthinite and tetrahedrite. Several holes intersected additional mineralized rock hosted by a series of hanging wall splays above the main mineralized structure.

Late in the season, approximately 150 km to the north of the Hyland property, Dentonia Resources optioned the **Hy** property (Yukon MINFILE 2003, 105H 102, Deklerk, 2003) from Phelps Dodge Corporation and staked the **Elf** property (Yukon

MINFILE 2003, 095E 052, Deklerk, 2003) which is 70 km south of Hy. The Hy and Elf claims are underlain by the Neoproterozoic to Lower Cambrian Hyland Group metasedimentary rocks, including quartzite, shale, quartz-pebble conglomerate, phyllite and limestone. No intrusive rocks have been identified on the Hy claims but a mid-Cretaceous Selwyn Suite intrusive stock does exist on the Elf. On the Hy, two areas of anomalous gold geochemistry have been previously outlined on the claims, and a chip sample from a quartz vein in phyllite returned 23.05 g/t Au. The Elf claims cover a 1200 by 400 m soil geochemical anomaly with peak values to 677 ppb Au, 639 ppm As and 323 ppb Bi. Dentonia staked additional claims late in 2003 and plans on commencing exploration on both properties in 2004.

Ross River Minerals Inc. conducted a program of geologic mapping, sampling and prospecting on the **Tay-LP** property (Yukon MINFILE 2003, 105F 121, Deklerk, 2003) in south-central Yukon. Semi-massive to massive sulphide mineralized rock consists of replacement-type pyrrhotite +/- pyrite, arsenopyrite and chalcopyrite in calcareous metasedimentary rocks, and similarly mineralized quartz-sulphide mineral veins. Recent interpretations of the glacial history of the property and area have shown up-valley glacial movement (Kennedy and Bond, this volume). This new information should help in interpreting the source areas of extensive mineralized float boulders found on the claims.

Figure 13. *Rob Duncan and Jason Dunning on StrataGold Corporation's Hyland Gold property.*

Highlights from drilling at Hyland Gold property.

	Interval (m)	Gold (g/t)	Silver (g/t)
HY03-01	17.22	1.29	13.85
including	3.82	3.56	49.79
HY03-02	28.0 m (oxide)	0.93	2.75
including,	4.89	1.31	6.96
including,	9.20	1.68	3.37
and including	53.11 (sulphide)	1.38	3.54
	5.54	4.24	4.96
HY03-08	4.10	1.31	1.91
HY03-09	4.73	0.98	19.46
and	12.35	0.98	5.31
HY03-10	6.52	0.63	1.00
and	5.30	0.62	1.52
HY03-11	5.55	0.69	2.96
HY03-12	9.82	0.76	13.35
and	9.63	1.57	43.76

Tagish Lake Gold Corp. continued with the advanced exploration of the **Skukum Creek** (Yukon MINFILE 2003, 105D 022, 025, Deklerk, 2003) gold-silver deposits located in the Wheaton River district south of Whitehorse. At the beginning of the year, Tagish Lake commissioned an independent technical report updating the resources at the Skukum Creek and Goddell Gully deposits. Significantly, at a 5 g/t Au-equivalent cutoff grade, the resources at Skukum Creek increased by 50% to a measured and indicated resource of 800 000 tonnes containing 6.77 g/t Au and 214 g/t Ag, and an inferred resource of 90 000 tonnes grading 6.53 g/t Au and 225 g/t Ag. Utilizing the same 5 g/t Au-equivalent cutoff grade, the following resources were calculated for Goddell Gully: indicated resources of 320 000 tonnes grading 11.02 g/t Au, and inferred resources of 280 000 tonnes grading 9.21 g/t Au, an increase of over 100%. A number of historical drill holes were not available for use in previous estimates because they were not surveyed. Tagish Lake was successful in using a continuous downhole surveying instrument that allowed the holes to be surveyed and included in the latest estimate. Bench-scale testwork conducted on mineralization from the Skukum Creek deposit utilizing extremely fine grinding demonstrated improved gold and silver recoveries. Leaching by cyanidation of the whole ore gave recoveries of over 85% for gold and 44% for silver. Flotation of a bulk sulphide mineral concentrate and fine regrinding of the sulphide mineral concentrate followed by cyanidation resulted in gold recoveries of 90% and silver of 40%.

At the Skukum Creek property, the 1300-m level was extended by 400 m along strike from the deposit to provide access for underground diamond drilling of the Ridge zone. The extension intersected a quartz-sulphide mineral vein (Fig. 14) that is on-strike with zone 2 of the Ridge zone which was intersected 200 metres to the west by surface drilling (8.44 g/t Au, 260 g/t Ag over 11.67 m). Underground chip-sampling of the zone at 3-m intervals over a strike length of 15 m returned a weighted average of 29.39 g/t Au and 280 g/t Ag over an average width of 0.37 m. An additional zone of massive to disseminated pyrrhotite-chalcopyrite-sphalerite not typical of the mineralization at Skukum Creek was intersected in the diamond drill crosscut. Samples from this zone returned 1.0 m of 0.8 g/t Au and 109 g/t Ag; 0.8 m of 4.2 g/t Au and 170 g/t Ag; and 1.5 m grading 21.0 g/t Au and 159 g/t Ag. Underground drilling of the extension vein and the diamond drill crosscut vein to test continuity of the zones with Skukum Creek and the Ridge zone commenced in late November.

Figure 14. *Quartz-sulphide mineral vein exposed in the underground extension at the Skukum Creek property.*

At the Goddell Gully deposit, a review of core from 1997 revealed unsampled mineralization. Sampling of hole 97-56 increased the previously reported intersection of 0.66 m grading 3.57 g/t Au to 19.82 m grading 2.37 g/t Au including 2.91 m at 8.49 g/t Au. Hole 97-56 is located 225 m to the west of the presently outlined resource block that has a

Figure 15. *Intersection from drill hole GG03-1 in the Goddell Gully deposit of Tagish Lake Gold.*

strike length of 450 m, as generated in the resource model. This hole demonstrates the potential of the deposit to continue along strike to the west and indicates that a significant increase in resources is possible. Hole GG03-01 (Fig. 15) was drilled from surface and intersected the mineralized zone approximately 25 m below and 10 m west of hole 97-56. GG03-01 intersected 26.92 m grading 2.46 g/t Au, including 9.01 m grading 5.00 g/t Au. Hole GG03-02 intersected the zone approximately 60 m west of hole 97-56 and returned 1.86 m grading 1.38 g/t Au and, at a second intersection, 2.56 m grading 2.03 g/t Au.

PLATINUM GROUP ELEMENTS

Tom Morgan explored his **Ultra** claims (Yukon MINFILE 2003, 115B 008, Deklerk, 2003; Galambos, this volume) near Haines Junction in southwestern Yukon with geophysical surveys (max-min and magnetometer), blast trenching and sampling. The Frohberg showing on the claims consists of veins of mainly chalcopyrite with minor pyrite and pyrrhotite near the margin of a mafic sill. Sampling by Morgan returned values up to 5.5 g/t Pt, 13.5 g/t Pd, 4% Cu and 1.7% Ni. Geophysical surveys were directed at helping define a source area for several large zinc-copper boulders with volcanogenic massive sulphide mineralized rocks that have assayed up to 5.1% Zn and 2.1% Cu. The survey produced several good conductors.

Gord Mcleod continued to evaluate his **Holdfast** property (Yukon MINFILE 2003, 105C 012, Deklerk, 2003) located approximately 80 km southeast of Whitehorse and 3 km north of the Alaska Highway. Chromite-bearing dunite hosted in an ophiolitic sequence of mafic to ultramafic rocks on the claims returned values (utilizing NiS fusion analysis) of up to 406 ppb Os, 417 ppb Ir, 683 ppb Ru, 70 ppb Rh, 159 ppb Pt and 5 ppb Pd for a total contained PGEs (platinum group elements) of 1740 ppb.

Figure 16. *Kennecott Canada Exploration's Lucky Joe camp.*

BASE METALS

Kennecott Canada Exploration optioned the **Lucky Joe** copper-gold property (Yukon MINFILE 2003, 115O 051, Deklerk, 2003; Fig. 16), located 50 km south of Dawson City, from Copper Ridge Exploration. Kennecott conducted a helicopter-supported regional-scale geological mapping and soil sampling program covering an area roughly 10 km by 40 km. Detailed work, including limited mechanical trenching, was also completed in the areas of known mineralized rock identified in 2002 by Copper Ridge. Chalcopyrite with minor pyrite, pyrrhotite and molybdenite at Lucky Joe are hosted in a blanket-like layer in biotite-muscovite schist and orthogneiss overlain by a magnetite-bearing amphibolite. The 2003 work defined two large parallel geochemical trends. The Lucky Joe trend is 11.3 km long and defined by anomalous copper and gold, with peak values of 3060 ppm Cu and 235 ppb Au, and associated silver and molybdenum. The copper-gold zone extends outward into a lead and zinc halo that together outlines a hydrothermal system over 21 km long and up to 3 km wide. The Ryan's Creek trend parallels the Lucky Joe trend approximately 4 km to the southwest. This trend, defined by anomalous copper and gold geochemistry, is 7.2 km long and has peak values of 4400 ppm Cu and 611 ppb Au. The geologic setting, alteration patterns and geochemistry of the rocks and mineral showings at Lucky Joe have outlined a large hydrothermal system representing a porphyry copper-gold or an iron-oxide-copper-gold (IOGC) mineralizing system.

Shawn Ryan, the underlying vendor on the Lucky Joe property, staked several properties in the vicinity of the Lucky Joe based on similar geology and a similar geophysical expression. Ryan conducted geochemistry and a 25 line-km ground magnetic survey on his Australia property. The surveys revealed a geophysical expression and geochemical signature similar to that of the Lucky Joe property.

Canadian Empire Exploration conducted a program of geophysics on the **Yukon Olympic** property (Yukon MINFILE 2003, 116G 082, Deklerk, 2003), an iron-oxide-copper-gold target optioned from Copper Ridge Exploration. The program included detailed gravity surveys, Induced Polarization and magnetic surveys, and mobile metal ion (MMI) geochemical surveys. The Yukon Olympic property is located just off the Dempster Highway, 130 km north of Dawson City. In Yukon, 'Wernecke Breccias' intruding Proterozoic rocks have many similarities to the giant Olympic Dam deposit in Australia. Wernecke Breccias are the same age as the breccias hosting the Olympic Dam deposit and have many of the same physical and mineralogic characteristics. Recent tectonic reconstructions indicate that Yukon and eastern Australia were part of the same landmass 1.6 billion years ago at the time of breccia formation (Thorkelson et al., 2001). Previous work on the Yukon Olympic

has outlined a 2 mGal gravity anomaly flanked by a magnetic anomaly and intermittently outcropping copper-bearing hematite breccia which assayed up to 0.9% Cu.

Monster Copper drilled a single diamond drill hole on the Monster property (Yukon MINFILE 2003, 116B 102, 103, Deklerk, 2003), under option to Orezone Resources, located in the Ogilvie Mountains north of Dawson City. The single hole targeted a gravity anomaly associated with occurrences of copper-gold hosted by hematitic breccia bodies and hydrothermal siderite veining. Drilling intersected intrusive hydrothermal breccia that did not contain any significant mineralized rock.

Copper Ridge Exploration acquired the **Hart River** iron-oxide-copper-gold property (Yukon MINFILE 2003, 116A 009, Deklerk, 2003) in the Hart River area to the east of the Yukon Olympic property (Fig. 17). The claims cover a new occurrence of 'Wernecke Breccia' where preliminary sampling has returned values up to 1.76% Cu in grab samples and 0.83% Cu over 3.2 m in chip sampling. Gold values up to 2.4 g/t have been obtained.

Grid Capital Corp. conducted a five-hole, 800-m diamond drilling program on the **Ami** property (Yukon MINFILE 2003, 115N 039, 040, Deklerk, 2003) located in the Sixtymile River area west of Dawson City. Diamond drilling followed an Induced Polarization survey that produced anomalies coincident with zones of anomalous gold, silver, lead, arsenic, copper and molybdenum soil geochemistry. The property is underlain by a Cretaceous, magnetite-rich, multiphase granitic stock. Mineralization on the property consists of porphyry-style copper-molybdenum and high-grade silver-lead veins. Drilling intersected weakly altered quartz monzonite mineralized with disseminated pyrite, chalcopyrite and molybdenite, however no significant values were returned. One hole targeted a high-grade lead-silver vein and intersected 0.64 m grading 22.1% Pb, 2085.5 g/t Ag and 1.13 g/t Au.

Figure 17. *Hematitic 'Wernecke Breccia' boulder on the Hart River property of Copper Ridge Exploration.*

Wildrose Resources and Sargold Resources completed an exploration program consisting of grid soil sampling on their **Canadian Creek** copper-gold-molybdenum property (Yukon MINFILE 2003, 115J 035, 036, 101, Deklerk, 2003), 150 km south of Dawson. This survey indicates a coherent copper-gold-molybdenum anomaly covering an area of approximately 900 m by 600 m within the bounds of this grid. Soil gold values for the 2003 survey range from 2.0 to 1609.0 ppb, with a mean value of 66.5 ppb; copper ranges from 13.4 to 334.1 ppm with a mean value of 79.6 ppm; and molybdenum ranges from 0.5 to 84.7 ppm with a mean value of 7.8 ppm. The eastern boundary of the grid is approximately 700 m

Figure 18. *Viewing core at the Logan deposit optioned by Expatriate Resources.*

west of the Casino deposit (Yukon MINFILE 2003, 115J 028, Deklerk, 2003) currently owned by Lumina Copper Corp. The Casino deposit has published measured and indicated resources of 103 million tonnes of supergene sulphide material grading 0.35% Cu, 0.32 g/t Au and 0.03% Mo, plus 323 million tonnes of hypogene material grading 0.26% Cu, 0.28 g/t Au and 0.03% Mo (C.M Rebagliati, PEng, and Ross Banner, PEng, Jan. 23, 2003, Qualifying report Casino property, Yukon, prepared for CRS Copper Resources Corp. and First Trimark Ventures Inc. and filed on SEDAR by Lumina Copper Corp. on March 27, 2003).

Expatriate Resources Inc commissioned Hatch Associates Ltd. to undertake preliminary engineering and economic studies into the Yukon Zinc Project. The Yukon Zinc Project consists of the **Wolverine** project (Yukon MINFILE 2003, 105G 072, Deklerk, 2003) located in the Finlayson Lake Massive Sulphide District and the **Logan** deposit (Yukon MINFILE 2003, 105B 099, Deklerk, 2003) located approximately 100 km west of Watson Lake. The combined resources of the two deposits are 18.5 million tonnes containing 1.5 billion kg (3.4 billion lb) Zn, 83 million kg (183 million lb) Cu, 96.6 million kg (213 million lb) Pb, 2.6 billion g (85 million troy oz) Ag and 11 billion g (350,000 troy oz) Au. The project proposes hauling ore from the high-grade Wolverine deposit approximately 200 km to mine and mill facilities at the Logan deposit (Fig. 18). Upon successful completion of the engineering and economic studies, Expatriate is planning extensive exploration, metallurgical, geotechnical and environmental studies at the Logan and Wolverine deposits in 2004.

GEMSTONES

True North Gems Inc conducted an advanced exploration program on their **Regal Ridge** emerald property (Yukon MINFILE 2003, 105G 147, Deklerk, 2003; Neufeld, this volume) located in the Finlayson Lake District of south-central Yukon. Early in the season, True North signed a memorandum of understanding with the Ross River

Figure 19. *Portal site at Regal Ridge. The southwest vein is visible in the trench face (dashed line indicates zone).*

Dena Council that acknowledged True North's ownership of the Regal Ridge property, and established a framework for creating economic partnerships with the Kaska First Nation in support of mineral exploration. The 2003 program consisted of construction of an airstrip, upgrading of the camp facilities and the sorting plant, diamond drilling, and underground (Fig. 19) and surface bulk-sampling.

The 2003 exploration resulted in the discovery of 3 new emerald-bearing zones, bringing the total number of zones to 13. The area of mineralization was doubled to 1500 m in length, 500 m in width and over 200 m of vertical section. Underground exploration was successful in following a continuous zone of emerald mineralization in the Southwest zone; and the newly discovered Mattscar zone

Figure 20. *Surface bulk sampling under close geological control at Regal Ridge.*

produced high concentrations of emerald mineralization including coarse gem and near-gem grade rough emerald crystals ranging in size from 1.4 to 9.9 carats.

Underground bulk-sampling produced 2029 tonnes of mineralized material, and surface sampling (Fig. 20) produced an additional 1781.2 tonnes from the Mattscar zone. From the underground bulk sample, a random sample of 272.7 tonnes of material was processed and produced 1429.2 carats of gem quality emeralds and 2938.94 carats of near-gem emeralds. All emeralds sorted measured in excess of 2 mm. From the underground material, a 2.39 carat emerald was cut from a 16.55 carat rough stone. Eight pits were dug on the Mattscar zone. In Pit 1, 192.4 tonnes of material was processed and produced 1206.5 carats of gem quality emeralds and 11 674.85 carats of near-gem quality emeralds were recovered. Detailed information on gem counts are available on the company's website. The company intends to have a representative parcel of finished gem, near-gem and non-gem material for tendered auction in late January, 2004.

True North also conducted testwork utilizing high-intensity magnetic separation and dense media separation in order to determine the feasibility of automating the extraction of emeralds in concentrates. The magnetic separation was highly successful in recovering 95% of the emeralds from initial testing. Results from dense media separation are pending. Automation of the emerald recovery process is a significant factor in reducing the overhead costs of recovering the emeralds from the Regal Ridge Project.

True North Gems also conducted regional exploration on targets defined through evaluation of proprietary information acquired from Archer Cathro and Associates (1981) Limited and research financed by the company from the University of British Columbia. The regional exploration was conducted by Bill Wengzynowski (discoverer of the Regal Ridge emeralds) of Archer Cathro and Associates and Dr. Lee Groat of the University of British Columbia. The regional exploration was successful in discovering at least one significant new gemstone discovery in 2003. Late in the season, True North announced the discovery of the True Blue beryl, a unique form of aquamarine. A mini-bulk sample was collected from the **True Blue** property (Yukon MINFILE 2003, 105F 081, Deklerk, 2003) which yielded 57.9 g of gem-grade blue beryl with individual crystals up to 38 by 11 mm. The blue beryls have an unusually intense saturation of blue colour and may be a new type of gemstone. A suite of faceted stones will be formally characterized by the Gemological Institute of America.

Firestone Ventures Inc. entered into the gemstone hunt by optioning the **Four Corners** property (Yukon MINFILE 2003, 105A 034, Deklerk, 2003) from Strategic Metals Ltd. and the Meg, Rusty, Lion and Straw properties from True North Gems. The Straw property is located 5 km southeast of Regal Ridge and covers a geological setting that is nearly identical to that at Regal Ridge. Geological mapping, geochemistry and prospecting were successful in delineating a zone of abundant black tourmaline within chlorite schist and alteration of the schist to the distinctive 'golden schist' that is associated with emerald mineralization at Regal Ridge. Anomalous beryllium and chromium in soils are also associated with the zone. Beryl mineralization consisting of white to pale green, opaque crystals up to 1.2 by 4 cm were also discovered in a tourmaline-bearing pegmatite dyke (Fig. 21).

On the Four Corners property, anomalous beryllium and chromium geochemistry was outlined in a 200 by 100 m zone, where rusty-weathering golden schist within

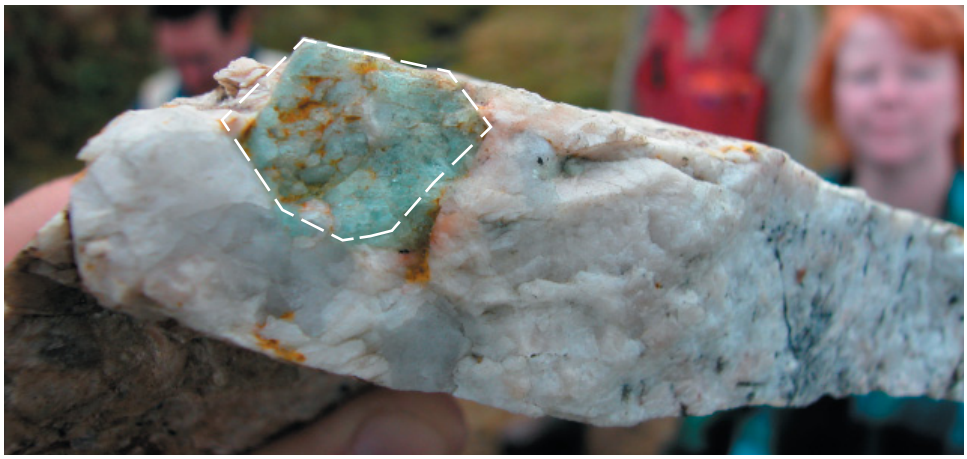

Figure 21. *Light green, opaque beryl mineralization from the Straw property (indicated by dashed outline). Close to actual size.*

the Fire Lake unit and abundant black tourmaline and quartz-tourmaline veins, similar to mineralization and alteration at Regal Ridge, were noted. In another area on the claims, an opaque to translucent, pale blue-green beryl crystal 1.3 by 1.7 cm was discovered in a tourmaline-bearing pegmatite dyke. Firestone also discovered gold mineralization on the claims. Grey-green siliceous boulders were sampled within a 100-m-long talus train. A chip sample from a 70-cm boulder returned 4.28 g/t Au, 2.64 g/t Ag, 513 ppm Ni, 954 ppm Cr, and elevated arsenic and antimony. Anomalous gold-in-soil samples up to 591 ppb were obtained up to a kilometre to the northeast of the talus train.

Hinterland Metals Inc. also conducted exploration in the Finlayson Lake district searching for gemstones on the **Gleam** and **Dazzle** properties (Yukon MINFILE 2003, 105G 030, 031, 120, Deklerk, 2003) optioned from True North Gems. Hinterland conducted geological mapping and stream sediment geochemistry on the properties originally staked due to their similar geologic setting to the Regal Ridge property located 25 km to the southeast. Anomalous beryllium-in-silt samples were obtained from creeks draining the contact of a mid-Cretaceous granite and Fire Lake metavolcanic rocks on the Dazzle property. During the course of exploration, Hinterland discovered gem-quality chrysoprase hosted in a subhorizontal metavolcanic unit of uncertain thickness that is traceable on surface for 1900 ft. Chrysoprase is a green, potentially gem-quality, cryptocrystalline variety of chalcedony that is used to make beads, cabochons and carved figures. Hinterland is encouraged that it may be able to generate an immediate cash-flow from this discovery. Hinterland also discovered a new gold showing during their exploration program. The showing consists of a vertical zone of massive to semi-massive quartz-sulphide mineralized veins hosted within a granitic intrusion (Fig. 22).

Figure 22. *Mark Fekete, President, Hinterland Metals at the new gold-silver vein discovery on the Gleam property.*

Chip sampling across the zone returned a weighted average of 3.86 g/t Au and 48.1 g/t Ag over 5.0 m.

International Arrimex Resources Inc. conducted emerald exploration on the **Glitter** property optioned from True North Gems. The Glitter claims are located 12 km east of Regal Ridge. Geological mapping, soil sampling and prospecting were successful in outlining two parallel trends of anomalous beryllium, chromium and fluorine in an area hosting favourable geology.

Arcturus Ventures Inc. conducted a short program of geological mapping, soil and silt sampling and prospecting on their **RB**, **First Base** and **Fife** properties (Yukon MINFILE 2003, 105G 126, 142, Deklerk, 2003) located near Regal Ridge. The properties host geology with potential for emeralds but also have excellent potential for volcanogenic massive sulphide deposits similar to the nearby Fyre Lake.

