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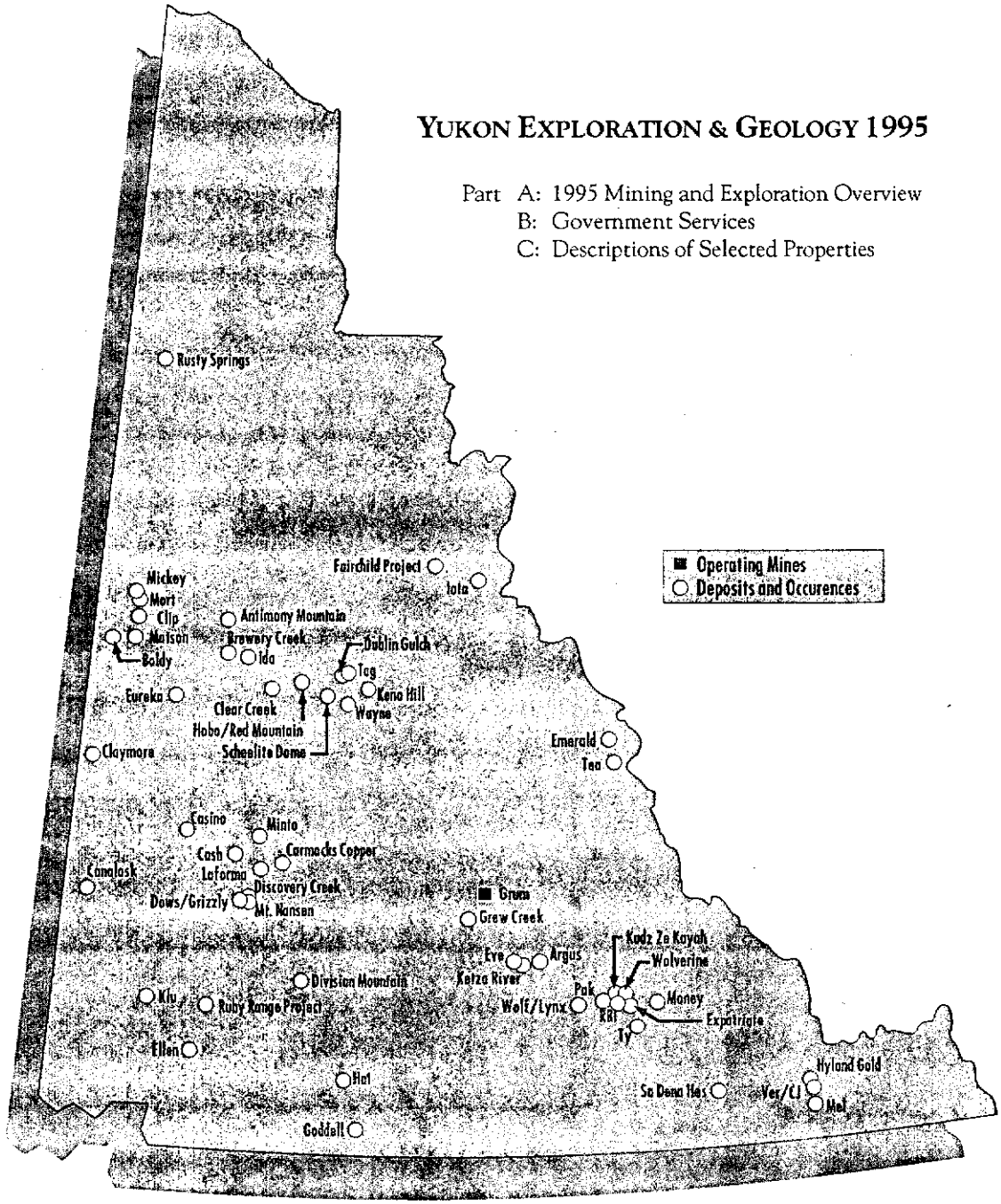
EXPLORATION AND GEOLOGICAL SERVICES DIVISION, YUKON REGION



YUKON EXPLORATION & GEOLOGY 1995

Part A: 1995 Mining and Exploration Overview
B: Government Services
C: Descriptions of Selected Properties

Canada

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1995 Yukon Mining and Exploration Overview

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Government Services

Part C:
Geological Descriptions of Selected Properties

PREFACE

Yukon Exploration and Geology 1995 consists of three parts: Part A is a comprehensive overview of mining and exploration activity in Yukon; Part B summarizes the activities of Government agencies which provided technical and financial assistance to the Yukon mining and exploration industries; and Part C consists of geological descriptions of selected properties in Yukon provided by industry and government geologists.

The bulk of the information in this volume comes from exploration geologists and mining companies who are willing to share information for the collective benefit of Yukon's minerals industry. Their contributions and assistance are gratefully acknowledged and sincerely appreciated.