Strategic Metals conducted exploration for coloured gemstones on a number of properties in the Finlayson district, as well as on other properties such as **Northern Dancer**. Northern Dancer (Yukon MINFILE 2003, 105B 039, Deklerk, 2003) is host to abundant blue beryls (aquamarines) associated with pegmatite dykes and quartz veins. Crystals up to 1 cm in diameter have been previously reported. Results from exploration on Strategic's other gemstone properties, beyond a report of mineralogical studies confirming a green chromium-rich beryl from one property, have not been released.

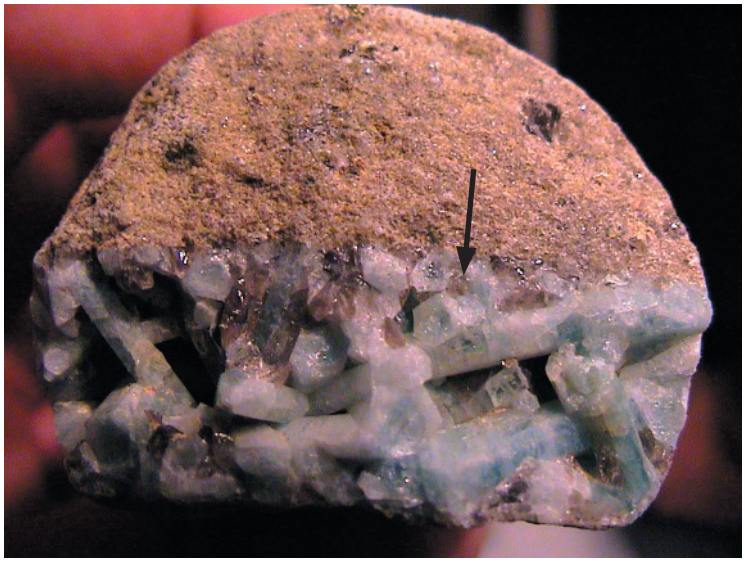

Figure 23. *Light blue beryl crystals in drill core from the Goddess (Pluto) property.*

Aquamarine crystals have also been reported from the **Pluto** property (Yukon MINFILE 2003, 116C 134, Deklerk, 2003) located 50 km northwest of Dawson City. The property was explored by Cominco in the early 1980s for porphyry molybdenum in an early Tertiary quartz porphyry pluton. In drill logs, Cominco geologists noted numerous pegmatites containing blue beryl (Fig. 23) and quartz-tourmaline veins intruding the surrounding ultramafic rocks. The property was restaked by Klondike Exploration (Shawn Ryan) as the Goddess claims.

Patrician Diamonds Inc. revealed in a press release in early November, 2003 that they had been conducting regional till sampling in 2002 and 2003 in Yukon. Sampling in 2002 had yielded four diamonds, the largest measuring 1.04 by 0.80 by 0.72 mm. The samples also contained kimberlitic ilmenites and chromites, plus blue and pink sapphires. A portion of the 2003 sampling that is being processed at the Saskatchewan Research Council laboratories recovered a total of 10 diamonds, G9 pyrope garnets, chrome diopside, Mg-chromite, picroilmenite and forsteritic olivine. The 2003 samples also contained abundant sapphire. Patrician was conducting a staking campaign late in the season covering potential source rocks and geophysical anomalies. Results from a further round of sampling were also pending at year-end.

ACKNOWLEDGEMENTS

This report is based on public information gathered from a variety of sources. It also includes information provided by companies through press releases, property summaries provided to the department by companies and from property visits conducted in the 2003 field season. The cooperation of companies in providing information, as well as their hospitality and access to the property during field tours, are gratefully acknowledged. Editing by Lara Lewis and Diane Emond is greatly appreciated.

REFERENCES

Deklerk (compiler), 2003. Yukon MINFILE 2003 – A mineral occurrence database. Yukon Geological Survey, CD-ROM.

Galambos, K., 2004 (this volume). Yukon Mining Incentives Program, 2003. *In:* Yukon Exploration and Geology 2003, D.S. Emond and L.L. Lewis (eds.), Yukon Geological Survey, p. 31-36.

Kennedy, K.E. and Bond, J.D., 2004 (this volume). Evidence for a late-McConnell readvance of the Cassiar Lobe in Seagull Creek, Pelly Mountains, central Yukon. *In:* Yukon Exploration and Geology 2003, D.S. Emond and L.L. Lewis (eds.), Yukon Geological Survey, p. 121-128.

Neufeld, H.L.D., Israel, S., Groat, L.A. and Mortensen, J.K., 2004 (this volume). Geology and structural setting of the Regal Ridge emerald property, Finlayson Lake district, southeastern Yukon. *In:* Yukon Exploration and Geology 2003, D.S. Emond and L.L. Lewis (eds.), Yukon Geological Survey, p. 281-287.

Thorkelson, D.J., Mortensen, J.K., Davidson, G.J., Creaser, R.A., Perez, W.A. and Abbott, J.G., 2001. Early Mesoproterozoic intrusive breccias in Yukon, Canada: The role of hydrothermal systems in reconstructions of North America and Australia. Precambrian Research, Special Volume III, p. 31-56.

APPENDIX 1: 2003 DRILLING STATISTICS[1]

		DIAMOND DRILL	
PROPERTY	**COMPANY**	**metres**	**# holes**
Ami	Grid Capital Corp.	800	5
Aurex	StrataGold Corp.	3991	25
Goddell Gully	Tagish Lake Gold Corp.	975	3
Grew Creek	Al Carlos	442	7
Hyland Gold	Northgate Exploration/ Stratagold Corp.	2417	12
Ice	ASC Industries Ltd.	1369	10
McQuesten	Spectrum Gold Inc./ Eagle Plains Resources	3050	18
Monster	Monster Copper Resources	194.5	1
Pike	Strategic Metals Ltd.	295	4
Red Mountain	Regent Ventures Inc.	442.5	1
Regal Ridge	True North Gems Inc.	630	14
Scheelite Dome	Copper Ridge Exploration	310	5
Skukum Creek	Tagish Lake Gold Corp.	284	5
TOTAL		15 200	

[1]*Note: No percussion drilling was carried out this year.*

APPENDIX 2: 2003 EXPLORATION PROJECTS

PROPERTY	COMPANY/OWNER	MINING DISTRICT	MINFILE # or (1:50 000 NTS)	WORK TYPE	COMMODITY
1st Base	Arcturus Ventures Inc.	Watson Lake	105G 031	G,GC	Cu-Pb-Zn-Ag-Au
Ami	Grid Capital Corporation	Dawson	115N 039,040	G,GP,DD	Cu-Mo, Ag-Pb-Au
Aurex	StrataGold Corporation	Mayo	105M 060	G,GC,GP,DD	Au
Brewery Creek	Viceroy Resources	Dawson	116B 160	G,Reclamation	Au
Box	Expatriate Resources	Watson Lake	(105G/10)	G,GP	Cu-Pb-Zn-Ag-Au
Box Car	Shawn Ryan	Dawson	115N 071	GC,GP,T	Cu-Pb-Ag-Au
Canadian Creek	Sargold Resources/ Wildrose Resources	Whitehorse	115J 035,036,101	G,GC	Cu-Mo-Au
Canadian Olympic	Copper Ridge Exploration/Canadian Empire Exploration	Dawson	116G 082	G,GC,GP	Cu-Au
Dazzle/Gleam	Hinterland Metals Inc./True North Gems Inc.	Watson Lake	105G 030,031,120	G,GC,P	gemstones, Au
Dawson project	Klondike Gold	Dawson	115O 072,077	GC,T	Au
Finlayson	Entourage Mining/ Expatriate Resources	Watson Lake	105G various	G,GC,P	gemstones
Four Corners	Firestone Ventures/ Strategic Metals Ltd.	Watson Lake	105A 034, etc.	G,GC,P	gemstones, Au
Glitter	International Arimex Resources Inc./True North Gems Inc.	Watson Lake	(105G/8)	G,GC,P	gemstones
Grew Creek	Al Carlos	Whitehorse	105K 009	DD	Au-Ag
Goddell Gully	Tagish Lake Gold Corp.	Whitehorse	105D 025	DD	Au-Ag
Hart River IOCG	Copper Ridge Exploration	Mayo	(116A/15)	G,GC,P	Cu-Au
Heidi	Logan Resources	Dawson	116A 037	G,GC,GP,P	Au
Hold Fast	Gordon McLeod	Whitehorse	105C 012	G,GC	Cr-PGE
Hy/Fer	Dentonia Resources	Watson Lake	105H 102		Ag-Pb-Zn
Hyland Gold	Northgate Exploration/ StrataGold Corp.	Watson Lake	95D 011	G,GC,DD	Au
Ice	ASC Industries Ltd.	Mayo	115P 006	G,GC,GP,DD	Au
Lion	Firestone Ventures Inc./True North Gems Inc.	Watson Lake	(105G/8)	G,GC,P	gemstones
Logan	Expatriate Resources	Watson Lake	105B 099	G	Zn-Pb-Ag
Lucky Joe	Kennecott Canada Exploration/Copper Ridge Exploration	Dawson	115O 051	G,GC,T	Cu-Au

continued...

Abbreviations:

BS – bulk sample
D – development
DD – diamond drilling
ES – environmental studies
F – feasibility
G – geology
GC – geochemistry
GP – geophysics
M – mining
PD – percussion drilling
PF – prefeasibility
R – reconnaissance
T – trenching
U/GD – underground development

APPENDIX 2 (continued): 2003 EXPLORATION PROJECTS

PROPERTY	COMPANY/OWNER	MINING DISTRICT	MINFILE # or (1:50 000 NTS)	WORK TYPE	COMMODITY
Lynx Creek	Expatriate Resources	Mayo	106D 020	G,GC,GP	Au
McQuesten	SpectrumGold Inc./ Eagle Plains Resources	Mayo	105M 029	DD	Au
Mahtin	Shawn Ryan	Mayo	115P 007	G,GC,GP,P	Au
Marn	Canadian United Minerals	Dawson	116B 147	G,GP,P	Au-Cu
Mars	Saturn Ventures Inc.	Whitehorse	105E 002	G,GC	Cu-Au
Meg	Firestone Ventures/ True North Gems Inc.	Watson Lake	(105G/7)	G,GC,P	gemstones
Minto	Minto Resources	Whitehorse	115I 021,022	D	Cu-Ag-Au
Monster	Monster Copper Resources/ Orezone Resources	Dawson	116B 103	DD	Cu-Au
Mt. Hinton	Yukon Gold Corporation	Mayo	105M 052	T	Au
Pike	Strategic Metals Ltd.	Mayo	106E 040	DD	Au
Pluto	Shawn Ryan	Dawson	116C 134	G,GC	gemstones
Red Mountain	Regent Ventures Inc.	Mayo	115P 006	G,GC,GP,DD	Au
Regal Ridge	True North Gems Inc./ Expatriate Resources	Watson Lake	105G 147	G,GC,T,DD,BS	emeralds
Rusty	Firestone Ventures/ True North Gems Inc.	Watson Lake	(105G/7)	G,GC,P	gemstones
Severance	Eagle Plains Resources	Dawson	115J 003	G,GC,GP	Au
Shamrock	Copper Ridge Exploration	Dawson	(115O/6)	GC	Cu-Au
Scheelite (Tom)	Golden Patriot Resources/Copper Ridge Exploration	Mayo	115P 003	G,GP,DD	Au
Skukum Creek	Tagish Lake Gold Corp.	Whitehorse	105D 022,025,158	G,GC,DD	Au-Ag
Straw	Firestone Ventures/ True North Gems Inc.	Watson Lake	(105G/8)	G,GC,P	gemstones
Tay/LP	Ross River Minerals Inc.	Whitehorse	105F 121	G,GC	Au
Ten/Flume	Fjordland Exploration	Dawson	115N 110,163	G,GC	Au
True Blue	True North Gems Inc.	Whitehorse	105F 081	G,GC,P	gemstones
Ultra	Tom Morgan	Whitehorse	115B 008	G,GC	Ni-Cu-PGEs; Zn-Cu-Au-Ag
White	Klondike Exploration	Whitehorse	105O 011,012	G,GC,P	Au, Cu

Abbreviations:
BS – bulk sample
D – development
DD – diamond drilling
ES – environmental studies
F – feasibility
G – geology
GC – geochemistry
GP – geophysics
M – mining
PD – percussion drilling
PF – prefeasibility
R – reconnaissance
T – trenching
U/GD – underground development

YUKON PLACER MINING OVERVIEW, 2003

William LeBarge[1]
Yukon Geological Survey

LeBarge, W., 2004. Yukon Placer Mining Overview, 2003. *In:* Yukon Exploration and Geology 2003, D.S. Emond and L.L. Lewis (eds.), Yukon Geological Survey, p. 27-30.

Placer mining continued to be an important Yukon industry in 2003. Although the number of mines at 125, decreased by 10% since 2002, direct employment held steady in 2003 at around 400. In addition, approximately 600 jobs were generated in related service and hospitality sectors. In small population centres such as Dawson and Mayo, the placer industry is a major contributor to the local economy. The majority of active placer mining operations were in the Dawson Mining District (83) followed by the Whitehorse Mining District (32) and the Mayo Mining District (10).

For 2003, over 85% of the Yukon's placer gold was produced in the Dawson Mining District, which includes the unglaciated drainages of Klondike River, Indian River, west Yukon (Fortymile and Sixtymile rivers and the Moosehorn Range) and lower Stewart River (Fig. 1). The remaining gold came from the glaciated Mayo and Whitehorse mining districts, which include the placer areas of Clear Creek, Mayo, Dawson Range, Kluane, Livingstone and Whitehorse South.

Reported placer gold production from Indian River drainages decreased compared to the previous year, from 23,745 crude ounces (738 550 g) to 16,126 crude ounces (501 570 g). Klondike River area drainages only saw a slight decrease to 16,582 crude ounces (515 760 g) from the 2002 total of 18,613 crude ounces (578 930 g); this was at least partly because Last Chance Creek production remained steady while Hunker Creek production actually increased slightly.

A fairly significant drop in production from both Sixtymile River and Miller Creek resulted in West Yukon (Sixtymile, Fortymile and Moosehorn) recording only 6264 crude ounces (194 800 g) compared to 9515 ounces (295 900 g) in 2002.

Although reported gold recovered from Black Hills Creek nearly doubled, it wasn't enough to offset 50% decreases in Henderson and Mariposa creeks, and a 75% decrease from Thistle Creek. This resulted in a total of only 3912 crude ounces (121 700 g) reported for the Lower Stewart River placer area, compared to 8151 crude ounces (253 500) reported in 2002.

A very small amount of gold was reported from the Clear Creek area, 229 crude ounces (7120 g), which was nearly the same as the 2002 total of 214 crude ounces (6660 g).

In the Dawson Range, reported placer gold production remained steady with 1664 crude ounces (51 760 g) compared to 1720 crude ounces (53 500 g) reported in 2002.

Mayo area drainages also reported similar figures with 1894 crude ounces (58 910 g) compared to 1694 crude ounces (52 690 g) in 2002. While Duncan Creek production reportedly decreased, this was offset by increases on Lightning, Owl and Swede creeks.

In the Kluane area, production in 2003 decreased by ~25% with 1619 crude ounces (50 360 g) reported. The cessation of mining on Fourth of July Creek was the major factor.

The Livingstone area remained inactive with no reported gold production.

In Whitehorse South drainages, the first gold production reported since 1993 came from Iron Creek, a tributary of Sydney Creek. The 25.4 crude ounces of gold (790 g) was derived from a small mining

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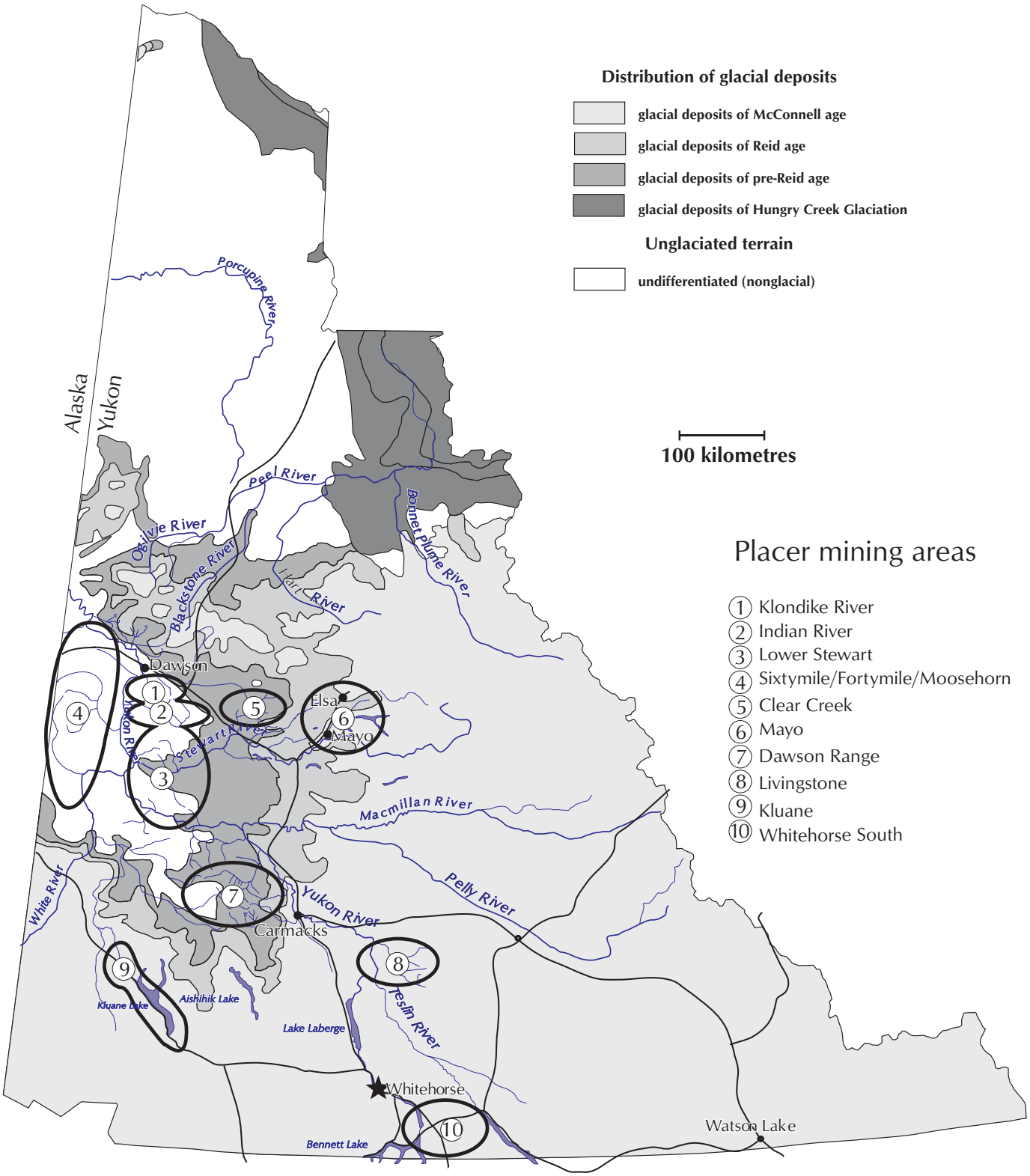

Figure 1. *Placer mining areas and distribution of glacial deposits in Yukon.*

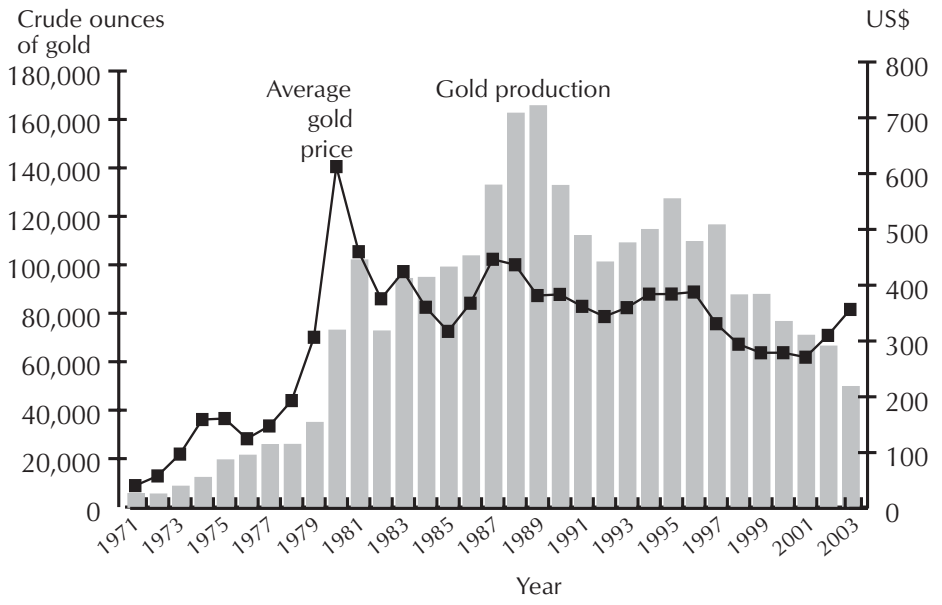

Figure 2. *Yearly gold production figures and average US gold price for the Yukon, 1971-2003.*

operation at the confluence of Iron and Sydney creeks. In addition, significant testing programs occurred on Moose Brook and Wolverine Creek.

In summary, the Yukon placer gold production in 2003 totalled 50,887 crude ounces (1 582 800 g), compared to 66,347 crude ounces (2 063 600 g) in 2002, which represents a 24% decrease (Fig. 2). Since 1999, placer gold production has dropped 43% to a level not seen since 1979. Although the world market price of gold continued to rise throughout 2002 and 2003, so did the Canadian dollar, and the effective value of gold for Yukon placer miners remained the same. The total dollar value of Yukon placer gold produced in 2003 was approximately $20.6 million, down from the $25.8 million generated in 2002.

APERÇU DE L'EXPLOITATION DES PLACERS AU YUKON EN 2003

L'exploitation de gîtes placériens est demeurée importante au Yukon en 2003. Même si le nombre de mines (125) a diminué de 10 % depuis 2002, les employés directs se sont maintenus autour de 400 en 2003. De plus, environ 600 emplois ont été créés dans les secteurs connexes des services et de l'accueil. Dans les petites agglomérations, comme Dawson et Mayo, l'exploitation des placers est un élément important de l'économie locale. La majorité des placers exploités étaient situés dans le district minier de Dawson (83), suivi du district de Whitehorse (32) et du district de Mayo (10).

En 2003, plus de 85 % de l'or placérien au Yukon provenait du district minier de Dawson où se trouvent les bassins de drainage non glaciaires de la rivière Klondike, de la rivière Indian et de l'ouest du Yukon (les rivières Fortymile et Sixtymile et le chaînon Moosehorn) et de la basse rivière Stewart. Le reste de l'or provenait des districts miniers glaciaires de Mayo et de Whitehorse où sont situés les placers de Clear Creek, Mayo, Dawson Range, Kluane, Livingstone et Whitehorse South.

En résumé, la production d'or placérien au Yukon en 2003 a totalisé 50 887 onces brutes (1 582 800 g); elle avait atteint 66 347 onces brutes (2 063 600 g) en 2002, ce qui représente un recul de 24 %. Depuis 1999, la

production d'or placérien a chuté de 43 %, niveau qui n'avait pas été atteint depuis 1979. Comme le prix du marché mondial de l'or a poursuivi son ascension en 2002 et 2003, à l'instar du dollar canadien, la valeur réelle de l'or pour les placers du Yukon est demeurée la même. La valeur totale de l'or placérien au Yukon en 2003 s'est élevée à environ 20,6 millions de dollars, ce qui constitue un glissement par rapport aux 25,8 millions de dollars de 2002.

Yukon Mining Incentives Program, 2003

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Galambos, K., 2004. Yukon Mining Incentives Program, 2003. *In:* Yukon Exploration and Geology 2003, D.S. Emond and L.L. Lewis (eds.), Yukon Geological Survey, p. 31-36.

The Yukon Mining Incentives Program (YMIP) received 93 applications by this year's deadline of March 1. A total of $987,000 was offered to 61 successful applicants. Nine of these were approved under the Grassroots-Prospecting module, 19 were part of the Focused Regional module, and 33 were approved under the Target Evaluation module.

With the increased price of gold on the world market, applicants were well poised with their exploration targets this season. Precious metal exploration under the program was up significantly; 56% of the applicants searched for gold and platinum group elements. Base metal exploration accounted for 30% of approved programs, while the remaining 14% of programs explored for gemstones and other commodities. Exploration programs were proposed for all four mining districts and were fairly evenly dispersed over the entire territory. This year there have been four option agreements signed for properties that have been explored under YMIP, with at least five more currently under negotiations.

Highlights for the year, for both placer and hard rock exploration programs, include the discovery of significant gold and pathfinder anomalies in both soils and rock, and the extension of known showings through prospecting and geophysics.

GRASSROOTS-PROSPECTING PROGRAMS

NUR

Peter Ross staked the Nur property, on the flanks of Mt. Haldane, north of Mayo, to cover anomalous soil geochemistry identified from previous exploration. The claims cover prospective geology very similar to that at the nearby McQuesten and Aurex properties (Yukon MINFILE 2003, 105M 029, 060, Deklerk, 2003). Soil surveys conducted this summer confirmed and expanded previous anomalies. Fourteen percent of the soils taken returned anomalous values greater than 20 ppb and up to 63 ppb Au. Fifty-eight percent returned values greater than 500 ppm and up to 9785 ppm As. The survey identified anomalous trends up to 135 m wide and in excess of 1500 m in length.

Figure 1. *Shawn Ryan indicates the apparent dip of a quartz vein containing visible gold. The vein returned values of 13.5 and 50 g/t Au.*

SOUTH DAWSON

Shawn Ryan believes his south Dawson property (Yukon MINFILE 2003, 115O 011, 012, Deklerk, 2003) covers a mineralized system that is at least 2 km x 5 km in size. Samples from a flat-lying quartz vein (Fig. 1) with minor

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Figure 2. *Silicified and brecciated siltstone such as this, assayed up to 24 g/t Au.*

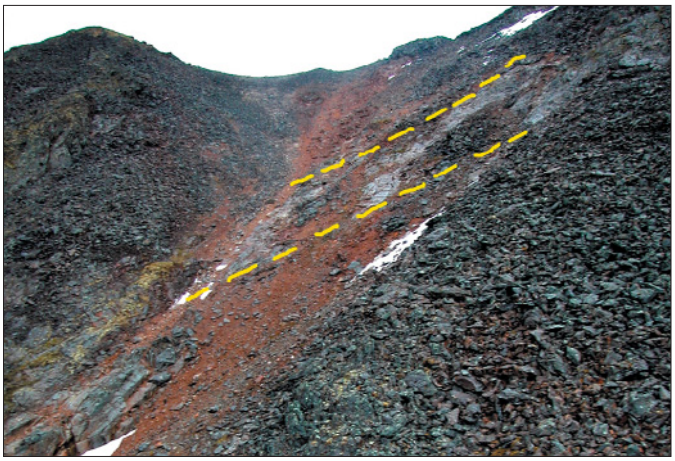

Figure 3. *Variably mineralized beds shedding talus containing pyrite, chalcopyrite and various copper oxides.*

tetrahedrite (?) and visible gold returned assays of 50 and 13.5 g/t Au. This vein is located at the top of a ridge line and is at least 1 m thick at this location. The base of the quartz vein was not exposed. Approximately 4.5 km from this location, silicified and hydrothermally brecciated sedimentary rocks (Fig. 2) and a rusty quartz breccia returned values of 24 g/t Au and 29 g/t Au, respectively.

FOCUSED REGIONAL PROGRAMS

HART RIVER

Bernie Kreft conducted further exploration on a large iron-oxide-copper-gold (IOCG) target that he had discovered in 2002 on the Hart River property (Yukon MINFILE 2003, 116A 009, Deklerk, 2003). Previous sampling from a large mineralized talus field returned values of up to 2% Cu and 0.25% Co from brecciated intrusive and sedimentary rocks as well as quartz-siderite and ankerite veins. The talus was eroding from variably fractured and mineralized beds of chert and siltstone (Fig. 3) that were intruded by both diorite dykes and bodies of hematite breccia. Sampling of bedrock exposures returned values of up to 1.76% Cu and 2.4 g/t Au from grab samples and 0.83% Cu from a 3.2-m chip sample near the crest of the ridge (Fig. 4). Copper Ridge Explorations Inc. has recently optioned the property.

Figure 4. *Showing on the Hart River property which assayed 0.835 % Cu over 3.2 m.*

GODDESS

Shawn Ryan staked the old Pluto property (Yukon MINFILE 2003, 116C 134, Deklerk, 2003) after researching assessment files. The property was explored from 1979-1982 by Cominco and Getty Canada Minerals

Figure 5. *Aquamarine (blue beryl) crystals from the Goddess property.*

Ltd. for molybdenite and tungsten. Logs from diamond drill hole 80-2 made reference to 22 pegmatites, 11 of which contained beryl, intruding into the granitic host rock. In all, 10 to 14 kg of core containing the blue beryl (aquamarine) were sampled from this drill hole (Fig. 5). Drill logs of other holes on the property mentioned better intersections of beryl, but these specimens had previously been removed. Cominco geologists also noted quartz-tourmaline veins (+/- beryl) intruding into the surrounding altered ultramafic rocks.

TARGET EVALUATION PROGRAMS

MARN

Canadian United Minerals restaked the Marn property (Yukon MINFILE 2003, 116B 147, Deklerk, 2002) as the Prune claims in January, 2002. They felt that there was good potential for high-grade gold-copper mineralization such as is found on the nearby Horn claims. Geological reserves (not National Instrument 43-101 compliant) for the Marn stand at 275 000 to 300 000 tonnes, grading 8.6 g/t Au and 1% Cu. The mineralization at the main showing trench is hosted in a dark green diopside skarn with only minor sulphide minerals. Shawn Ryan conducted nearly 22 km of magnetometer and soil geochemical surveys over the property, which revealed a 150 m x 400 m magnetic anomaly with coincident soil values of up to 200 ppm copper. A new zone of skarn mineralization was found in the valley bottom (Fig. 6) with initial rock samples returning values of up to 580 ppb Au, >10 000 ppm As and 0.6% Cu.

INDIAN RIVER

Pete Risby supervised the auger drilling of two large bench deposits of White Channel Gravel on the Indian River with the intention of determining the total value of the contained heavy metals. Preliminary estimates from surface sampling is that the upstream bench contains 265 million tonnes of material valued at US$15.46/tonne. The projected metal content of the bench is over 10 million ounces (311 000 kg) gold, 73 million pounds (33 182 tonnes) of tin, 67 million pounds (30 455 tonnes) of titanium and 150,000 pounds (68.2 tonnes) of

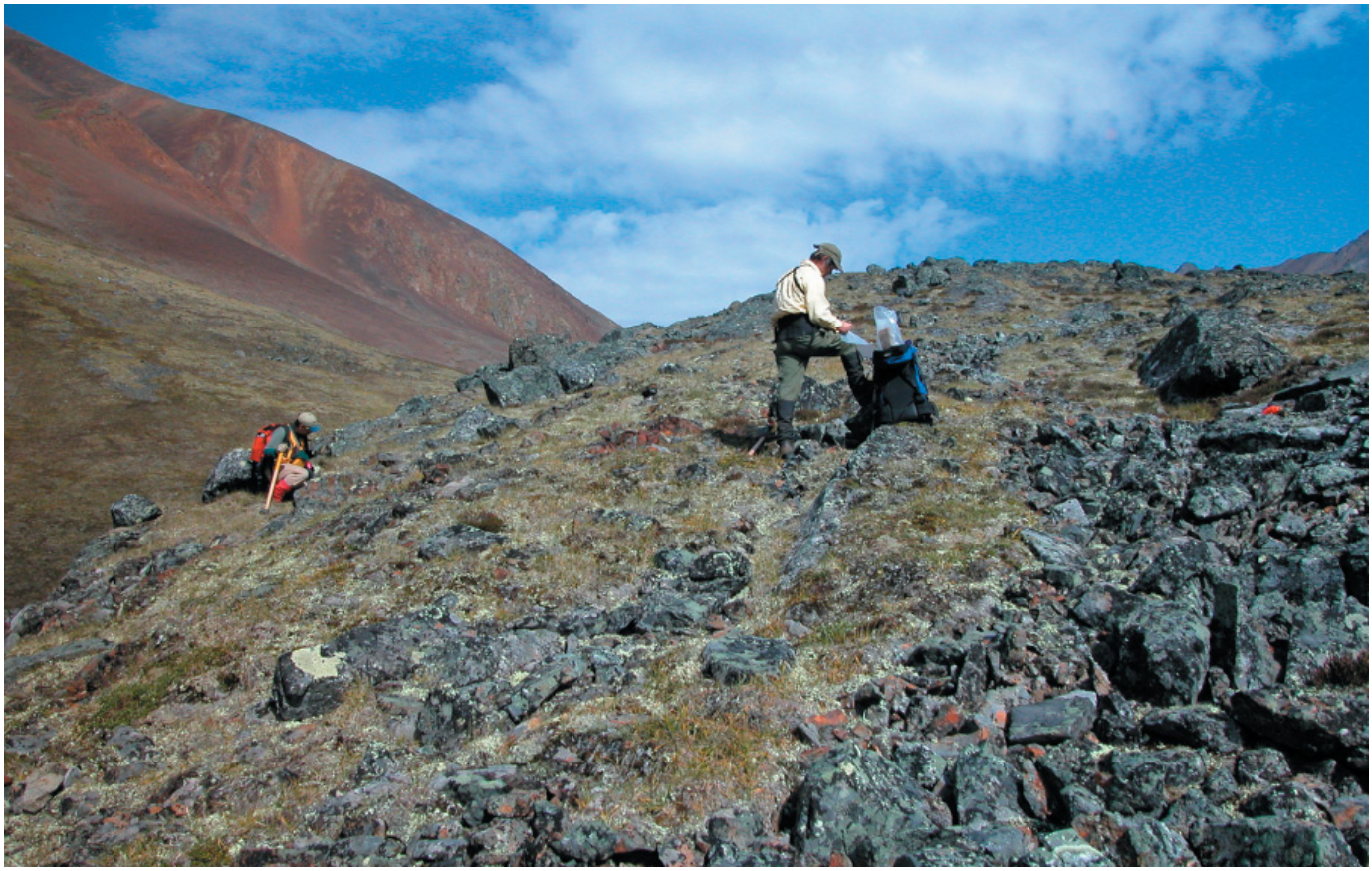

Figure 6. *A new skarn showing on the Prune claims (Marn property) was found; rock samples assayed 580 ppb Au, >10 000 ppm As and 6000 ppm Cu.*

Figure 7. *Brian Thurston supervised the auger drilling and sampling program on the Indian River property.*

scandium. (No recovery estimates have yet been made on the material.) Figure 7 shows Brian Thurston screening the samples. Both the oversize and the -16 mesh material were weighed to facilitate reserve calculations. Results from the late season drilling program are pending.

MAHTIN

Shawn Ryan completed geophysical and geochemical surveys over the Mahtin property (Yukon MINFILE 2003, 115P 007, Deklerk, 2003) this past summer. He outlined three magnetic anomalies associated with skarn mineralization, two IP anomalies, as well as a 900 x 200 m gold-in-soils anomaly with values up to 400 ppb Au. Rock sampling returned values of up to 4.3 g/t Au in pyrrhotite skarn (Fig. 8), and 6300 ppb Au and 948 ppm Bi in calc-silicate rocks.

SCHEELITE DOME

Copper Ridge Explorations Inc. completed 5.9 km of IP and 7.8 km of magnetometer surveys over the Tom zone located in the northwestern quadrant of the large Scheelite Dome property in the McQuesten River area (Yukon MINFILE 2003, 115P 033, Deklerk, 2003). The geophysical surveys were conducted in an effort to define drill targets for a Phase 2 drill program (Fig. 9). The program was successful in defining IP chargeability targets that correlate in part with the magnetic surveys and surface mineralization. Results from the follow-up drilling include 1.22 m of 5.06 g/t Au from Tom-1 and 6.4 m of 7.09 g/t Au (including 1.7 m of 24.42 g/t Au) and various other shorter intersections from Tom-2. Tom-4 intersected 2.55 g/t Au over 5.8 m, including 10.0 g/t over 1.37 m. Tom-5 encountered 3.35 g/t Au over 0.61 m at the collar of the hole. Tom-3 was abandoned before reaching its target depth.

ULTRA

Tom Morgan continued to explore the Ultra property (Yukon MINFILE 2003, 115B 008, Deklerk, 2003) near Haines Junction with a combination of geophysics, trenching and sampling this season. Max-min and magnetometer surveys over the Telluride showing revealed a number of good electromagnetic conductors

Figure 8. *Pyrrhotite skarn mineralization from the Mahtin property typically assayed between 1 and 4.3 g/t Au.*

Figure 9. *Golden Patriot Mining Inc. drilled five holes into the Tom zone on the Scheelite Dome property. The drill shown is setting up on Tom-3.*

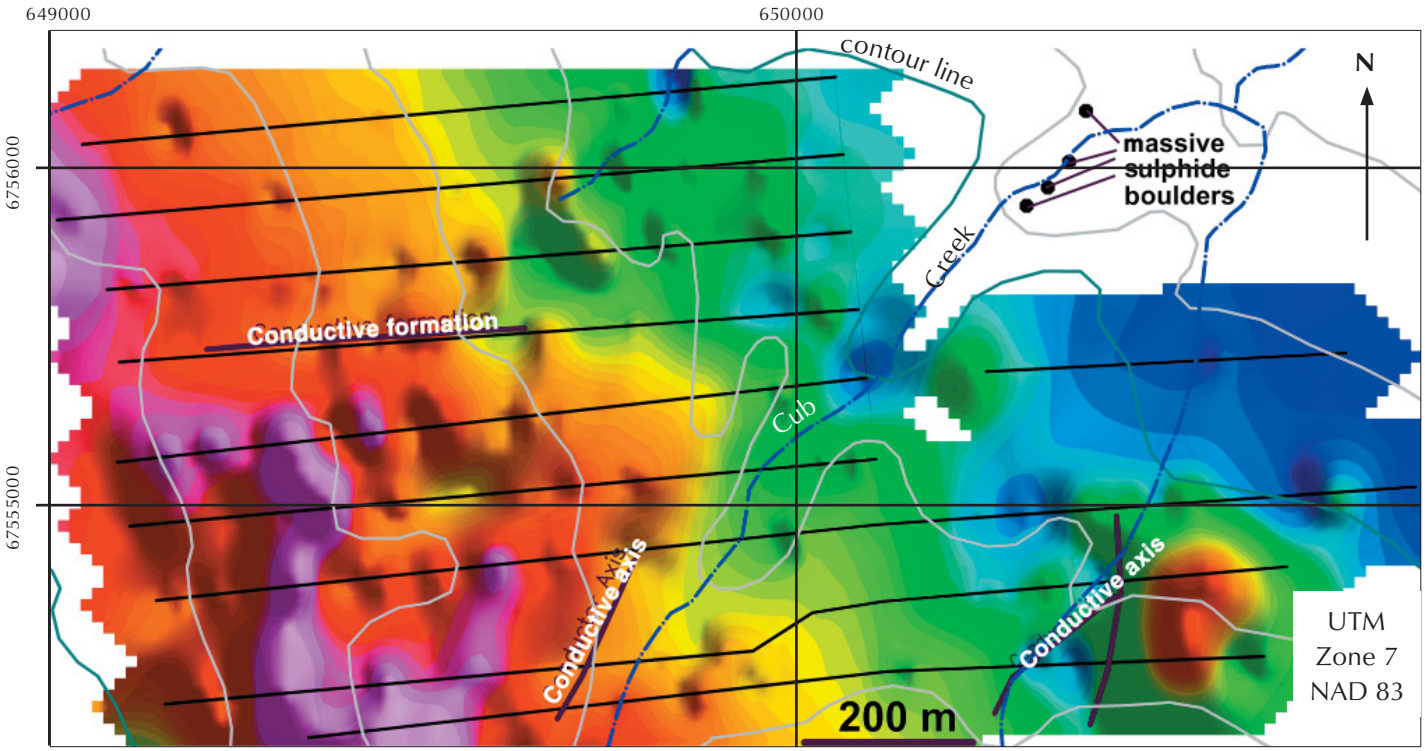

Figure 10. *Shaded relief magnetic anomalies and HLEM conductors, Ultra property. The geophysical plot shows the magnetic signature of the buried rock units with electromagnetic conductors, which may represent the source of the mineralized boulders exposed in Telluride Creek (approximate UTM coordinates).*

uphill from massive sulphide boulders that are exposed in the toe of a terminal moraine (Fig. 10). The boulders appear to be from a volcanogenic massive sulphide (VMS) source and have returned assays up to 5.1% Zn and 2.1% Cu. The Froberg showing (Fig. 11) approximately 2.5 km to the southwest, appears to be hydrothermal mineralization related to a fault. Recent sampling returned values of 5.5 g/t platinum (Pt), 13.5 g/t palladium (Pd), 4% Cu and 1.7% Ni.

SHAMROCK

Amax Molybdenum Ltd. originally staked the Shamrock property, located 82 km west of Carmacks, in 1970 and identified a 1000 m x 1200 m copper soil anomaly and a +700 gamma magnetic anomaly immediately to the north. BQ holes drilled in 1976 intersected values up to 1960 ppm Cu and up to 240 ppb Au over widths up to 100 m. In 1985 Chevron Resources Ltd. identified an 800 x 2400 m soil anomaly, with values up to 1270 ppb Au coincident with the 1970 magnetic anomalies. This year, 4763 NWT Ltd. staked the property, re-established the grid and completed soil sampling and magnetometer surveys. The program identified a 1.7-km-long gold-in-soil anomaly that is open at both ends. A number of

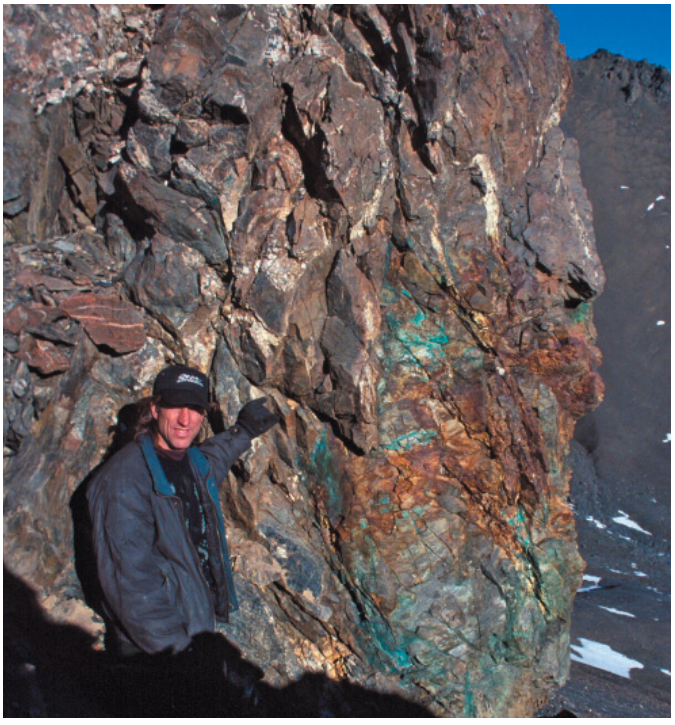

Figure 11. *Tom Morgan stands beside fracture-controlled mineralization at the Froberg showing. Trench samples from here assayed up to 5.5 g/t Pt, 13.5 g/t Pd, 4% Cu and 1.7% Ni.*

northwest and northeast anomalous trends are indicated by the soil and geophysical surveys (Fig. 12). Plans for next year are to extend the soil and magnetic grid and to trench a number of the identified anomalies.

ET

Peter Ross conducted an orientation survey on his ET claims (Yukon MINFILE 2003, 115P 042, Deklerk, 2003) this summer. He compared the results from an Enzyme Leach survey completed last year with those from a mobile metal ion (MMI) survey and a conventional inductively coupled plasma (ICP) soil survey. He found that the conventional ICP analysis gave him the best response in the area. Eleven percent of his samples returned anomalous values over 20 ppb, to a high of 169 ppb Au. The soil survey identified a number of anomalous trends up to 90 m wide and at least 230 m in length. Soil data, in addition to -200 mesh silt sample values of up to 5770 ppb Au, lead him to believe that the property is a good one.

REFERENCES

Deklerk, R. (compiler), 2003. Yukon MINFILE 2003 – A database of mineral occurrences. Yukon Geological Survey, CD-ROM.

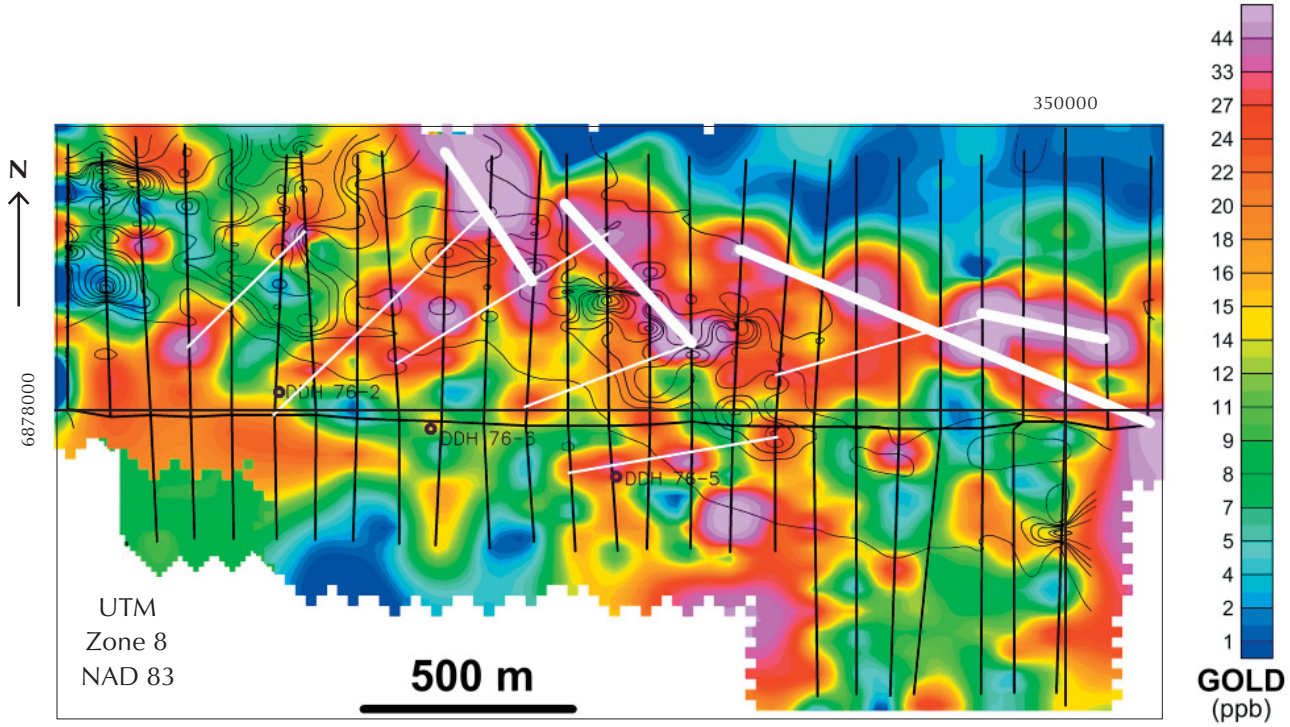

Figure 12. *Gold soil geochemistry and magnetic contours, Shamrock property. Soil sampling and magnetic surveys show strong northwest- and weaker northeast-trending anomalous zones, possibly related to faulting (from 4763 NWT Ltd., Aurora Geosciences Ltd.; approximate UTM coordinates).*

GOVERNMENT

Yukon Geological Survey

Grant Abbott and staff
Yukon Geological Survey

La Commission géologique du Yukon

Grant Abbott
La Commission géologique du Yukon

Yukon Regional Mineral Potential by Deposit Models

Geoff D. Bradshaw and Jo-Anne vanRanden
Yukon Geological Survey

Robert E. Leckie Awards for Outstanding Reclamation Practices

Judy St. Amand
Mining Lands, Energy, Mines and Resources

Yukon Geological Survey

Grant Abbott[1] and staff
Yukon Geological Survey

Abbott, J.G. and staff, 2003. Yukon Geological Survey. *In:* Yukon Exploration and Geology 2003, D.S. Emond and L.L. Lewis (eds.), Yukon Geological Survey, p. 39-55.