Trevor Bremner
Chief Geologist
Exploration and Geological Services Division
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Yukon Region

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PART A

1995 MINING & EXPLORATION OVERVIEW

by M. Burke

1995 Yukon Mining and Exploration Overview

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Burke, M.R., 1996. 1995 Yukon Mining and Exploration Overview. In: Yukon Exploration and Geology 1995: Exploration and Geological Services Division, Yukon, Indian and Northern Affairs Canada.

INTRODUCTION

With the opening of the Grum mine at Faro in August, hard rock metal production resumed in 1995, after a two-year hiatus, and development began on two other projects at Brewery Creek and Mt. Nansen. Six other Yukon mining projects are currently under environmental review and upon successful completion of the process are expected to begin mine development in 1996 or 1997, with the result that by 1998 Yukon could have eight operating mines.

Exploration expenditures increased 60% over 1994 figures: spending to the end of 1995 was just less than $40 million (Fig. 1). Spending on mining development in the territory rose to $57 million in 1995 compared with $11 million spent in 1994. This is the fourth consecutive year that Yukon has enjoyed an increase in exploration and development expenditures.

By the end of 1995, a total of 14,207 new quartz claims had been recorded (Fig. 2). The total for 1995 is the largest amount of new staking since the rush associated with the discovery of the Casino deposit in 1969. Quartz claims in good standing have also increased substantially to 56,444 which is a historic high for Yukon (Fig. 3).

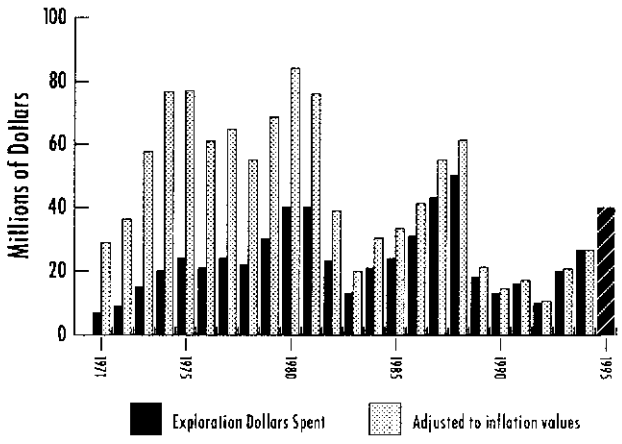

Figure 1: Exploration Expenditures: 1971-1995.

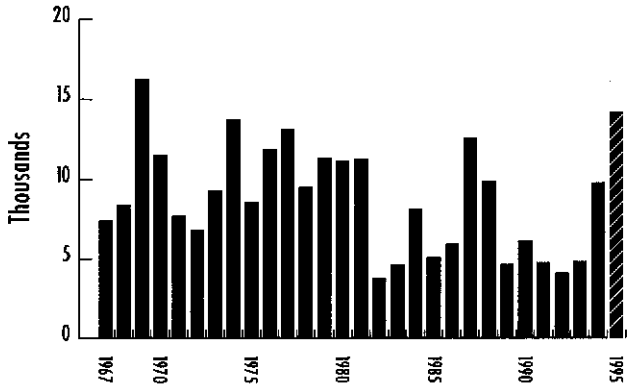

Figure 2: Quartz claims staked: 1967 - 1995

More than 50 individual properties were explored in 1995 (Appendix 1; Fig.4). Increased exploration was noted in all categories from grassroots levels to advanced projects. Eight of the projects account for approximately 65% of Yukon expenditures. They include Brewery Creek, Dublin Gulch, Fairchild Project, Red Mountain, Keno Hill, Kudz Ze Kayah, Laforma and the Wolverine Project. The highlight of the exploration season was once again in the Finlayson/ Wolverine Lake area where Westmin discovered a new polymetallic volcanic-hosted massive sulphide body at the south end of Wolverine Lake, on ground optioned from Atna Resources. The Wolverine Zone is located approximately 20 km east of Cominco's 1993 Kudz Ze Kayah discovery and confirms the significant mineral potential of the Finlayson Lake area and other parts of the Yukon-Tanana terrane, which underlies much of central Yukon. Westmin intersected the Wolverine zone with 15 consecutive drill holes over an area of approximately 250 by 400 meters. The deposit is open down dip and along strike in both directions and will be the focus of an intensive exploration program beginning in early 1996.

PLACER MINING

Placer gold mining continues to be a major industry in Yukon, as it has been since the Klondike Gold Rush of 1898. Production to the end of 1995 was 127 333 crude ounces, valued at over Cdn $54 million. This is a 10% increase over 1994 production, and continues a rising trend which started in 1992. In 1995, approximately 220 placer mines were operating in Yukon, providing direct employment to an estimated 700 people and contributing to the local economy through the purchase of services and supplies.