OVERVIEW

Eleven years ago, the Canada-Yukon Geoscience Office opened it doors and marked the beginning of a de facto Yukon Geological Survey (YGS) with the creation of the Yukon Geology Program. In April of 2003, that vision finally became a reality when responsibilities for management of Yukon's natural resources devolved from the federal government to the Government of Yukon. The Department of Energy, Mines and Resources now has responsibility for minerals, oil and gas, forestry, agriculture and lands. The new Yukon Geological Survey (Fig. 1) supercedes the Geology Program. YGS is part of the Minerals Development Branch, and is co-managed by Grant Abbott and Rod Hill,

Figure 1. *Yukon Geological Survey staff from left to right: Geoff Bradshaw, Charlie Roots, Steve Traynor, Lara Lewis, Rob Deklerk, Grant Lowey, Diane Emond, Ken Galambos, Grant Abbott, Karen Pelletier, Jo-Anne vanRanden, Ali Wagner, Bill LeBarge, Amy Stuart, Rose Williams, Lee Pigage, Craig Hart, Panya Lipovsky, Crystal Huscroft, Mike Burke, Kaori Torigai (Mining Lands), Don Murphy, Julie Hunt, Rod Hill, Jeff Bond, Maurice Colpron.*

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under the direction of Jesse Duke (Fig. 2). The Geological Survey integrates the Exploration and Geological Services Division (EGSD) of the Department of Indian Affairs and Northern Development (DIAND), with the Yukon Geoscience Office, the Mineral Assessment Group and the Yukon Mining Incentives Program (YMIP) of the Department of Energy, Mines and Resources of Government of Yukon (YTG). The Geological Survey of Canada (GSC) also maintains an office with the YGS. Activities of the Mineral Assessment Group and YMIP are described separately from this report.

Funding for the YGS remains at the same level as it was in previous years for the Geology Program. This year, in addition to core funding, we benefited from additional short-term funding from DIAND through the industry-led Northern Geoscience Initiative and through the Knowledge and Innovation Fund. The last federal budget renewed the Natural Resources Canada Targeted Geoscience Initiative for two more years. Yukon Government will see substantial funding this year, with YGS as a partner.

Over the past year we were sorry to lose Roger Hulstein and Robert Stroshein from the Mineral Assessment Group to the private sector. We are pleased to welcome mineral assessment geologist Geoff Bradshaw and project geologist Steve Israel.

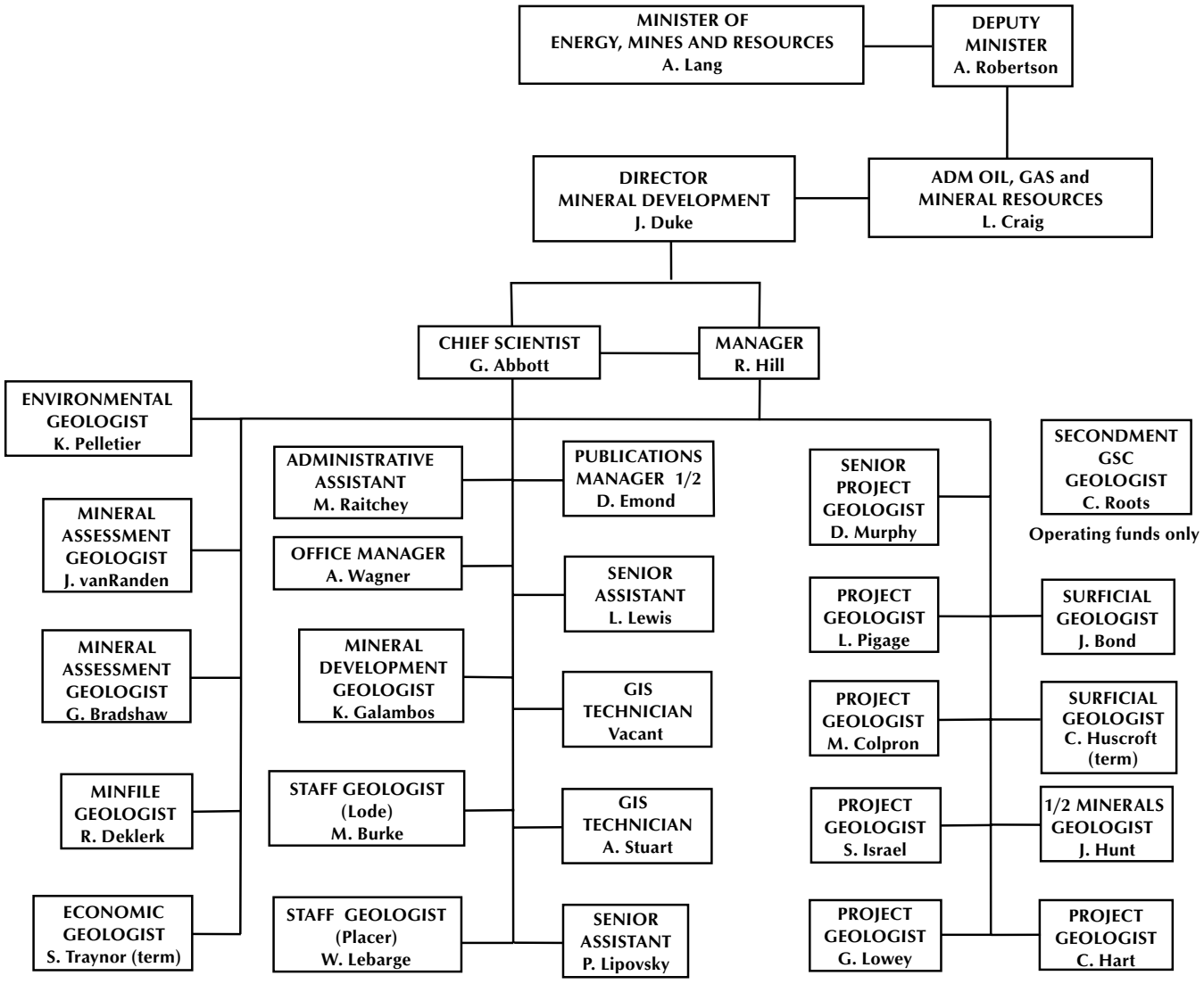

Figure 2. *Yukon Geological Survey organization chart.*

The Technical Liaison Committee to the YGS reviews our program twice a year. We are grateful to Chair Gerry Carlson and members Al Doherty, Moira Smith, Jean Pautler, Forest Pearson, Bernie Kreft, Jim Mortensen and Jim Christie for their valuable support and constructive advice.

A mandate for the YGS has been developed in consultation with senior management in Energy, Mines and Resources and the Technical Liaison Committee. The YGS now has the responsibility "to build, maintain, and communicate the geoscience and technical information base required to enable stewardship and sustainable development of the Territory's energy, mineral, and land resources." The mandate formalizes much of the work that has been underway over the last few years through the Geology Program, and opens the door for projects in new areas. Support for the mineral industry remains the primary focus, but more resources are being dedicated to mapping and studies of areas with hydrocarbon potential. Effort is also going into environmental studies that have relevance to the extractive industries and land use issues. In recent years, interest and demand for geoscience information has increased substantially from regulators, First Nations, the general public and schools. In addition, the interests of resource industries are best served by informed decision-making and informed public opinion. As a result, perhaps the largest change is not in what we do, but in the increased diversity of our clients.

FIELDWORK

The YGS is committed to providing a balanced complement of field projects that not only quickly stimulate mineral and hydrocarbon exploration, but also take the longer term view towards developing an understanding of the Yukon regional geological framework, and building the Yukon Geoscience database. Field projects carried out in 2003 are shown in Figure 3, and the present state and location of geological, geochemical and geophysical surveys are shown in Figure 4.

Bedrock mapping continues to be the cornerstone of the YGS. Several projects are in the completion and writeup stage this year. Lee Pigage has a bulletin in preparation on the geology of the Anvil District, and is writing a bulletin and papers on the La Biche mapping project as part of the Central Forelands National Mapping Project (NATMAP). Grant Lowey has a bulletin in press on the placer geology and potential of Stewart River map area, The Ancient Pacific Margin NATMAP is in its final year. Maurice Colpron and Don Murphy are each writing bulletins on the Glenlyon and Finlayson Lake areas, respectively. Maurice Colpron, together with JoAnne Nelson of the B.C. Geological Survey Branch, is organizing and editing the synthesis volume for the Ancient Pacific Margin NATMAP project, to be published by the Geological Association of Canada. The volume will summarize the results of more than four years of work in Stewart River, Glenlyon, Finlayson Lake and Wolf Lake map areas in Yukon, parts of northern and southern British Columbia and eastern Alaska by authors from the YGS, Geological Survey of Canada, British Columbia Geological Survey, United States Geological Survey, and several universities. This work has made a seminal leap in our understanding of the geology and mineral potential of the Yukon-Tanana Terrane, up until now the least understood part of the North American Cordillera.

Field work in 2003 included ongoing bedrock mapping in the Finlayson Lake map area where Don Murphy continues to define and expand areas of potential for volcanic-hosted massive sulphide (VMS) deposits and emeralds. Maurice Colpron and Charlie Roots participated in the GSC's Stewart River mapping project where the additional manpower allowed for timely completion of fieldwork. Lee Pigage undertook a short exploratory trip into eastern Coal River map area to determine possible correlations of Late Proterozoic and Early Paleozoic volcanic and siliciclastic rocks near Toobally Lakes with possibly equivalent strata in the adjacent La Biche map area. Our most important new initiative is the Whitehorse Trough project. The Whitehorse Trough project will be a multidisciplinary partnership with the Geological Survey of Canada and universities, much like the current NATMAP. The purpose is to more accurately determine the hydrocarbon potential of the northern portion of the Trough by more clearly defining its stratigraphic and structural framework. This year, Grant Lowey began a stratigraphic and sedimentological study of the Lebarge Group. Later this year, the GSC, with funding from the Targeted Geoscience Initiative will conduct a seismic survey across the Trough along the Campbell and Klondike highways. Stratigraphic, sedimentological and structural studies, and bedrock mapping will continue over the next two years.

Craig Hart is completing a PhD Program at the University of Western Australia. Most of the requirements for the degree will entail writing papers on his previous field studies of the Tintina Gold Belt and other Yukon gold

occurrences. This year, Craig and Lara Lewis carried out a wide-ranging reconnaissance study of tungsten and beryl occurrences.

Julie Hunt has returned to school to undertake a PhD program at James Cook University in Australia. YGS is funding her fieldwork. Julie partnered with Derek Thorkelson of Simon Fraser University to complete fieldwork on the Wernecke Breccias, and is taking advantage of the Australian connection by comparing the Yukon breccias with similar Australian rocks which host giant copper-gold ore deposits.

Bill LeBarge and Mark Nowasad completed their studies of the relationship between sedimentology, grain size distribution and water quality of effluent from placer deposits. Their results will be evaluated for possible long-term applications and further research. Data gathered from this study was useful in the 2003 review of the Yukon Placer Authorization.

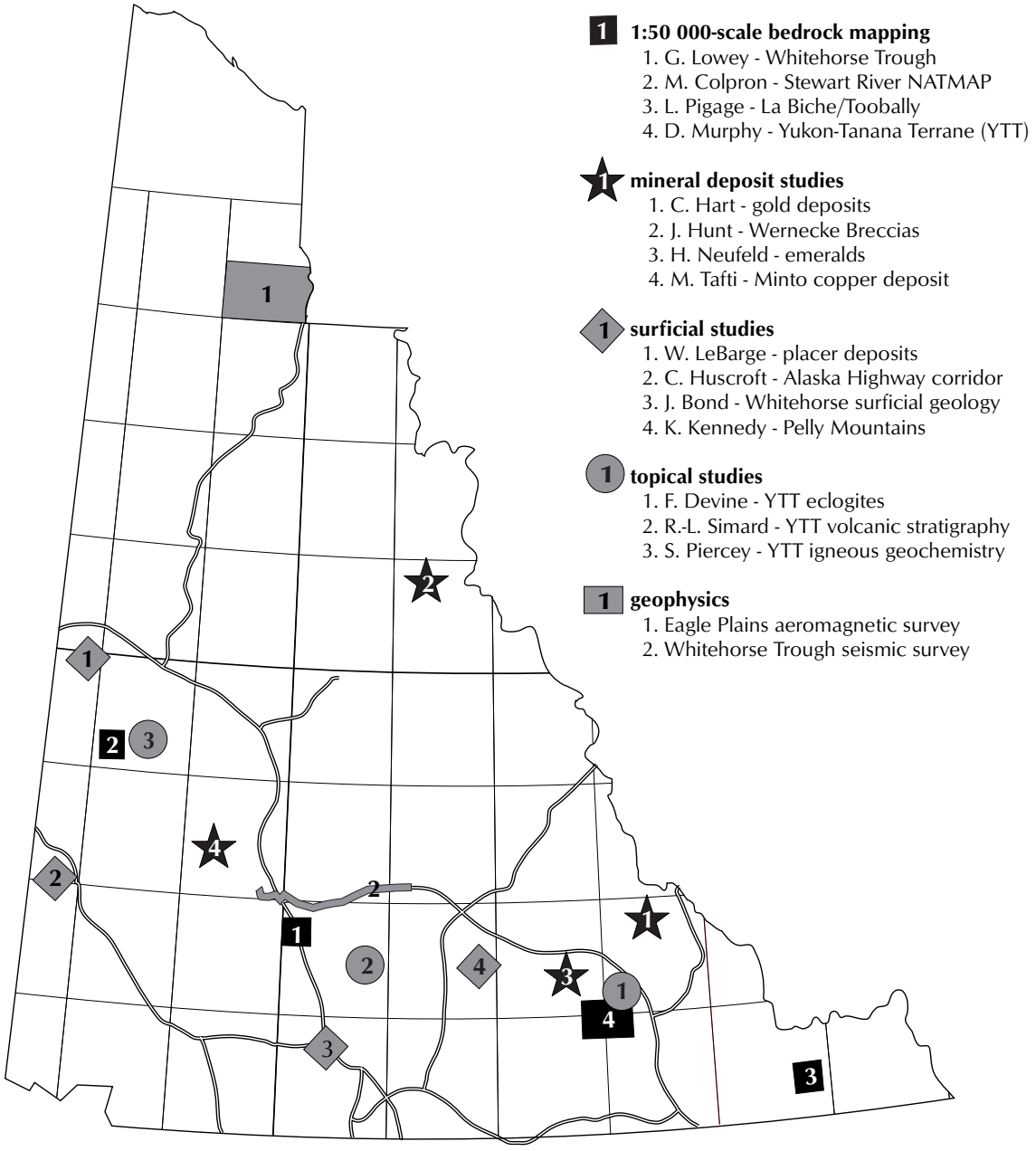

Figure 3. *Field projects carried out or sponsored by the Yukon Geological Survey in 2003.*

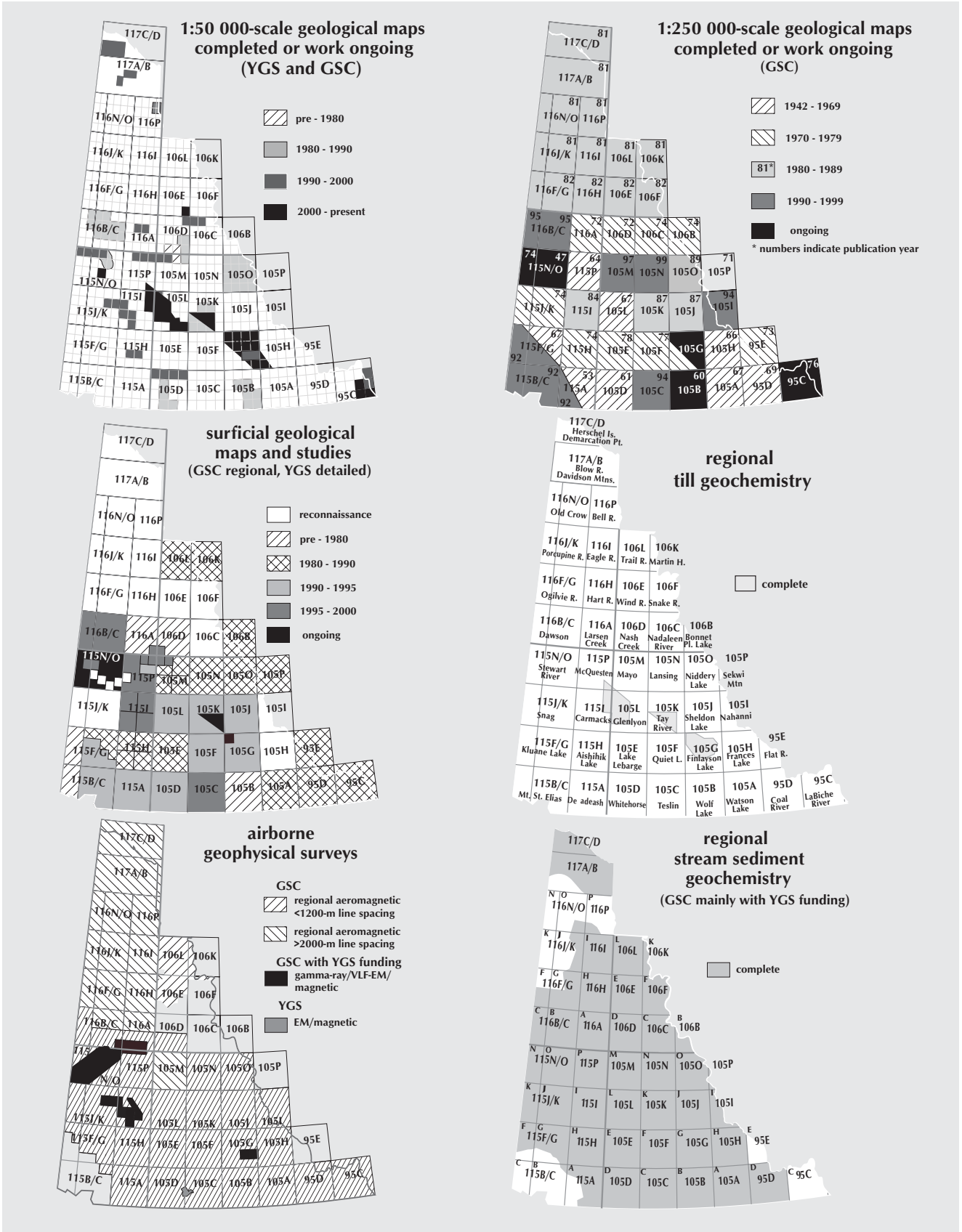

Figure 4. *Summary of available geological maps, and regional geochemical and geophysical surveys in the Yukon, in 2003.*

Jeff Bond continued surficial mapping of the greater Whitehorse area to be published as two 1:50 000-scale maps. The project will provide baseline information to support land-use decisions, groundwater studies and public education.

Jeff and Kristen Kennedy studied the surficial geology and ice-flow patterns in the Seagull Creek area, and determined that glacial flow was to the north, up-valley, in the opposite direction to what had previously been believed. These results have a significant bearing on the interpretation of soil geochemical anomalies and potential of known gold occurrences in the area.

Jeff also provided advice and support to placer miners, First Nations and to the Department of Fisheries and Oceans on matters related to surficial geology.

EXTERNAL SUPPORT

The Yukon Geological Survey (YGS) is providing financial and logistical support, or is a partner with graduate students and university researchers in the following projects.

Fionnuala Devine began field work in the Finlayson Lake area for a Master's thesis under Dr. S. Carr at Carleton University, Ottawa, Ontario. Her study of the geological setting and geochemical, petrological and geochronological character of high pressure metamorphic rocks of the Yukon-Tanana Terrane will provide critical information on the metamorphic and tectonic history of these rocks.

Reza Tafti is completing a study of the Minto copper deposit for his MSc at the University of British Columbia, Vancouver, British Columbia, under the supervision of Dr. Jim Mortensen. Through the project we will attempt to gain a better understanding of the nature, age and origin of the main host rocks to the Minto deposit and the copper-gold mineralized rock contained within them. This information will be used as a basis for developing an exploration model for similar mineralization elsewhere in the Minto-Williams Creek belt.

Heather Neufeld is completing a study of emerald and beryl occurrences in the Yukon and Northwest Territories for her MSc degree at the University of British Columbia under the supervision of Drs. Jim Mortensen and Lee Groat. The main focus of the study will be the Regal Ridge emerald deposit in the Finlayson Lake district. The purpose of the project is to understand the origin of the emerald occurrences and to develop exploration guidelines for the northern Canadian Cordillera.

Renée-Luce Simard is completing a study of the volcanic stratigraphy, composition and tectonic evolution of Late Paleozoic successions in central Yukon for her PhD thesis at Dalhousie University, Halifax, Nova Scotia, under the direction of Dr. J. Dostal. The project compares and contrasts the depositional style, composition and tectonic setting of several volcanic successions within the belt of pericratonic terranes in the Northern Cordillera. These include the Klinkit Group in Wolf Lake map area, the Little Salmon formation in Glenlyon map area, and the Boswell and Semenof formations in central Laberge map area.

Dr. Steve Piercey at Laurentian University, Sudbury, Ontario, as part of the Ancient Pacific Margin NATMAP Project, is completing a study of the field, geochemical and isotopic attributes of volcanic and intrusive rocks in the Stewart River map area. The study will, in part, determine the similarities and differences of these rocks to volcanogenic massive sulphide (VMS)–bearing rocks in the Finlayson Lake district.

In addition to providing geochronological support to the GSC's Stewart River project, Mike Villeneuve (GSC – Ottawa) has been using argon geochronology to 1) determine the cooling and uplift history of the Klondike region to aid in understanding mineralizing and tectonic processes in that region; 2) define the timing of recent volcanism in the Yukon, particularly the Fort Selkirk region; and 3) provide timing constraints on intrusion-related gold mineralization in the Tintina Gold Belt.

ENVIRONMENTAL STUDIES

Karen Pelletier continued to administer the Mining and Environmental Research Group (MERG), YTG. The 2003-funded studies include: *The Evolution of Metal Tolerant Vegetation in Native Yukon Vegetation Invading Abandoned Mine Sites: A Strategy for Long-Term Regulation* by Thomas Hutchinson, Trent University; *Bioengineering Experimentation - Noname Creek and Gold Run Creek, Feasibility Study and Field Trials* by Laberge Environmental Services; *Permafrost and Freezing: Implications for Northern Mine Sites* by EBA Engineering Consultants Ltd.; *Examination of Natural Attenuation of Metals in Soils in Northern Environments* by Access Consulting Group; and *Evaluation of Distributions of Bacteria, Sediments, Aqueous Chemistry and Heavy Metals in Yukon Wetlands* by EBA Engineering Consultants Ltd.

Karen continues to review Mining Land Use and Water License applications, and monitor reclaimed sites to document the effectiveness of mitigation practices. Karen also represents YGS on several committees which sponsor environmental research that involves geology.

Funding from the DIAND Knowledge and Innovation Fund has supported a project by Crystal Huscroft to characterize the settings of landslide hazards along the Alaska Highway Corridor. Many of the landslides in the region are related to degradation of permafrost and the influence of frozen ground on soil drainage. This study will help to assess the potential impact of global warming on terrain stability and the risk to future development such as the Alaska Highway pipeline.

LIAISON AND SUPPORT TO INDUSTRY, FIRST NATIONS AND THE PUBLIC

Mike Burke and Bill LeBarge, our main links to the exploration industry, continued to monitor Yukon hard-rock and placer mining and mineral exploration activity, visit active properties, review reports for assessment credit, and maintain the assessment report library.

The YGS continues to focus more attention on increasing awareness among the public, schools and First Nations of geology and its importance to the mining industry, land use planning and environmental management. Karen Pelletier, Charlie Roots and other YGS staff continue to make presentations in the schools and conduct field trips in the communities. Karen also organized field trips with First Nations groups to visit exploration properties to examine modern reclamation practices. We are in the process of developing an interpretive guide to the Whitehorse Copper Belt through a contract with Danièle Héon.

INFORMATION MANAGEMENT AND DISTRIBUTION

With the increasing volume of information generated by YGS and others, and rapidly evolving digital technology, the Survey has placed more effort and resources into making geological information more accessible. A large part of our effort has gone into developing and maintaining key databases, and making all of our information internet-accessible. Ongoing activities include support for the H.S. Bostock Core Library and the Energy, Mines and Resources (EMR) library (Elijah Smith Building).

DATABASES

With new reporting requirements to securities regulators, widely recognized mineral deposit models are becoming increasingly important. In cooperation with the British Columbia Geological Survey, the YGS has contracted Anna Fonseca to adapt the British Columbia Geological Survey Mineral Deposit Models for the Yukon. These models are now incorporated into Yukon MINFILE and will be published in early 2004.

Yukon MINFILE, the Yukon's mineral occurrence database, is maintained by Robert Deklerk. An update was released in November, 2003. The database now contains 2603 records, of which 500 have been revised, and is complete to the end of 2001. All mineral occurrences are now assigned to a deposit model. Reserve tables have been completely revised and updated to match, as closely as possible, the Canadian Institute of Mining Standards for Reporting Mineral Resources and Reserves.

The Yukon Placer Database, compiled under the direction of Bill LeBarge, was released in the fall of 2002. The database is in Microsoft Access 2000 format and is a comprehensive record of the geology and history of Yukon placer mining. The database contains descriptions of 440 streams and rivers, and 1356 associated placer occurrences. It also includes location maps in Portable Document Format (PDF). An update is scheduled for the spring of 2004.

The Yukon GEOPROCESS File, under the direction of Diane Emond, is an inventory of information on geological process and terrain hazards, including 1:250 000-scale maps showing permafrost, landslides, recent volcanic rocks, structural geology, and seismic events, and also includes references and summaries of bedrock and surficial geology. The GEOPROCESS File is intended as a planning aid for development activities and is available for most areas south of 66° latitude. The maps are now standardized in colour, and available on a single compact disk. Maps with text are in AutoCAD 2000 and PDF formats.

The Yukon Digital Geology compilation was updated this year by Steve Gordey and Andrew Makepeace of the Geological Survey of Canada with funding from YGS. It includes syntheses of bedrock geology and glacial limits, compilations of geochronology, paleontology, and mineral occurrences, and a compendium of aeromagnetic images, as well as an oil and gas well database. All are now available on CD-ROM. Bedrock geology and glacial limit paper maps are also available at 1:1 000 000 scale.

The Yukon Regional Geochemical Database 2003, compiled by Danièle Héon, contains all of the available digital data for regional stream sediment surveys that have been gathered in the Yukon under the Geological Survey of Canada's National Geochemical Reconnaissance Program. It is available on CD-ROM in Microsoft Excel 2000 format and in ESRI ArcView Shapefile format.

The YukonAge 2002 Database, compiled by Katrin Breitsprecher and Jim Mortensen at the University of British Columbia with funding from YGS, can now be viewed on the YGS Map Gallery in a version modified by Mike Villeneuve and Linda Richard with the Geological Survey of Canada. The database contains over 1500 age determinations, derived from over 1100 rock samples from the Yukon Territory, in both Microsoft Access 2000 format and as a flat file in Microsoft Excel 2000 format so that the data may be viewed without Microsoft Access. The database will be updated in the spring of 2004.

The Yukon Geoscience Publications Database, 2003, compiled by Lara Lewis and Diane Emond, is current to 2003 and contains more than 5000 references to papers on Yukon geology and mineral deposits, including YGS publications.

Funding from DIAND for Northern Geoscience announced in May, 2003 will be used in part to complete scanning of assessment reports and conversion to PDF format. The complete database of over 5000 files is expected to be available on-line by the spring of 2005.

H. S. BOSTOCK CORE LIBRARY

Mike Burke and Ken Galambos maintain the H.S. Bostock Core Library. The facility contains about 128 000 m of diamond drill core from about 200 Yukon mineral occurrences. Confidentiality of material is determined on the same basis as mineral assessment reports. Confidential core can be viewed with a letter of release from the owner. Rock saws and other rock preparation equipment are available to the public.

EMR LIBRARY

The EMR library in the Elijah Smith Building is an invaluable resource that is available to the public, but often overlooked. It is Yukon's largest scientific library and includes collections that, prior to devolution, belonged to Indian and Northern Affairs Canada and the Department of Energy, Mines and Resources, Yukon Government. The library also houses Yukon assessment reports and contains most geological journals and a good selection of references on general geology, Yukon geology and economic geology.

INFORMATION DISTRIBUTION

The YGS distributes information in three formats. We sell and distribute paper maps and reports through our Geoscience Information and Sales Office. In addition, many of our recent publications and databases are available in digital format at considerably lower prices than for paper copies. Most of our publications are available as PDF files on our website (www.geology.gov.yk.ca), free of charge. A directory of assessment reports is also available online. We are pleased to make spatial data available through our interactive map server; the Map Gallery can be accessed through the YGS website. We are continuing to improve the Map Gallery and have added coverages of regional stream geochemistry, mineral claims and geochronology to the existing coverages of regional geology, MINFILE locations, topography, roads and communities, and First Nations land selections. Vector data can now be clipped and downloaded. Planned enhancements include addition of geophysics and paleontology, and addition of more attribute data to existing coverages. Users are encouraged to provide feedback and suggest improvements.

Hard copies of YGS publications are available at the following address:

Geoscience Information and Sales
c/o Whitehorse Mining Recorder
102-300 Main Street (Elijah Smith Building)
P.O. Box 2703 (K102)
Whitehorse Yukon Y1A 2C6
Ph. (867) 667-5200
Fax. (867) 667-5150
E-mail: geosales @gov.yk.ca

To access publications and to learn more about the Yukon Geological Survey, visit our website at http://www.geology.gov.yk.ca or contact us directly:

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2003 PUBLICATIONS AND MAPS

YGS OPEN FILES

(also see under Joint YGS/GSC Open Files)

Bradshaw, G. and vanRanden, J. (compilers), 2003. Yukon Regional Mineral Potential by Deposit Models 2003. Yukon Geological Survey, Open File 2003-11(D), CD-ROM.

Lipovsky, P.S., Colpron, M., Stronghill, G. and Pigage, L., 2003. GeoFIELD v.2.2 - Data management and map production for the field geologist. Yukon Geological Survey, Open File 2003-8(D), CD-ROM. A customized Microsoft Access 2000 database application, which facilitates data entry/recording and the production of geologic maps while in the field.

Simard, R.-L., 2003. Geological map of southern Semenof Hills (part of NTS 105 E/1,7,8), south-central Yukon (1:50 000 scale). Yukon Geological Survey, Open File 2003-12.

YGS GEOSCIENCE MAPS

Hart, C.J.R., 2003. Geology of Thirty-seven Mile Creek map area (105 D/13), southern (1:50 000 scale), Yukon. Yukon Geological Survey, Geoscience Map 2003-2. Digital reissue of Geoscience Map 1997-4.

Hart, C.J.R., 2003. Geology of Upper Laberge map area (105 D/14), southern Yukon. Yukon Geological Survey, Geoscience Map 2003-3 (1:50 000 scale). Digital reissue of Geoscience Map 1997-5.

Hart, C.J.R., 2003. Geology of Joe Mountain map area (105 D/15), southern Yukon (1:50 000 scale). Yukon Geological Survey, Geoscience Map 2003-4. Digital reissue of Geoscience Map 1997-8.

Hart, C.J.R., 2003. Geology of Mount M'Clintock map area (105 D/16), southern Yukon (1:50 000 scale). Yukon Geological Survey, Geoscience Map 2003-5. Digital reissue of Geoscience Map 1997-7.

Roots, C.F., 2003. Bedrock geology of Lansing Range map area (NTS 105N), central Yukon. Yukon Geological Survey, Geoscience Map 2003-1, 1:250 000 scale. Also known as Geological Survey of Canada Open File 1616.

MINERAL INDUSTRY REPORTS

Mining Inspection Division, 2003. Yukon Placer Industry 1998-2002. Mineral Resources Directorate, Yukon Region, Indian and Northern Affairs Canada, 214 p.

YGS DATABASES

Deklerk, R. (compiler), 2003. Yukon MINFILE 2003 – A database of mineral occurrences. Yukon Geological Survey, CD-ROM.

Héon, D. (compiler), 2003. Yukon Regional Geochemical Database 2003 – Stream sediment analyses. Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs Canada, CD-ROM.

Lewis, L.L. and Emond, D.S. (compilers), 2003. Yukon Geoscience Publications Database 2003. Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs Canada, CD-ROM.

JOINT YGS/GSC OPEN FILES AND GEOSCIENCE MAPS

Colpron, M., Bond, J.D., Liposvky, P.S., Gladwin, K., Gordey, S.P., Murphy, D.C., Nelson, J.L., Plouffe, A., Roots C.F. and Abbott, J.G., 2003. Digital compilation of bedrock geology and till geochemistry of Glenlyon (105L) and eastern Carmacks (115I) map areas, Yukon Territory. Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs Canada and Geological Survey of Canada, EGSD Open File 2003-7(D)/GSC Open File 1561, CD-ROM.

Gordey, S.P. and Makepeace, A.J. (compilers), 2003. Yukon Digital Geology (version 2). Yukon Geological Survey Open File 2003-9(D), and Geological Survey of Canada Open File 1749, 2 CD-ROMs.

Kiss, F., Coyle, M., Forté, S. and Dumont R., 2003. Six aeromagnetic total field and first derivative maps, Yukon Territory (1:100 000 scale):

EGSD Open File 2003-1/GSC Open File 1538: Aeromagnetic Total Field, 106E/SE-SW

EGSD Open File 2003-2/GSC Open File 1539: Aeromagnetic Total Field, 106E/NE-NW

EGSD Open File 2003-3/GSC Open File 1540: Aeromagnetic Total Field, 106L/SE-SW

EGSD Open File 2003-4/GSC Open File 1542: Magnetic First Derivative, 106E/SE-SW

EGSD Open File 2003-5/GSC Open File 1543: Magnetic First Derivative, 106E/NE-NW

EGSD Open File 2003-6/GSC Open File 1544: Magnetic First Derivative, 106L/SE-SW

Plouffe, A. and Bond, J.D., 2003. Till geochemistry of the Finlayson Lake (105G), Glenlyon (105L) and east Carmacks (115I) map areas, Yukon Territory. Yukon Geological Survey Open File 2003-10(D) and Geological Survey of Canada Open File 4479, CD-ROM.

Roots, C.F., 2003. Bedrock geology of Lansing Range map area (NTS 105 N), central Yukon. Yukon Geological Survey Geoscience Map 2003-1 and Geological Survey of Canada Open File 1616.

YGS CONTRIBUTIONS

Bradley, D.C., Dumoulin, J., Layer, P., Sunderlin, D., Roeske, S., McClelland, B., Harris, A., **Abbott, G.**, Bundtzen, T. and Kusky, T., 2003. Late Paleozoic orogeny in Alaska's Farewell Terrane. *In:* Tectonophysics, vol. 372, p. 23-40.

Goldfarb, R.J., Mao, J., **Hart, C.,** Wang, D., Anderson, E. and Wang, Z., 2003. Tectonic and metallogenic evolution of the Altay Shan, Northern Xinjiang Uygur Autonomous Region, northwestern China. *In:* Tectonic Evolution and Metallogeny of the Chinese Altay and Tianshan, J. Mao, R.J. Goldfarb, R. Seltmann, D. Wang, W. Xiao and C. Hart (eds.), International Association on the Genesis of Ore Deposits, London, England, p. 209-226.

Groves, D.I., Goldfarb, R.J., Robert, F. and **Hart, C.J.R.,** 2003. Gold Deposits in Metamorphic Belts: Overview of Current Understanding, Outstanding Problems, Future Research, and Exploration Significance. Economic Geology, vol. 98.

Harris M.J., Symons D.T.A., Blackburn W.H., **Hart C.J.R.** and Villeneuve M., 2003. Travels of the Cache Creek Terrane: a paleomagnetic, geobarometric and Ar/Ar study of the Jurassic Fourth of July Batholith, Canadian Cordillera. Tectonophysics, vol. 262, p. 137-159.

Hart, C.J.R., Wang, Y., Goldfarb, R.J., Begg, G., Mao, J.W. and Dong, L., 2003. Axi and associated epithermal gold deposits in the western Tianshan, Xinjiang, PR China. *In:* Tectonic Evolution and Metallogeny of the Chinese Altay and Tianshan, J. Mao, R.J. Goldfarb, R. Seltmann, D. Wang, W. Xiao and C. Hart (eds.), International Association on the Genesis of Ore Deposits, London, England, p. 209-226.

Lowey, G.W., 2002. Sedimentary processes of the Kusawa Lake torrent system, Yukon, Canada, as revealed by the September 16, 1982 flood event. Sedimentary Geology, vol. 151, p. 293-312.

Mao, J.W., Goldfarb, R.J., Seltmann, R., Wang, D.H., Xiao W.J. and **Hart, C.** (eds.), 2003. Tectonic Evolution and Metallogeny of the Chinese Altay and Tianshan. International Association on the Genesis of Ore Deposits (IAGOD), London, England, 282 p.

Marsh, E.E., Goldfarb, R.J., **Hart, C.J.R.** and Johnson, C.A., 2003. Geology and geochemistry of the Clear Creek intrusion-related gold occurrences, Tintina Gold Province, Yukon, Canada. Canadian Journal of Earth Sciences, vol. 40, p. 681-699.

Marshall, D., Groat, L., Giuliani, G., **Murphy, D.,** Mattey, D., Ercit, T.S., Wise, M.A., Wengzynowski, W. and Eaton, W.D., 2003. Pressure, temperature and fluid conditions during emerald precipitation, southeastern Yukon, Canada: fluid inclusion and stable isotope evidence. Chemical Geology, vol. 194, p. 187-199.

Piercey S.J., Mortensen J.K., **Murphy D.C.**, Paradis S. and Creaser R.A., 2003. Geochemistry and tectonic significance of alkalic mafic magmatism in the Yukon-Tanana Terrane, Finlayson Lake region, Yukon. Canadian Journal of Earth Sciences, vol. 39, p. 1729-1744.

Piercey, S.J., **Murphy, D.C.,** Mortensen, J.K. and Creaser, R.A., in press. The Mid-Paleozoic Initiation of the Northern Cordilleran Marginal Back-Arc Basin*:* Geological, Geochemical and Neodymium Isotopic Evidence from the Oldest Mafic Magmatic Rocks in Yukon-Tanana Terrane, Finlayson Lake district, Southeast Yukon, Canada. Geological Society of America Bulletin.

Simard R.-L., Dostal J. and **Roots C.F.,** 2003. Development of late Paleozoic volcanic arcs in the Canadian Cordillera: an example from the Klinkit Group, northern British Columbia and southern Yukon. Canadian Journal of Earth Sciences, vol. 40, p. 907-924.

Thorkelson, D.J., **Abbott, J.G.** and **Roots, C.F.**, 2003. Comment: Proterozoic prism arrests suspect terranes: insights into the ancient Cordilleran margin from seismic reflection data. GSA Today, Geological Society of America, vol. 13, p. 18.

YGS ABSTRACTS

Bond, J.D., Plouffe, A. and Fletcher, W.K., 2003. Drift prospecting and case study highlights from the Northern Cordillera, Yukon Territory. *In:* Program Abstract, CANQUA-CGRG joint biennial meeting, Halifax, Nova Scotia, A. Miller (program chair), Abstract A-9.

Bradshaw, G.D., Rowins, S.M., Peter, J.M. and Taylor, B.E., 2003. Genesis of the polymetallic Wolverine deposit, Finlayson Lake district, Yukon: transitional volcanic rock-hosted massive sulphide (VHMS) and Sedimentary Exhalative (SEDEX) mineralization in an ancient continental margin setting. *In:* Geological Association of Canada – Mineralogical Association of Canada – Society of Economic Geologists (GAC-MAC-SEG) Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, CD-ROM.

Colpron, M., 2003. A stratigraphic framework for the pericratonic terranes of the northern Cordillera. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, no. 274, CD-ROM.

Colpron, M., Mortensen, J.K. and Gehrels, G.E., 2003. Basement complex, Carboniferous magmatic arcs and Paleozoic deformation in Yukon-Tanana Terrane of central Yukon. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, no. 521, CD-ROM.

Fletcher, W.K. and **Bond, J.D.**, 2003. Evaluation of weak extractions and lead isotope ratios in till at the Pb-Zn Swim deposit, Yukon Territory, Canada. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, CD-ROM.

Gabrielse, H. and **Murphy, D.C.,** 2003. Early Cretaceous and Eocene dextral orogen-parallel displacements in the northern Canadian Cordillera. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, p. 152, CD-ROM.

Gordey, S.P. and **Murphy, D.C.,** 2003. Yukon-Tanana Terrane: its relationship to North America. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, CD-ROM.

Hart, C.J.R., 2003. From Rocks to Blue Sky: New Exploration Ideas and Opportunities in Yukon. *In:* Northwest Miners Association 109th Annual Meeting, Abstract Book, p. 38-39.

Hart, C.J.R., Mair, J.L., Groves, D.I. and Goldfarb, R.J., 2003. The influence of source variations on redox state and metallogeny of a cross-orogen plutonic province, Yukon, Canada. The Origin of Granites and Related Rocks, Hutton Symposium V, Geological Survey of Japan, Interim-Report 29, p. 42.

Hart, C.J.R., Villeneuve, M., Mair J.L., Selby, D. and Creaser, R., 2003. Integrated geochronology of intrusion-related gold systems: Examples from Yukon & Alaska. 13th Goldschmidt Conference, Kurashiki, Japan, Geochimica et Cosmochimica Acta, vol. 67, p. A136.

Huscroft, C.A. and **Lipovsky, P.S**., 2003. Climate Change and Periglacial Landslide Activity in South-Western Yukon Territory. Eos Transactions American Geophysical Union 84(46), Fall Meeting Supplement, Abstract.

Laughton J.R., Thorkelson, D.J. and **Hunt, J.A.,** 2003. Preservation of Paleoproterozoic rift volcanics as clasts in hydrothermal megabreccia, Wernecke Mountains, Yukon. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, no. 97, CD-ROM.

Logan, J.M. and **Colpron, M.,** 2003. Stratigraphy, Cu-Zn VMS deposits and tectonic setting of the Lower Paleozoic Lardeau Group, northern Selkirk Mountains, British Columbia. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, no. 579, CD-ROM.

MacNaughton, R.B., **Pigage, L.C.** and Fallas, K.M., 2003. Proterozoic and Lower Palaeozoic tectonostratigraphic evolution, Pool Creek and Larson Lake map areas, southeasternmost Yukon Territory. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, CD-ROM.

Mair, J.L., **Hart, C.J.R.,** Groves, D.I. and Goldfarb, R.J., 2003. The Nature of Tombstone Plutonic Suite rocks at Scheelite Dome, Tintina Gold Province: Evidence for an enriched mantle contribution. The Ishihara Symposium: Granites and Associated Metallogenesis, Abstracts with Program. GEMOC Macquarie University, Sydney, Australia.

Mortensen, J.K., Dusel-Bacon, C. and **Hunt, J.A.**, 2003. Lead isotopic constraints on the metallogeny of sygenetic base metal occurrences in the Yukon-Tanana Terrane and adjacent portions of the North American Miogeocline. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, CD-ROM.

Murphy, D.C., Fonseca, A., Lipovsky, P.S., Stuart, A., Groat, L. and Piercey, S.J., 2003. What about those emeralds, eh? Geological setting of emeralds at Regal Ridge (SE Yukon) provides clues to their origin – and to other places to explore. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, p. 154, CD-ROM.

Murphy, D.C. and Mortensen, J.K., 2003. Late Paleozoic and Mesozoic features constrain displacement on Tintina Fault and limit large-scale orogen-parallel displacement in the Northern Cordillera. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, p. 151, CD-ROM.

Murphy, D.C., Piercey, S.J., Mortensen, J.K. and Orchard, M.J., 2003. Mid- to Late Paleozoic tectonostratigraphic evolution of Yukon-Tanana Terrane, Finlayson Lake massive sulphide district, southeastern Yukon. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, p. 212, CD-ROM.

Paradis, S., Nelson, J.L., Piercey, S.J., Bailey, S.L., Hoy, T., **Murphy, D.C.**, and Peter, J., 2003. Devonian-Mississippian sulphide deposits of western Canada as an expression of continent margin tectonics. *In:* GAC-MAC-SEG Joint Annual Meeting, Abstracts vol. 28, p. 59, CD-ROM.

Peter, J.M., Mihalynuk, M.G., **Colpron, M.** and Nelson, J.L., 2003. Diverse examples of exhalative hydrothermal sediments in Yukon-Tanana Terrane, Yukon Territory and British Columbia. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, abstract no. 470, CD-ROM.

Piercey, S.J., **Colpron, M.**, Dusel-Bacon, C., Nelson, J.L., Simard, R.-L. and Yukon-Tanana Working Group, 2003. Paleozoic magmatic, tectonic and crustal growth history of the ancient Pacific margin of North America: geochemical constraints from the Yukon-Tanana Terrane in British Columbia, Yukon and Alaska. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, abstract no. 391, CD-ROM.

Piercey, S.J. and **Murphy, D.C.**, 2003. The importance of high temperature magmatism and extensional geodynamics in the formation of volcanogenic massive sulphide (VMS) deposits: Examples from the Finlayson Lake VMS District, Yukon, Canada (Poster). *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, p. 139, CD-ROM.

Pigage, L.C., 2003. Structural styles in western La Biche River map area (NTS 95C), southeastern Yukon Territory, Canada. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, CD-ROM.

Roots, C.F., 2003. Between and beneath Yukon-Tanana arcs lie slivers of the distal miogeocline – the Dorsey complex of northern BC and southern Yukon; Contribution to the Ancient Pacific Margin NATMAP Project. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, abstract no. 225, CD-ROM.

Selby, D., Creaser, R.A., Heaman, L.M. and **Hart, C.J.R.**, 2003. Re-Os and U-Pb geochronology of the Clear Creek, Dublin Gulch and Mactung deposits, Tombstone Gold Belt, Yukon, Canada: Absolute timing relationships between plutonism and mineralization. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, CD-ROM.

Simard, R.-L., Dostal, J., **Colpron, M.** and Gehrels, G.E., 2003. Late Paleozoic arc evolution in the northern Canadian Cordillera: an example from the Semenof Block, central Yukon. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, no. 499, CD-ROM.

Simard, R.-L., Dostal, J. and **Roots, C.F.**, 2003. Late-Paleozoic pre-accretion paleogeography of the western margin of the ancestral North American craton: An example from the Klinkit Group, northern British Columbia and southern Yukon. *In:* Geological Society of America, Northeastern Section, 38th Annual Meeting, Halifax, Nova Scotia, March 27-29, 2003. Program with Abstracts, CD-ROM.

Thorkelson, D.J., **Abbott, J.G., Roots, C.F.** and Gordey, S.P., 2003. Early Proterozoic to early Paleozoic supracrustal history of Yukon. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28. Abstract no. 107, CD-ROM.

YUKON GEOLOGICAL PAPERS OF INTEREST

Beierle, B.D., 2002. Late Quaternary glaciation in the Northern Ogilvie Mountains: revised correlations and implications for the stratigraphic record. Canadian Journal of Earth Sciences, vol. 39, p. 1709-1717.

Canil, D., Johnston, S.T., Evers, K., Shellnutt, J.G. and Creaser, R.A., 2003. Mantle Exhumation in an Early Paleozoic Passive Margin, Northern Cordillera, Yukon. Journal of Geology, vol. 111, p. 313–327.

Sack, R.O., Lynch, J.V.G. and Foit, F. Jr., 2003. Fahlore as a petrogenetic indicator: Keno Hill Ag-Pb-Zn District, Yukon, Canada. Mineralogical Magazine, October, 2003, vol. 67(5), p. 1023-1038.

Froese, D.W., Shari, J.P. and Storer, J., 2002. Age and significance of the Late Pleistocene Dawson tephra in eastern Beringia. Quaternary Science Reviews, vol. 21, Issues 20-22, November 12, 2002, p. 2137-2142.

Lauriol, B., Cabana, Y., Cinq-Mars, J., Geurts, M.-A. and Grimm, F.W., 2003. Cliff-top eolian deposits and associated molluscan assemblages as indicators of Late Pleistocene and Holocene environments in Beringia, Quaternary International, vol. 87, p. 59-79

Mangan, M.T., Waythomas, C.F., Miller, T.P., Trusdell, F.A., 2003. Emmons Lake Volcanic Center, Alaska Peninsula: source of the Late Wisconsin Dawson tephra, Yukon Territory, Canada Canadian Journal of Earth Sciences, vol. 40, p. 925-936.

Orberger, B., Pasava, J., Gallien, J.P., Daudin, L. and Trocellier, P., 2003. Se, As, Mo, Ag, Cd, In, Sb, Pt, Au, Tl, Re traces in biotic and abiotic sulfides chemical sulfides from Black Shales (Selwyn Basin, Yukon Territory, Canada). Nuclear Instruments and Methods in Physics Research (in press).

Orberger, B., Pasava, J., Gallien, J.P., Daudin, L. and Pinti, D.L., 2003. Biogenic and abiogenic hydrothermal sulfides: controls of rare metal distribution in black shales (Yukon Territory, Canada). Journal of Geochemical Exploration, vol. 78/79, May, 2003, p. 559-563.

Stockmal, G.S., Kubli, T.E., Currie, L.D. and McDonough, M.R., 2002. Map symbology and analysis of box and polyclinal folds, with examples from the Rocky Mountain Foothills of northeastern British Columbia and the Liard Ranges of southeastern Yukon Territory and southwestern Northwest Territories. Canadian Journal of Earth Sciences, vol. 39, p. 145-155.

Telmer, K., Pass, H.E. and Cook, S., 2003. Combining dissolved, suspended and bed load stream geochemistry to explore for volcanic massive sulfide deposits: Big Salmon Complex, northern British Columbia. Journal of Geochemical Exploration, vol. 75, Issues 1-3, May, 2002, p. 107-121

YUKON GEOLOGICAL ABSTRACTS OF INTEREST

Anderson, L., Abbott, M.B., Finney, B.P. and Burns, S.J., 2003. An 8,000 Year Record of Meteoric $\delta^{18}O$ in the Northwest Sub-arctic from Jellybean Lake, Yukon Territory, Canada. *In:* Geological Society of America Annual Meeting, Seattle, Washington, Nov. 2-5, 2003, Program with Abstracts.

Anderson, L., Abbott, M.B., Finney, B.P., Burns, S.J. and Edwards, M.E., 2003. Holocene temperature and moisture reconstructions for the southern Yukon Territory, Canada: oxygen isotope studies of small carbonate lakes. *In:* 33rd International Arctic Workshop Program and Abstracts, Norwegian Polar Institute, Tromsø, Norway.

Enkin, R.J., Johnston, S.T., Larson, K.P. and Baker, J., 2003. Paleomagnetism of the 70 Ma Carmacks Volcanics at Solitary Mt. (Yukon) confirms and extends controversial results: Further evidence on the Baja-BC Model. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, CD-ROM.

Fallas, K.M. and Lane, L.S., 2003. The influence of tectonic inheritance on basin evolution in the Foothills of the northern Rocky Mountains: Implications for resource development. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, abstract 665, CD-ROM.

Gladwin, K. and Johnston, S.T., 2003. Mid-Cretaceous metamorphic and plutonic stitching of Yukon-Tanana and Cassiar terranes in southern central Yukon Territory. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, CD-ROM.

Gladwin, K., Johnston, S.T. and Black, R.A., 2003. Mid-Cretaceous Pin in the Northern Cordillera Linking Yukon-Tanana to Continental Margin Assemblages. *In:* Geological Society of America, Cordilleran Section – 99th Annual Meeting, April 1-3, 2003, Puerto Vallarta, Mexico, CD-ROM.

Heffernan, R.S., Mortensen, J.K. and Sterenberg, V.Z., 2003. Age, geochemical and isotopic studies of Cretaceous intrusions in the eastern Selwyn Basin, SE Yukon and SW NWT: Constraints on the tectonomagmatic evolution of the northern Cordillera. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, CD-ROM.

Irving, T., Baker, J., Barendregt, R.W. and Opdyke, N.D., 2003. Paleomagnetic data from Late Cenozoic Fort Selkirk Lavas, Yukon, significance for secular variation and tectonics. *In:* Eos Transactions, American Geophysical Union 84 (46), Fall Meeting Supplement, Abstract.

Johnston, S.T. and Canil, D., 2003. Crustal structure of the Northern Cordillera: Downward younging crust, voluminous granitic sills, and a prolonged record of crustal underplating in southwest Yukon. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, CD-ROM.

Lane, L.S., Fallas, K.M. and Okulitch, A.V., 2003. Controls on northern Cordilleran Foothills structures: Results of Central Foreland NATMAP bedrock mapping. *In:* CSPG-CSEG Joint Convention, Calgary, Alberta, 2-6 June, 2003, Abstracts, CD-ROM.

Lane, L.S., Fallas, K.M., Bednarski, J.M., Smith, I.R. and Okulitch, A.V., 2003. Geology of the northern Cordilleran Foothills: Mapping the inheritance of a Proterozoic crustal transition. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, abstract no. 148, CD-ROM.

Simard, R.-L., Dostal, J. and Roots, C.F., 2003. Late-Paleozoic Pre-Accretion Paleogeography of the Western Margin of the Ancestral North American Craton: An Example from the Klinkit Group, Northern British Columbia and Southern Yukon. *In:* Geological Society of America, Northeastern Section, 38th Annual Meeting, Halifax, Nova Scotia, March 27-29, 2003, Program with Abstracts.

Laughton, J.R. and Thorkelson, D.J., 2003. Preservation of Paleoproterozoic rift volcanics as clasts in hydrothermal megabreccia, Wernecke Mountains, Yukon. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, CD-ROM.

Layton-Matthews, D., Leybourne, M.I., Peter, J.M. and Scott, S.D., 2003a. A Modified Technique for Determining Selenium Isotope Ratios in Geologic Materials using a CHG-ICP-DRC-MS, with Applications to Se-Rich Volcanic-Hosted Massive Sulfide Deposits of the Finlayson Lake District, Yukon. *In:* Geological Society of America Annual Meeting, Seattle, Washington, Nov. 2-5, 2003, Program with Abstracts.

Layton-Matthews, D., Peter, J.M., Scott, S.D., Leybourne, M.I. and Paradis, S., 2003b. Selenium in sulfide minerals from the Kudz Ze Kayah, Wolverine, and GP4F Volcanogenic Massive Sulfide Deposits: Distribution and implications for deposit genesis. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, CD-ROM.

MacNaughton, R.B., Pigage, L.C. and Fallas, K.M., 2003. Proterozoic and Lower Paleozoic tectonostratigraphic evolution, Pool Creek and Larsen Lake map areas, southeasternmost Yukon Territory. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, abstract no. 168, CD-ROM.

McCausland, P.J.A. and Symons, D.T.A., 2003. Paleomagnetic constraints from six intrusions on the Mesozoic and Cenozoic geotectonic motions of the Yukon-Tanana Terrane: key to the assembly of the northern Cordillera. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, CD-ROM.

Miskovic, A. and Francis, D., 2003. Crust-mantle interaction and petrogenesis of the Sifton Range Volcanics, Yukon Territory. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, CD-ROM.

Moore, K., Alverson, K. and Holdsworth, G., 2003. Mount Logan Ice Core Evidence for Secular Changes in the Climate of the North Pacific Following the End of the Little Ice Age. Eos Transactions, American Geophysical Union 84 (46), Fall Meeting Supplement, Abstract.

Nelson, J.L., 2003. The Yukon-Tanana Terrane and its Late Paleozoic odyssey. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, CD-ROM.

Neufeld, H.L., Groat, L.A., Mortensen, J.K. and Gaboury, B., 2003. Preliminary investigations of emerald mineralization in the Regal Ridge area, Finlayson Lake District, southeastern Yukon. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, CD-ROM.

Pigage, L.C., 2003. Structural styles in western La Biche River map area (NTS 95C), southeastern Yukon Territory, Canada. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, abstract no. 137, CD-ROM.

Pyle, L.J. and Barnes, C.R., 2003. Early Paleozoic tectonic evolution of the western Laurentian margin based on regional stratigraphic and biostratigraphic correlations. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, p. 137, CD-ROM.

Reyes, A.V., Luckman, B.H., Smith, D.J., Jensen, B.J.L. and Clague, J.J., 2003. Tree-Ring Dating of Little Ice Age Glacier Advances and Associated Ice-Dammed Lakes in Kluane National Park and Reserve, Yukon Territory, Canada. *In:* Geological Society of America Annual Meeting, Seattle, Washington, Nov. 2-5, 2003, Program with Abstracts.

Richards, B.C., 2003. Upper Paleozoic sedimentation and tectonism in the Liard Basin, northwestern Canada. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, abstract no. 661, CD-ROM.

Ruks, T.W., Piercey, S.J., Ryan, J.J. and Gordey, S.P., 2003. Petrology and tectonic significance of K-feldspar augen granitoids in the Yukon-Tanana Terrane, Stewart River, Yukon. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, CD-ROM.

Ryan, J.J., Gordey, S.P., Villeneuve, M.E. and Piercey, S.J., 2003. Schists and gneisses of the Yukon-Tanana Terrane in the Stewart River area, western Yukon: composition, protolith and paleotectonic setting. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28.

Sack, R.O., Lynch, J.V.G. and Foit, F. Jr., 2003. Fahlore as a Petrogenetic Indicator: Keno Hill Ag–Pb–Zn District, Yukon, Canada. *In:* Geological Society of America Annual Meeting, Seattle, Washington, Nov. 2-5, 2003, Program with Abstracts.

Stanley, C.R., 2003. Lithogeochemistry and hydrothermal alteration about the Grizzly sediment hosted massive sulphide deposit, Anvil Range mining camp, Yukon (Poster). *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, CD-ROM.

Storer, J.E., 2003. The Eastern Beringian vole Microtus deceitensis (Rodentia, Muridae, Arvicolinae) in Late Pliocene and Early Pleistocene faunas of Alaska and Yukon. Quaternary Research, vol. 60, p. 84-93.

Symons D.T.A., Erdmer, P. and McCausland, P.J.A., 2003. New 42 Ma cratonic North American paleomagnetic pole from the Yukon underscores another Cordilleran paleomagnetism-geology conundrum. Canadian Journal of Earth Sciences, vol. 40, p. 1321-1334.

Tafti, R. and Mortensen, J.K., 2003. Nature, age and origin of Cu-Au mineralization at the Minto and Williams Creek deposits. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, CD-ROM.

Thorkelson, D.J., Cook, D.G. and MacLean, British Columbia, 2003. The Early Proterozoic Racklan and Forward orogenies of northwestern Laurentia: geological and seismic evidence. Geophysical Research Abstracts, vol. 5, European Geophysical Society, abstract 04633.

Utting, J., MacNaughton, R.B. and Zonneveld, J-P., 2003. Palynostratigraphy and thermal maturity of Lower Triassic rocks in Yukon, N.W.T., British Columbia, Alberta and the Sverdrup Basin, Nunavut. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, CD-ROM.

Villeneuve, M.E., Ryan, J.J., Gordey, S.P. and Piercey, S.J., 2003. Detailed thermal and provenance history of the Stewart River area (Yukon-Tanana Terrane, western Yukon) through application of SHRIMP, Ar-Ar and TIMS. *In:* GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, CD-ROM.

GSC CONTRIBUTIONS TO YUKON GEOLOGY

Bednarski, J.M., 2003. Surficial geology, Betalamea Lake, Northwest Territories – Yukon Territory – British Columbia. Geological Survey of Canada, Open File 4502, 1 sheet.

Côté, M.M., Wright, J.F., Duchesne, C. and Dallimore, S.R., 2003. Surficial materials and ground ice information from seismic shotholes in the Mackenzie – Beaufort region, Yukon and Northwest Territories: digital compilation. Geological Survey of Canada, Open File 4490.

Dumont, R., Kiss, F., Coyle, M., Potvin, J., Oneschuk, D. and Dostaler, F., 2003. Aeromagnetic survey program of the Geological Survey of Canada, 2002-2003. Geological Survey of Canada, Current Research, no. 2003-H1, 4 p.

Fallas, K.M.A., 2003. GIS dataset of geological features for the Dendale Lake map area (95 C/15), Yukon Territory and Northwest Territories. Geological Survey of Canada, Open File 1750.

Fallas, K.M., Hynes, G.F. and Lane, L.S., 2003. A GIS dataset of geological features for the Etanda Lakes map area (95 C/16), Northwest Territories and Yukon Territory. Geological Survey of Canada, Open File 1802.

Fallas, K.M. and Lane, L.S., 2003. Geology, Babiche Mountain (95 C/8), Yukon and Northwest Territories. Geological Survey of Canada, Open File 1563, 1 sheet.

Fallas, K.M. and Lane, L.S., 2003. A GIS dataset of geological features for the Babiche Mountain map area (95 C/8), Yukon and Northwest Territories. Geological Survey of Canada, Open File 1747.

Gordey, S.P. and Ryan, J.J., 2003. Geology, Stewart River area (parts of 115 N/1, 2, 7, 8 and 115 O/2 - 7, 12), Yukon Territory. Geological Survey of Canada, Open File 1772, 1 sheet.

Hynes, G.F., Fallas, K.M. and Lane, L.S., 2003. Geology, Etanda Lakes (95C/16), Northwest Territories – Yukon Territory. Geological Survey of Canada, Open File 1676, 1 sheet.

Khudoley, A K., 2003. A GIS dataset of geological features for the Brown Lake map area (95C/7), Yukon Territory. Geological Survey of Canada, Open File 1765.

Khudoley, A.K., 2003. A GIS dataset of geological features for the Tika Creek map area (95C/10), Yukon Territory and Northwest Territories. Geological Survey of Canada, Open File 1777.

Khudoley, A.K., 2003. Geology, Tika Creek (95C/10), Yukon and Northwest Territories. Geological Survey of Canada, Open File 1660, 1 sheet.

Lane, L.S. and Fallas, K.M., 2003. A GIS dataset of geological features for the Chinkeh Creek map area (95C/9), Northwest Territories and Yukon Territory. Geological Survey of Canada, Open File 1828.

Lane, L.S. and Fallas, K.M., 2003. Geology, Chinkeh Creek (95C/9), Yukon and Northwest Territories. Geological Survey of Canada, Open File 1674, 1 sheet.

MacNaughton, R.B. and Pigage, L.C., 2003. Geology, Larsen Lake (95C/4), Yukon Territory and British Columbia. Geological Survey of Canada, Open File 1797, 1 sheet

Rotheisler, P.N., Jackson, L.E., Jr. and Hicock, S.R., 2003. Late Cenozoic geology, Ancient Pacific Margin NATMAP Project, report 6: glacial limits, Middle Pleistocene sediments, and placer gold in the Scroggie Creek basin, south Klondike placer region, Yukon Territory. Geological Survey of Canada, Current Research 2003-A1, 8 p.

Ryan, J.J., Gordey, S.P., Glombick, P., Piercey, S.J. and Villeneuve, M.E., 2003. Update on bedrock geological mapping of the Yukon-Tanana Terrane, southern Stewart River map area, Yukon Territory. Geological Survey of Canada, Current Research 2003-A9, 7 p.

Smith, I.R., 2003. Surficial geology, Etanda Lakes, Northwest Territories – Yukon Territory. Geological Survey of Canada, Open File 1671, 1 sheet.

Smith, I.R., 2003. Surficial geology, Babiche Mountain, Yukon Territory – Northwest Territories. Geological Survey of Canada, Open File 1558, 1 sheet.

Smith, I.R., 2003. Surficial geology, Brown Lake, Yukon Territory. Geological Survey of Canada, Open File 1771, 1 sheet.

Smith, I.R., 2003. Surficial geology, Chinkeh Creek, Northwest Territories – Yukon Territory. Geological Survey of Canada, Open File 1615, 1 sheet.

Smith, I.R., Fallas, K.M., Lane, L.S., 2003. Landslides and bedrock geology associations, Babiche Mountain, Yukon Territory – Northwest Territories. Geological Survey of Canada, Open File 1752, 1 sheet.

Turner, R.J., Mougeot, C.M., Roots, C.F., Clague, J.J. and Franklin, R., 2003. Geoscape Whitehorse – Geoscience for a Yukon community. Geological Survey of Canada, GSC Miscellaneous Report 82, poster.

MINING ENVIRONMENT RESEARCH GROUP (MERG) REPORTS

Access Consulting Group, 2003. Examination of Revegetation Methodologies for Dry Stack Tailings in Northern Environments, Economic Development, Yukon Government, MERG Report 2003-2.

Microbial Technologies, Inc. and Laberge Environmental Services, Inc., 2003. Detoxifying Pit Lakes by Controlled Algal Blooms: Laboratory Study and Pilot Field Trial at Little Creek Pond at Vangorda Pit near Faro, Yukon, Canada. Economic Development, Yukon Government, MERG Report 2003-1.

Nicholson, H.C., 2003. Arsenic in Plants Important to Two Yukon First Nations: Impacts of Gold Mining and Reclamation Practices, Economic Development, Yukon Government, MERG Report 2002-4.

Nicholson, H.C., 2003. Flying in Sheep Country: How to minimize disturbance from aircraft. Economic Development, Yukon Government, MERG Report 2002-6.

Tintina Consultants and Midnight Mines Ltd., 2003. Utilizing Volcanic Ash as a Natural Flocculant in Placer Settling Ponds. Economic Development, Yukon Government, MERG Report 2002-5.

Withers, S., 2003. Follow-up Monitoring: Shrub Trial Plots at Brewery Creek Mine and Bioengineering Trials at Noname Creek. Economic Development, Yukon Government, MERG Report 2003-3.

La Commission géologique du Yukon

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Abbott, J.G., 2003. La Commission géologique du Yukon. *Dans :* Yukon Exploration and Geology 2003, D.S. Emond et L.L. Lewis (eds.), la Commission géologique du Yukon, p. 57-60.

APERÇU

Il y a onze ans, le Bureau de la géoscience Canada-Yukon ouvrait ses portes, ce qui marquait dans les faits les débuts d'une Commission géologique du Yukon (CGY) par la création du Programme géologique du Yukon. En avril 2003, cette vision se concrétisait enfin lorsque les responsabilités en gestion des ressources naturelles du Yukon étaient transférées du gouvernement fédéral au gouvernement du Yukon. C'est maintenant le ministère de l'Énergie, des Mines et des Ressources qui est responsable des minéraux, du pétrole et du gaz, de la foresterie, de l'agriculture et des terres. La nouvelle Commission géologique du Yukon remplace le Programme géologique. La CGY fait partie de la Direction de la mise en valeur des ressources minérales et est gérée conjointement par Grant Abbott et Rod Hill sous la direction de Jesse Duke. La Commission géologique regroupe la Division des services d'exploration et de géologie (DSEG) du ministère des Affaires indiennes et du Nord canadien (MAIN), le Bureau de la géoscience du Yukon, le Groupe d'évaluation du potentiel minéral et le Programme d'encouragement pour l'exploration minérale du Yukon (PEEMY) du ministère de l'Énergie, des Mines et des Ressources du gouvernement du Yukon. La Commission géologique du Canada (CGC) conserve en outre un bureau à la CGY. Les activités du Groupe des évaluations minières et du PEEMY sont décrites dans un rapport distinct.

Le financement de la CGY reste ce qu'il était les années précédentes dans le cadre du Programme géologique. Cette année, en plus du financement de base, nous recevons un financement additionnel à court terme du MAIN par l'entremise de l'Initiative géoscientifique dans le Nord menée par l'industrie ainsi que du Fonds pour le savoir et l'innovation. Dans le cadre du dernier budget fédéral, l'Initiative géoscientifique ciblée de Ressources naturelles Canada a été renouvelée pour deux autres années. Le gouvernement du Yukon recevra un financement substantiel cette année et la CGY est un partenaire.

Pendant l'année écoulée, nous déplorons la perte de Roger Hulstein et de Robert Stroshein du Groupe d'évaluation du potentiel minéral qui ont accepté des emplois dans le secteur privé. Il nous fait plaisir d'accueillir Geoff Bradshaw à titre de géologue d'évaluation du potentiel minéral et Steve Israel comme géologue de projet.

Le Comité de liaison technique à la CGY examine nos programmes deux fois par année. Nous remercions le président, Gerry Carlson et les membres du comité Al Doherty, Moira Smith, Jean Pautler, Forest Pearson, Bernie Kreft, Jim Mortensen et Jim Christie de leur précieux appui et des conseils constructifs qu'il nous fournissent.

Un mandat pour la CGY a été élaboré en consultation avec la haute direction d'Énergie, Mines et Ressources et le Comité de liaison technique. La CGY a maintenant la responsabilité «d'accumuler, de gérer et de communiquer la base d'information géoscientifique et technique nécessaire pour la gérance et le développement durable des ressources en énergie, en minéraux et en terres du territoire». Le mandat formalise une bonne part des travaux déjà entrepris ces quelques dernières années dans le cadre du Programme géologique et ouvre la voie à de nouveaux projets dans de

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nouveaux domaines. Le soutien à l'industrie minière reste l'objectif premier, mais davantage de ressources sont consacrées à la cartographie et aux études des régions présentant des possibilités pour les hydrocarbures. Des efforts sont également consacrés aux études environnementales pertinentes pour les industries de l'extraction et pour l'utilisation des terres. Ces dernières années, la demande des organismes de réglementation, des Premières nations et du grand public pour l'information géoscientifique a considérablement augmenté. De plus, les intérêts des industries des ressources sont au mieux servis par une prise de décisions éclairée et un public bien informé. Le changement le plus important se manifestera en conséquence non pas au niveau de la nature de nos activités, mais plutôt au niveau de la diversité de notre clientèle.

TRAVAUX SUR LE TERRAIN

La CGY s'est engagée à exécuter un ensemble complémentaire équilibré de projets sur le terrain visant non seulement à stimuler rapidement l'exploration à la recherche de minéraux et d'hydrocarbures, mais, à plus long terme, à comprendre le cadre géologique régional du Yukon et à constituer la base de données géoscientifiques du Yukon.

La cartographie du socle rocheux reste la pierre angulaire de la CGY. Cette année plusieurs projets ont été complétés ou ont atteint le stade de la rédaction du rapport. Lee Pigage a rédigé un bulletin sur la géologie du district d'Anvil actuellement sous presse et des communications concernant le projet de cartographie La Biche mené dans le cadre du Projet de cartographie nationale de l'avant-pays central (CARTNAT). Grant Lowey a rédigé un bulletin, sous presse, sur la géologie et le potentiel des placers de la région de la carte Stewart River. Le CARTNAT de l'ancienne marge du Pacifique en est à sa dernière année. Maurice Colpron et Don Murphy rédigent actuellement des bulletins concernant respectivement les régions de Glenlyon et de Finlayson Lake. Maurice Colpron, en collaboration avec JoAnne Nelson de la Commission géologique de C.-B., travaille à l'organisation et à la direction d'un volume de synthèse portant sur les résultats de plus de quatre années de recherches dans les régions de Stewart River, Glenlyon, Finlayson Lake et Wolf Lake au Yukon, sur les régions septentrionale et méridionale de la C.-B. et sur l'est de l'Alaska par des chercheurs de la CGY, de la Commission géologique du Canada, de la Commission géologique des États-Unis et de plusieurs universités. Ce volume sera publié par l'association géologique du Canada. Ces travaux ont permis d'accroître considérablement notre compréhension de la géologie et du potentiel minier du terrane de Yukon-Tanana jusqu'à présent l'une des région les moins bien comprises de la Cordillère nord-américaine.

Parmi les travaux sur le terrain en cours en 2003, mentionnons la cartographie du socle rocheux dans la région de la carte Finlayson Lake où Don Murphy continue à définir et à étendre les régions propices aux gisements de sulfures massifs volcanogènes (SMV) et d'émeraudes. Maurice Colpron et Charlie Roots ont participé au projet de cartographie de la CGC à la rivière Stewart où la main-d'œuvre additionnelle a permis de compléter les travaux sur le terrain en temps opportun. Lee Pigage a effectué un bref voyage d'exploration dans la partie de la région de la carte Coal River pour déterminer des corrélations possibles entre les roches volcaniques et siliciclastiques du Protérozoïque tardif et du Paléozoïque précoce près des lacs Toobally et des strates peut-être équivalentes de la région de l'adjacente carte La Biche. Notre plus importante nouvelle initiative est le projet du bassin de Whitehorse. Il s'agit d'un partenariat multidisciplinaire avec la Commission géologique du Canada et des universités ressemblant beaucoup à l'actuel CARTNAT. L'objectif en est de déterminer avec exactitude le potentiel pour les hydrocarbures de la partie septentrionale du bassin en définissant plus nettement ses cadres stratigraphique et structural. Cette année, Grant Lowey a entrepris une étude stratigraphique et sédimentologique du Groupe de Lebarge. Plus tard pendant l'année, la CGC effectuera, à même un financement fourni dans le cadre de l'Initiative géoscientifique ciblée, un levé sismique transversal du bassin le long des routes de Campbell et du Klondike. Les études stratigraphiques, sédimentologiques et structurales ainsi que la cartographie du socle rocheux se poursuivront pendant les deux prochaines années.

Craig Hart complète un programme de doctorat à l'Université d'Australie occidentale. Les exigences pour l'obtention du diplôme comprennent surtout la rédaction d'articles sur ses antérieures études sur le terrain dans la zone aurifère de Tintina et dans d'autres manifestations d'or au Yukon. Cette année, Craig et Lara Lewis ont effectué sur une grande étendue une reconnaissance des manifestations de tungstène et de béryl.

Julie Hunt est retournée aux études pour entreprendre un programme de doctorat à l'Université James Cook en

Australie et la CGY finance ses travaux sur le terrain. Julie a fait équipe avec Derek Thorkelson pour compléter des travaux sur le terrain dans les brèches de Wernecke et tire avantage de ses contacts en Australie pour comparer les brèches du Yukon avec des roches similaires en Australie dans lesquelles on trouve des gîtes géants de cuivre et d'or.

Bill LeBarge et Mark Nowasad ont complété leurs études des relations entre la sédimentologie, la distribution granulométrique et la qualité de l'eau provenant de gîtes placériens. Leurs résultats seront évalués à des fins d'application éventuelle à long terme et pour des recherches plus poussées. Les données recueillies dans le cadre de cette étude ont été utiles pour la revue du processus d'autorisation des placers de 2003 au Yukon.

Jeff Bond a poursuivi ses travaux de cartographie des dépôts meubles dans le grand Whitehorse qui doivent être publiés sous forme de deux cartes à l'échelle de 1/50 000. Le projet fournira l'information de base à l'appui de décisions en aménagement des terres , pour les études de l'eau souterraine et pour l'éducation du public.

Jeff et Kristen Kennedy ont étudié la géologie des dépôts meubles et les configurations de l'écoulement glaciaire dans la région du ruisseau Seagull; ils ont pu déterminer que la glace s'écoule vers le nord en remontant la vallée contrairement à ce que l'on avait d'abord pensé. Ces résultats ont une importante portée pour l'interprétation des anomalies géochimiques des sols et le potentiel pour les manifestations aurifères dans la région.

Jeff a également fourni des conseils aux entreprises d'exploitation de placers, aux Premières nations et au ministère des Pêches et Océans en matière de géologie des dépôts meubles.

Finallement, le Commission géologique du Yukon continue son assistance financière et logistique de nombreuses études thématiques conduites par des étudiants de deuxième et de troisième cycle, et par des chercheurs universitaires.

PROGRAMME D'ENCOURAGEMENT POUR L'EXPLORATION MINÉRALE DU YUKON

Le Programme d'encouragement pour l'exploration minérale du Yukon (PEEMY) a reçu 93 demandes avant la date limite du 1er mars. Une somme totale de 987 000 $ a été versée à 61 demandeurs répondant aux exigences. Des programmes présentés, 9 ont été approuvés dans le cadre du module Prospection primaire, 19 dans le cadre du module Objectif régional et, enfin, 39 dans le cadre du module Évaluation des cibles.

La hausse du prix de l'or et de certains métaux de base sur le marché mondial a incité les demandeurs à explorer leurs cibles cette saison. L'exploration visant les métaux précieux menée dans le cadre du programme a grimpé, 56 % des demandes portant sur l'or et les éléments du groupe du platine. Les métaux de base ont représenté 30 % des programmes approuvés; le reste, 14 %, a été consacré à l'exploration pour découvrir des pierres précieuses et d'autres substances utiles. Les programmes d'exploration proposés ont touché les quatre districts miniers du Yukon, leur répartition ayant été relativement uniforme sur le territoire. Cette année, quatre conventions d'option ont été signées pour des propriétés explorées dans le cadre du PEEMY et au moins cinq autres sont en cours de négociation.

Les faits saillants de cette année pour les programmes d'exploration visant à découvrir des gîtes placériens et des gîtes en roche dure sont la découverte d'anomalies significatives d'or et d'éléments associés tant dans les sols que dans la roche et le prolongement d'indices connus par des travaux de prospection et de géophysique.

PRIX ROBERT E. LECKIE

Les noms des récipiendaires des prix Robert E. Leckie décernés pour la cinquième année consécutive pour des travaux exceptionnels de restauration de gîtes de quartz et de placers ont été annoncés le 16 novembre 2003 au Forum géoscientifique du Yukon. Ce sont Atac Resources Ltd. pour la restauration exceptionnelle d'un site d'exploration en roche dure au gisement de Mechanic Creek près de Carmacks, et Frank et Karen Hawker pour la restauration exceptionnelle d'un placer au gîte de Sixtymile River près de Dawson.

DIFFUSION DE L'INFORMATION

La Commission géologique du Yukon (CGY) produit maintenant une gamme complète de publications numériques. Toutes nouvelles cartes et rapports géologiques sont disponibles sur demande en format numérique, et toutes publications récentes sont aussi disponibles (sous format PDF) sans frais sur notre site internet (http://www.geology.gov.yk.ca). De plus, une gammes de rapports d'évaluation de propriété minières est maintenant disponible par l'entremise de notre site internet. Nous sommes aussi fier de notre service de carte interactive ('Map Gallery'). Ce service est disponible par l'entremise de notre site internet et permet la visualisation de la géologie régionale, des sites MINFILE, des levés régionaux de géochimie des sédiments de ruisseaux, de la topographie, des routes et des communautés du Yukon, et des sélections des terres des nations authochtones. Les données vectorielles peuvent maintenant être sélectionnées et téléchargées. Certaines des améliorations à venir incluent l'addition de données géophysiques, géochronologiques et paléontologiques. De plus, la couverture des concessions minières sera bientôt disponible.

Les publications de la Commission géologique du Yukon sont diffusées par le Bureau d'information et des ventes en géoscience. Elles sont disponible à l'addresse suivante :

Bureau d'information et des ventes en géosciences
a/s Conservateur des registres miniers
le ministère de l'Énergie, des Mines et des Ressources
le governement du Yukon
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Téléphone : (867) 667-5200
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Courriel : geosales@gov.yk.ca

Pour en savoir plus long sur le Commission géologique du Yukon, visitez notre page d'accueil à www.geology.gov.yk.ca ou communiquez directement avec :

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Yukon regional mineral potential by deposit models

Geoff D. Bradshaw[1] and Jo-Anne vanRanden[2]
Yukon Geological Survey

Bradshaw, G.D. and vanRanden, J.A., 2004. Yukon regional mineral potential by deposit models. *In:* Yukon Exploration and Geology 2003, D.S. Emond and L.L. Lewis (eds.), Yukon Geological Survey, p. 61-68.

ABSTRACT

The results from four separate regional mineral potential assessments initiated by the Yukon Government from 1999 to 2001 are presented as mineral potential maps for specific deposit models. A quantitative method was used for the prediction of undiscovered deposits based on 44 mineral deposit models applicable to the Yukon. A panel of industry experts predicted the probability of discovering new deposits of each type within individual pre-defined tracts of land. Their predictions were based on all available geoscientific and mineral exploration data, combined with their own knowledge and experience. A statistical simulator produced scores for each tract for each individual deposit model, and these were given relative rankings. The accuracy of mineral potential maps is limited by the quality and quantity of geoscientific and mineral exploration history data, and by the level of geological knowledge at the time of the assessments. The mineral potential of a region should be re-evaluated when there is a significant advance in the knowledge of the geology of the region or when new data becomes available.

RÉSUMÉ

Les résultats de quatre évaluations distinctes du potentiel minéral régional entrepris par le gouvernement du Yukon de 1999 à 2001 sont présentés sous forme de cartes du potentiel minéral pour des modèles gîtologiques spécifiques. Pour prédire les gîtes non découverts, on a utilisé une méthode quantitative basée sur 44 modèles applicables au Yukon. Un groupe d'experts de l'industrie ont prédit la probabilité de découverte de nouveaux gisements pour chaque type dans des bandes de terrain prédifinies. Leurs prédictions étaient basées sur les données géoscientifiques et les données d'exploration minérale actuelles, combinées à leurs propres connaissances et expérience. Un simulateur statistique a produit des pointages pour chaque bande et pour chaque modèle, ce qui a permis de les classer. L'exactitude des cartes sur le potentiel minéral est limitée par la qualité et la quantité des données recueillies au cours de travaux géoscientifiques et d'exploration minérale et par le niveau des connaissances géologiques au moment des évaluations. Il faudrait réévaluer le potentiel minéral d'une région lorsqu'on aura accompli des progrès importants dans la connaissance de la géologie de la région ou lorsque de nouvelles données seront accessibles.

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INTRODUCTION

This contribution summarizes the results from four separate regional mineral potential assessments initiated by the Yukon Government from 1999 to 2001. The assessments were designed to assist in land use planning exercises, but also may be of interest to the mineral exploration industry. Data are presented as 18 maps; each one illustrates the mineral potential of a different deposit model. In addition to the mineral potential maps, this paper provides detailed information on the purpose, methodology and limitations of the mineral assessment process. This information is now available as a CD open file (Bradshaw and vanRanden, 2003).

REGIONAL MINERAL POTENTIAL ASSESSMENTS

Regional mineral potential studies have been completed over the majority of Yukon (with the exception of the northernmost Yukon and southwest of the Alaska Highway). Regional mineral potential was assessed in four phases (Fig. 1). These regional mineral resource assessments were conducted using a quantitative method for prediction of undiscovered deposits that was developed by the United States Geological Survey (USGS). This method is based on 39 mineral deposit types (i.e., mineral deposit models of Cox and Singer, 1986) and their probability of being hosted in a particular geological environment. The British Columbia Geological Survey (BCGS) modified the deposit models defined by the USGS and added others to best fit the geological and metallogenic setting of the southern Canadian Cordillera (Lefebure and Ray, 1995; Lefebure and Höy, 1996). For the Yukon assessments, the deposit models utilized by the BCGS were further modified to incorporate Yukon deposits (Fonseca and Abbott, in press). This method is best suited for regions such as Yukon where vast tracts of land commonly lack complete geological characterization and may contain a variety of mineralization styles. Although this method of mineral assessment is not without limitations, it yields reproducible and unbiased results.

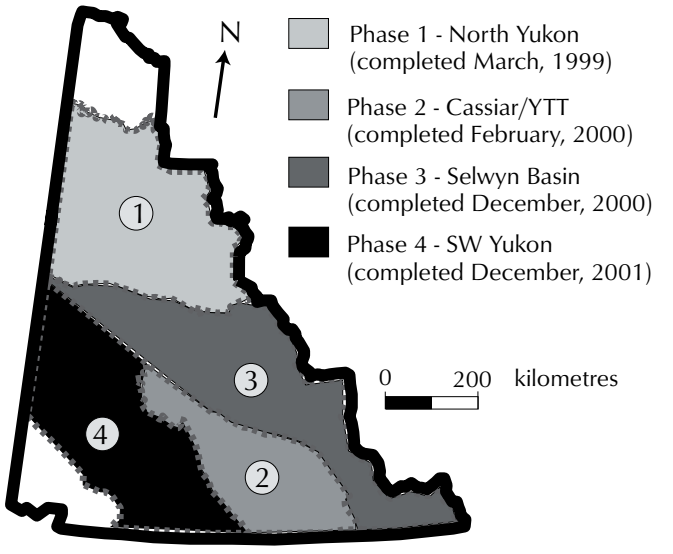

Figure 1. *Locations and completion dates of Yukon regional mineral assessment phases.*

MINERAL POTENTIAL

The mineral potential of a region describes the probability for the existence of undiscovered metallic mineral deposits. This mineral potential is based on the current state of geoscientific knowledge, and its accuracy is dependent upon the availability and quality of geoscientific data (also supplemented by the mineral exploration history records). Regional mineral resource assessments utilize the following geoscientific and mineral exploration data: (1) bedrock geology maps at 1:250 000 and 1:50 000 scale (digital compilation by Gordey and Makepeace, 1999); (2) regional airborne geophysical surveys (Lowe et al., 1999); (3) regional stream sediment, lake sediment (RGS), and till surveys (Héon, 2003); and (4) exploration history (Deklerk, 2002). These regional assessments were based on existing, publicly available data. Mineral potential of a region is a 'snapshot in time' and should be re-evaluated when there is a significant advance in the knowledge of the geology and the mineral deposit types in the region, or when new base data (e.g., RGS data) becomes available.

ASSESSMENT METHODOLOGY

Each mineral resource assessment consists of seven phases: (1) compilation, (2) definition of tracts, (3) preparation of deposit models, (4) assessment workshop, (5) data entry, (6) statistical simulation, and (7) ranking.

COMPILATION

Yukon Digital Geology (Gordey and Makepeace, 1999) was used as the geological base map at 1:250 000 scale. The overall accuracy of this compilation on a regional scale is considered to be very good, although the geology in some areas is based on studies done as long as

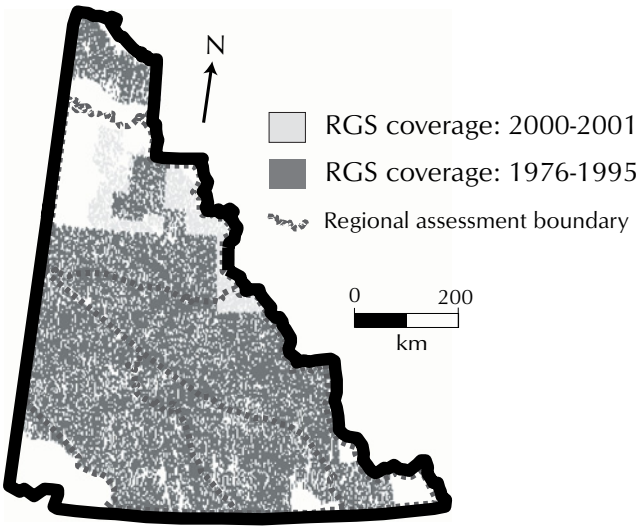

Figure 2. *Yukon regional geochemical survey (RGS) coverage.*

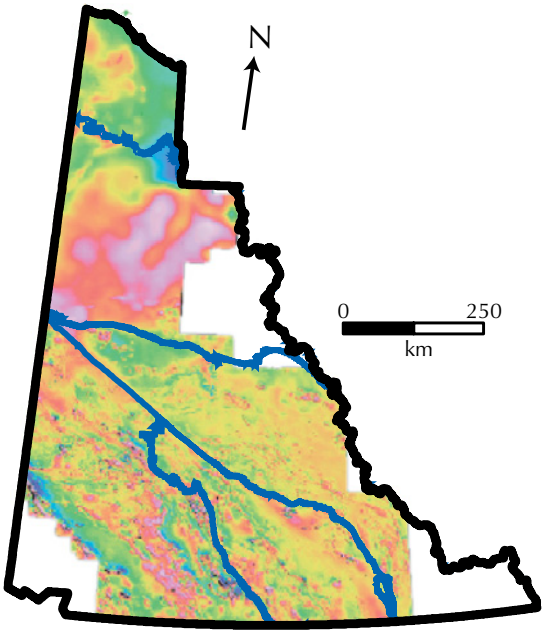

Figure 3. *Yukon airborne magnetic geophysical coverage.*

60 years ago. The Yukon Digital Geology compilation includes many recent 1:50 000-scale maps produced by the Yukon Geological Survey (YGS), and 1:250 000-scale maps produced by the Geological Survey of Canada (GSC).

Regional stream sediment geochemical surveys (RGS) have been completed over a large part of the Yukon Territory and have been digitally compiled (Héon, 2003). Median values were calculated for 21 diagnostic elements, and multiples of the medians were reported on 1:250 000-scale geochemical maps for each element. At the time of the mineral assessments, geochemical coverage was absent or incomplete in the following 1:250 000-scale map sheets: NTS 95C and 95E in southeast Yukon; NTS 106B, 106C, 106E, 106F, and 106L in northeast Yukon; and NTS 116F, 116G, 116H, 116I, 116J, 116K, 116N, 116O and 116P in north Yukon. RGS coverage has improved considerably since the completion of the regional mineral assessments, especially in the north Yukon (Fig. 2).

Aeromagnetic coverage is available for most of the Yukon (Fig. 3; Lowe et al., 1999). There is little or no geophysical coverage for NTS 106C, 106D, 106E and 106F in northeast Yukon. Most flight lines in the southern Yukon are at 0.8-km spacing. Flight lines in the north Yukon (north of ~65° latitude) are at 2-km spacing. Digital data was captured by digitizing contoured analog data, because most surveys are 1950-1960 vintage. Coloured maps illustrating the variations in the aeromagnetic total residual field were provided for each of the assessments (Lowe et al., 1999).

Mineral occurrences from the Yukon MINFILE database (anomalies, showings and deposits; Deklerk, 2002) were plotted on geological and geochemical maps to highlight areas of known mineralization and past exploration activity. Summaries and original descriptions of the mineral occurrences in each assessment area, which include deposit type, status, commodities, work history, and geological description, were provided to the estimators as supplements to the geology and geochemistry maps.

TRACTS

The Yukon Territory was divided into four large regions (each corresponding to a distinct mineral assessment phase) based on the large scale geological environment (e.g., Selwyn Basin). The area of each assessment phase was separated into a large number of tracts of approximately equal area (~1000 km^2). Tracts were defined on the basis of the regional geology. Tract boundaries are most commonly geological contacts (more specifically faults, lithologic contacts, or limits of Quaternary cover). A few tracts were assigned arbitrary

boundaries, such as drainage patterns or roads, in order to maintain similar areas.

DIGITAL DEPOSIT MODELS

Tonnage and grade curves for 44 metallic mineral deposit types were utilized for the regional assessments. These deposit models are described by Fonseca and Abbott (in press).

ASSESSMENT WORKSHOPS

Assessment workshops hosted by the Yukon Geology Program took place in Whitehorse following the data compilation for each of the four phases. Five industry geologists (hereafter referred to as 'the estimators'), with considerable field experience and knowledge of the geology and mineral deposit models applicable to each region, participated in the assessment workshops. The following procedure was used for each of the four assessments: (1) for each tract, the estimators decided on the mineral deposit models that could potentially occur; (2) for each mineral deposit model, and for each individual tract, the estimators evaluated the percent probability (from 100 to 0) of discovering new deposits of that type in that tract; (3) for each tract, the estimators recorded their confidence (from 100 to 0 percent) in the current knowledge of the geology; and, (4) for each mineral deposit model, and for each tract, each estimator evaluated the relative knowledge and experience of each of the other four estimators and distributed 100 points between them. No estimates were made for non-metallic minerals such as diamonds, asbestos, emeralds and rhodonite. Likewise, potential for placer gold deposits and gravel deposits was not evaluated.

STATISTICAL SIMULATION AND RANKING

Data provided by the estimators were entered into a spreadsheet. Measurements of tract confidence and confidence level for undiscovered deposits were digitized in AutoCAD, and then copied to the spreadsheet. The data were then converted to a single evaluation for each tract/deposit model combination. The Monte Carlo Mark 3b simulator used the data to produce metal tonnages at the 90%, 50%, 10%, 5% and 1% confidence level intervals for each tract. The tonnages represent a combination of all possible mineral deposit models that could potentially occur within a given tract. These tonnages were then converted to dollar values using 10-year average prices for each of the commodities that are dictated by the relevant mineral deposit models. A 'confidence index' were derived from each of these dollar values by dividing the dollar value that corresponds to each confidence interval by the tract area. A 'confidence score' was calculated for each of the confidence level intervals by sorting and ranking the confidence index for each tract (i.e., the lowest confidence index has a score of 1, and the highest has a score equal to the total number of tracts). A final confidence score, referred to as 'sum score', was then calculated for each tract using the individual confidence scores weighted according to the 90%, 50%, 10%, 5% and 1% confidence level intervals. The sum score value was then ranked from highest to lowest, and defined the rank intervals used on the mineral potential maps.

For this compilation, the data provided by the estimators from all four regional assessments were used to calculate, in the same manner as described above, the potential for each tract to host a particular deposit type (i.e., a new 'sum score' was calculated for every tract that was assessed for a given deposit model). This value was used to rank the relative potential for each deposit type throughout the Yukon.

MINERAL POTENTIAL MAPS BY DEPOSIT MODELS

The mineral potential of the Yukon is ranked on 18 maps (Figs. 4a-r) using 18 individual deposit models. Of the 44 deposit models utilized in the 4 regional assessments, these 18 deposit types were deemed the most beneficial for publication as mineral potential maps. Relative rankings are from higher to lower and are illustrated using three categories for purposes of simplicity and ease of display. The maps show the relative potential, from higher to lower, for each tract to contain a specific deposit type. Every tract that was assessed for a given deposit model is ranked, and therefore tracts defined during different assessment phases are now ranked relative to one another. Tracts that were not assessed for a given deposit model are not ranked, and are displayed as white tracts on the respective mineral deposit model map. It should be emphasized, however, that no tract has zero potential and it still may be possible for a mineral deposit of a specific type to exist within a tract not assessed for that deposit model.

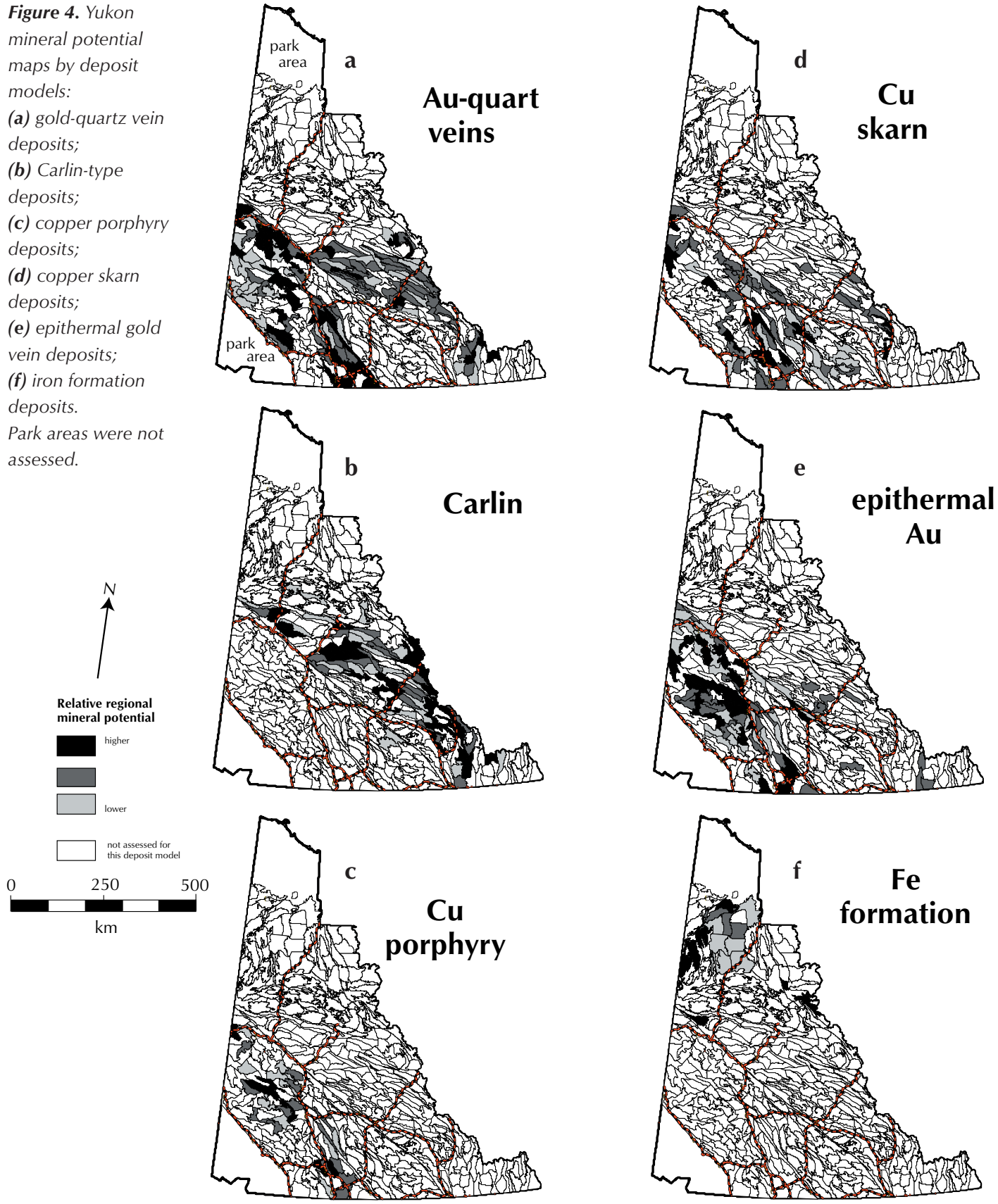

Figure 4. *Yukon mineral potential maps by deposit models:* ***(a)*** *gold-quartz vein deposits;* ***(b)*** *Carlin-type deposits;* ***(c)*** *copper porphyry deposits;* ***(d)*** *copper skarn deposits;* ***(e)*** *epithermal gold vein deposits;* ***(f)*** *iron formation deposits. Park areas were not assessed.*

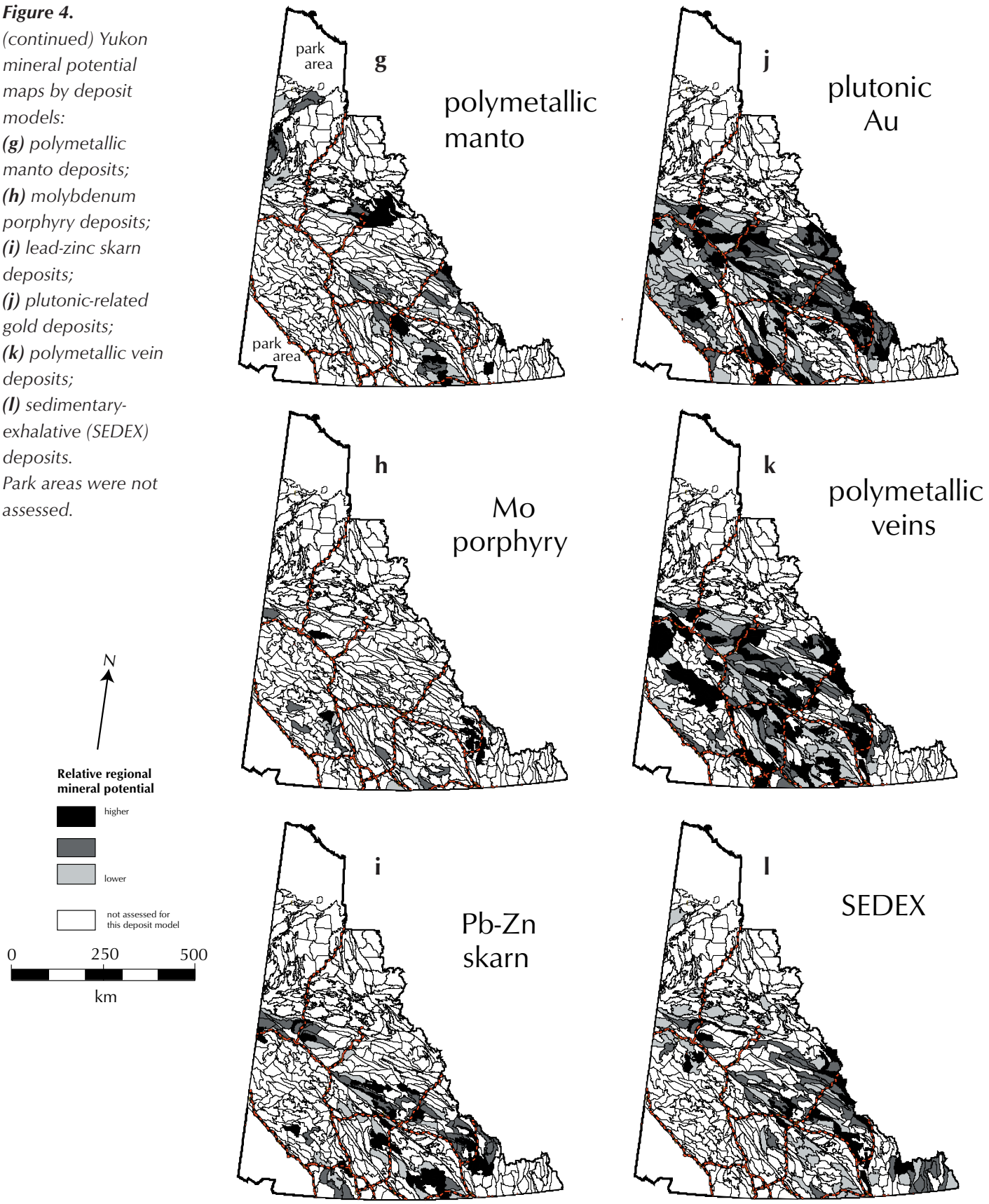

Figure 4.
(continued) Yukon mineral potential maps by deposit models:
(g) *polymetallic manto deposits;*
(h) *molybdenum porphyry deposits;*
(i) *lead-zinc skarn deposits;*
(j) *plutonic-related gold deposits;*
(k) *polymetallic vein deposits;*
(l) *sedimentary-exhalative (SEDEX) deposits.*
Park areas were not assessed.

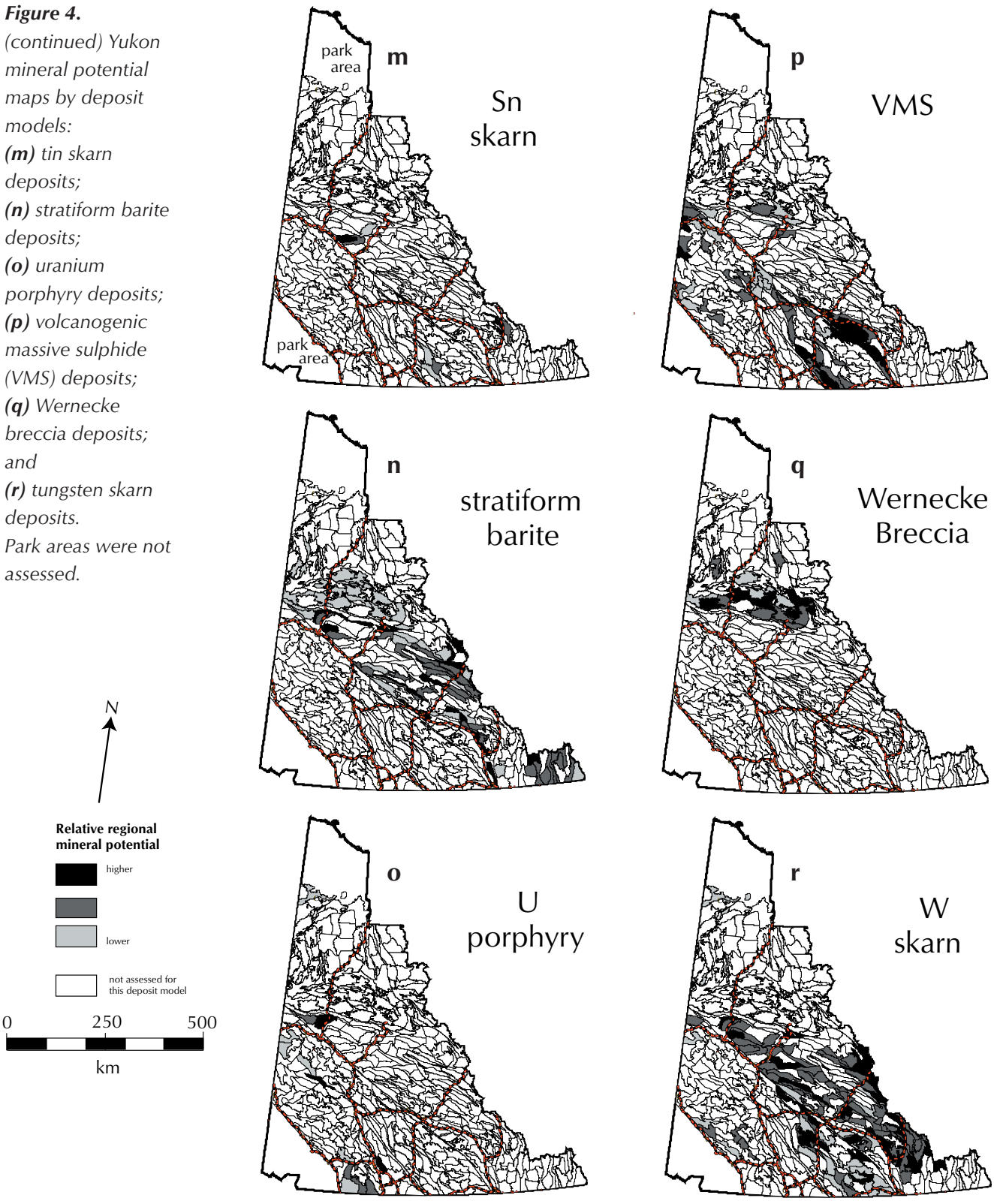

Figure 4.
(continued) Yukon mineral potential maps by deposit models:
(m) *tin skarn deposits;*
(n) *stratiform barite deposits;*
(o) *uranium porphyry deposits;*
(p) *volcanogenic massive sulphide (VMS) deposits;*
(q) *Wernecke breccia deposits; and*
(r) *tungsten skarn deposits.*
Park areas were not assessed.

LIMITATIONS OF REGIONAL MINERAL ASSESSMENTS

The primary limitation of mineral potential studies is that they are based on geological knowledge and data that was available at the time of the assessments. Rankings are subject to change as more data becomes available and geological knowledge improves. Although the estimators recorded their confidence in the current knowledge of the geology for each tract, it was not possible to integrate this information into the simulator. Furthermore, there may be potential in Yukon for deposit models that have not yet been recognized. Most commonly, tracts with limited baseline data were ranked as lower potential. For example, many tracts in the North Yukon were either not assessed or were found to have lower potential for most mineral deposit types. This is, at least partly, because of the relatively low level of geological knowledge and lack of baseline data (e.g., RGS) at the time of the North Yukon assessment.

Mineral potential assessments are also limited by the quality of the data on which they were based. For example, RGS data collected in 1976 does provide important information, but has not benefited from recent advances in the science of geochemistry and may prove to be unreliable for certain elements due to improvements in our understanding in how to collect and analyse samples. The number, locations, and types of mineral occurrences (from the Yukon MINFILE database, Deklerk, 2002), although controlled primarily by geology, also depend on the amount of exploration work done, which in turn depends on ease of access, price of commodities, and other non-scientific issues. Also, information pertaining to geology and mineral deposit models from the MINFILE database may require updating, particularly where derived from properties not recently worked.

Despite the limitations, quantitative regional mineral assessments yield reproducible and unbiased results. The deficiencies are a direct consequence of the fact that the mineral potential of a region is a 'snapshot in time' and should be re-evaluated when there is a significant advance in the knowledge of the geology and the mineral deposit types in the region, or when new base data (e.g., RGS data) becomes available.

ACKNOWLEDGEMENTS

This compilation is the result of the extensive efforts of former Yukon Government mineral assessment geologists: in particular A. Fonseca, with large contributions from D. Héon, R. Hulstein and R. Stroshein. Geologists M. Baknes, E. Balon, G. Bidwell, M. Burke, R. Carne, A. Doherty, G. Jilson, M. Jones, P. Holbek, B. Mawer, R. Stroshein, P. MacRobbie, J. Pautler and M. Stammers are thanked for sharing their considerable knowledge of Yukon geology, mineral exploration history, and deposit model profiles during the assessment workshops.

REFERENCES

Bradshaw, G.D. and vanRanden, J.A. (compilers), 2003. Yukon Regional Mineral Potential by Deposit Models 2003. Yukon Geological Survey, Open File 2003-11(D), CD-ROM.

Cox, D.P. and Singer, D.A. (eds.), 1986. Mineral Deposit Models. U.S. Geological Survey, Bulletin 1693, 379 p.

Deklerk, R. (compiler), 2002. Yukon MINFILE 2002. Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs Canada.

Fonseca, A. and Abbott, G. (comps.), 2003 (in press). Yukon Mineral Deposit Models. Yukon Geological Survey.

Gordey, S.P. and Makepeace, A.J. (comps.), 1999. Yukon Digital Geology. Geological Survey of Canada, Open File D3826 and Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs Canada, Open File 1999-1(D).

Héon, D. (compiler), 2003. Yukon Regional Geochemical Database 2003 – Stream sediment analyses. Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs Canada.

Lefebure, D.V. and Ray, G.E. (eds.), 1995. Selected British Columbia Mineral Deposit Profiles, Volume I – Metallics and Coal. British Columbia Ministry of Energy, Mines, and Petroleum Resources, Open File 1995-20, 136 p.

Lefebure, D.V. and Höy, T. (eds.), 1996. Selected British Columbia Mineral Deposit Profiles, Volume 2 – Metallic Deposits. British Columbia Ministry of Energy, Mines, and Petroleum Resources, Open File 1996-13, 172 p.

Lowe, C., Miles, W., and Kung, R. and Makepeace, A.J., 1999. Aeromagnetic data over the Yukon Territory. In: Yukon Digital Geology, S.P. Gordey and A.J. Makepeace (comps.), Geological Survey of Canada Open File D3826 and Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs Canada, Open File 1999-1(D).

Robert E. Leckie Awards for Outstanding Reclamation Practices

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St. Amand, J., 2004. Robert E. Leckie Awards for Outstanding Reclamation Practices. *In:* Yukon Exploration and Geology 2003, D.S. Emond and L.L. Lewis (eds.), Yukon Geological Survey, p. 69-70.

The fifth annual Robert E. Leckie Awards for outstanding reclamation practices were presented in Whitehorse, November, 2003. The awards, both for quartz and placer exploration or mining, were first established in November, 1999. The two awards are given for reclamation and site restoration efforts that go well beyond what is required by law, either by reclaiming land for which there is no obligation to reclaim, adding features to the land that have enhanced the area and local community, or returning mined land to a condition that is not only sound but aesthetically pleasing. The award is named after the late Robert (Bob) Leckie, a mining inspector with Indian and Northern Affairs Canada, who passed away in November, 1999 (see Yukon Exploration and Geology 1999).

QUARTZ MINING RECLAMATION

The 2003 Robert E. Leckie Award for Outstanding Reclamation Practices in Quartz Exploration and Mining was presented to Atac Resources Ltd. Atac is a junior exploration company, based in Vancouver, BC. Their commitment to reclamation is "to accomplish as good a job as it is humanly possible to do."

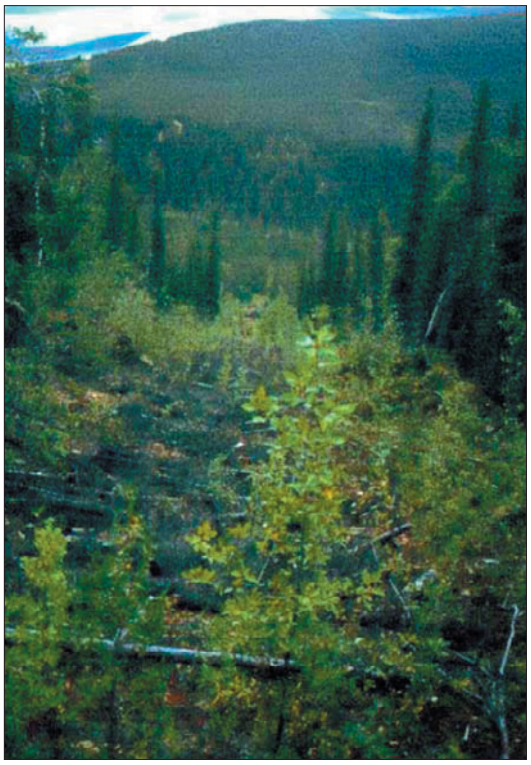

Figure 1. *Reclaimed trench at Mechanic Creek.*

In 2001, they carried out exploration on the Golden Revenue property at Mechanic Creek. The area was heavily disturbed with many old trenches scarring the landscape. Where the company partially entered these dated trenches, they restored the entire trench. In addition, organic debris was collected throughout the area, and transported to be used for site reclamation. Atac returned what was an unsightly area and a potential fire hazard back to its natural state. The company has been actively removing waste such as scrap metal and plastics from the area, consulting with local placer miners for possible recycling prior to removal.

The reclamation activities undertaken by Atac Resources Ltd. were a huge effort and they are without doubt worthy recipients of this award.

Honourable mention was also given to Viceroy Minerals Corporation for leadership and innovation in their reclamation efforts at Brewery Creek gold mine near Dawson City. Viceroy has carried out progressive reclamation at the site since operations

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Figure 2. *Kokanee pit at Viceroy's Brewery Creek gold mine.*

Figure 3*. Reclaimed Sixtymile River stream channel and banks.*

began in 1996; they won two previous awards for outstanding clean-up practices. Reclamation work has included the following: staging of mine open-pit development for waste rock disposal, reducing surface disturbances; heap detoxification and neutralization with innovative technology — nutrient addition with a contingency biological treatment cell; stockpiling and reuse of organic soils as a growth media for reclamation; and testing of revegetation, seeding with native and non-native species. Most of the waste rock dumps and pits have already been reclaimed and liability of the site has been greatly reduced.

PLACER MINING RECLAMATION

The 2003 Robert E. Leckie Award for Outstanding Reclamation Practices in Placer Mining Reclamation was presented to Fox Placer Exploration. Frank and Karen Hawker have been mining the Sixtymile River area near Dawson since 1993. This ground had been previously dredged and mined by bulldozer. Frank and Karen believe that reclamation is part of the mining process and, as a result, have consistently achieved land restoration beyond what was required.

Mining this previously dredged area has brought organic materials, which were buried under coarser material during the dredging process, back to the surface to be redistributed over recontoured tailings piles. Presence of this organic material will now promote natural revegetation. While contouring, the area was scarified to encourage entrapment of water and airborne seeds. The area where the Hawkers have mined supports rapid natural revegetation and has been converted from a virtually barren landscape of dredge tailings and old abandoned cuts to aesthetic rolling hills.

Honourable mention was also given to Mr. Geoffrey Jacobs of Downunder Joint Mining Ventures. He added to the well-being of the community at large for his outstanding reclamation efforts at both Lousetown and Hunker Creek. At Lousetown, the entire pit face was contoured for stability and safety. Relocated material was used and all wastes removed. The bench at Hunker Creek had been mined by a number of previous operators. Mr. Jacobs cleaned up the site, and removed fuel containers and oil pails, as well as miscellaneous waste materials. The bench was contoured, including the pit wall; then this was covered with an organic soil/root mix to promote revegetation.

Figure 4. *Natural revegetation at Hunker Creek.*