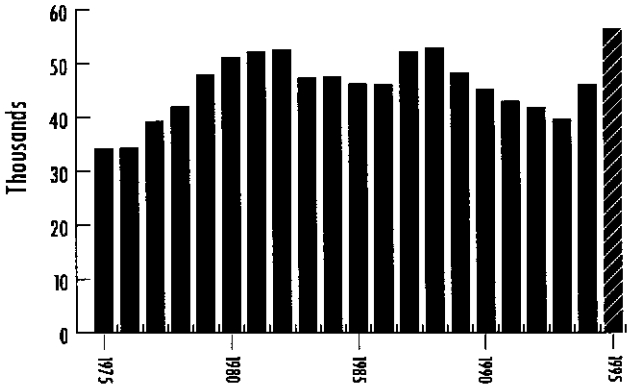

Figure 3: Quartz claims in good standing: 1975 - 1995.

Figure 5 shows a good correlation between gold price and placer gold production over the last ten years. For example, a 6.4% rise in the average gold price between 1993 and 1994 was reflected in a 9.6% increase in gold production over the same period. Production is still well below the modern day record of 169 345 crude ounces mined in 1988-1989, which was the largest amount of placer gold produced since 1917.

Currently there are about 300 placer leases and 17 500 placer claims in good standing, mostly in historic areas such as the Klondike (Fig. 6). However, there has been a recent surge of interest in other areas. One of the most significant changes was the lifting of staking and mining restrictions along the Stewart River, allowing several operators to begin mining abandoned channels and oxbows in areas which have not seen activity in recent years. Some drainages in the Mayo district have also seen increased activity in the last couple of years. These trends are expected to continue as production from traditional mining areas declines and new areas including glaciated parts of the central and southern Yukon begin to be explored more diligently.

LODE MINING

Anvil Range Mining Corporation accounted for the bulk of development expenditures in Yukon by reopening the **Faro Mine** (Minfile #'s 105K-46,55,56,61) in 1995 with production from the Vangorda and Grum sedimentary-exhalative orebodies (Fig. 7). Between November 1994 and October 1995 Anvil Range removed a total of 27 million

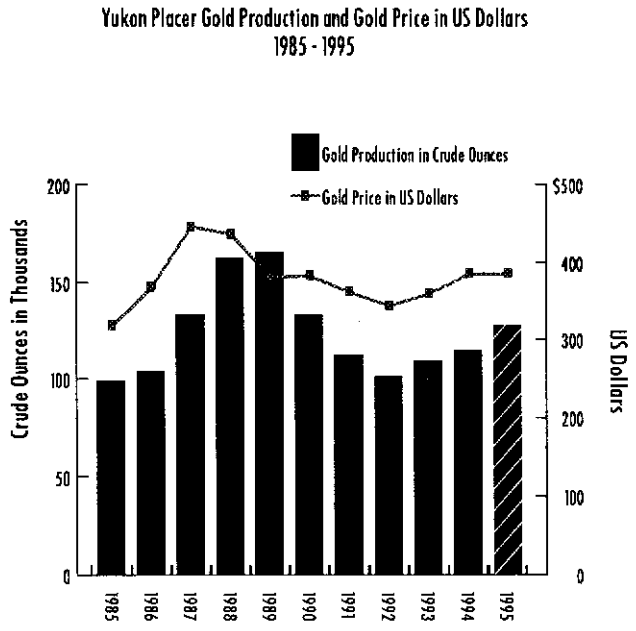

Figure 5: Yukon Placer Gold Production and Gold Price

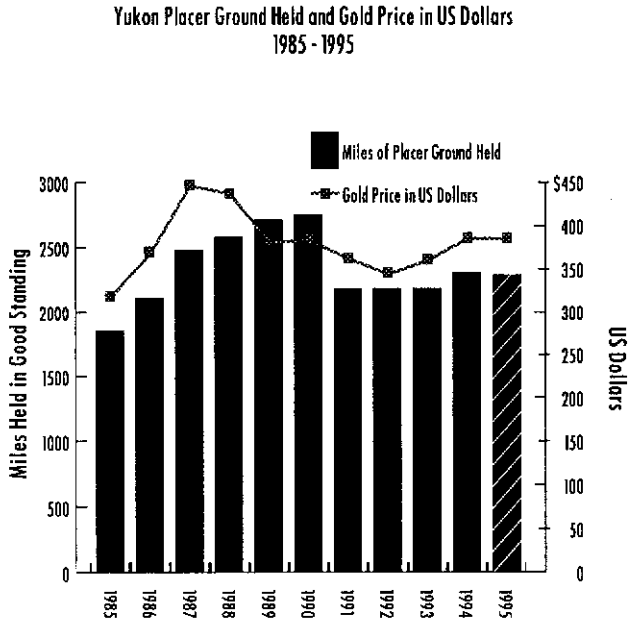

Figure 6: Yukon Placer Ground Held and Gold Price

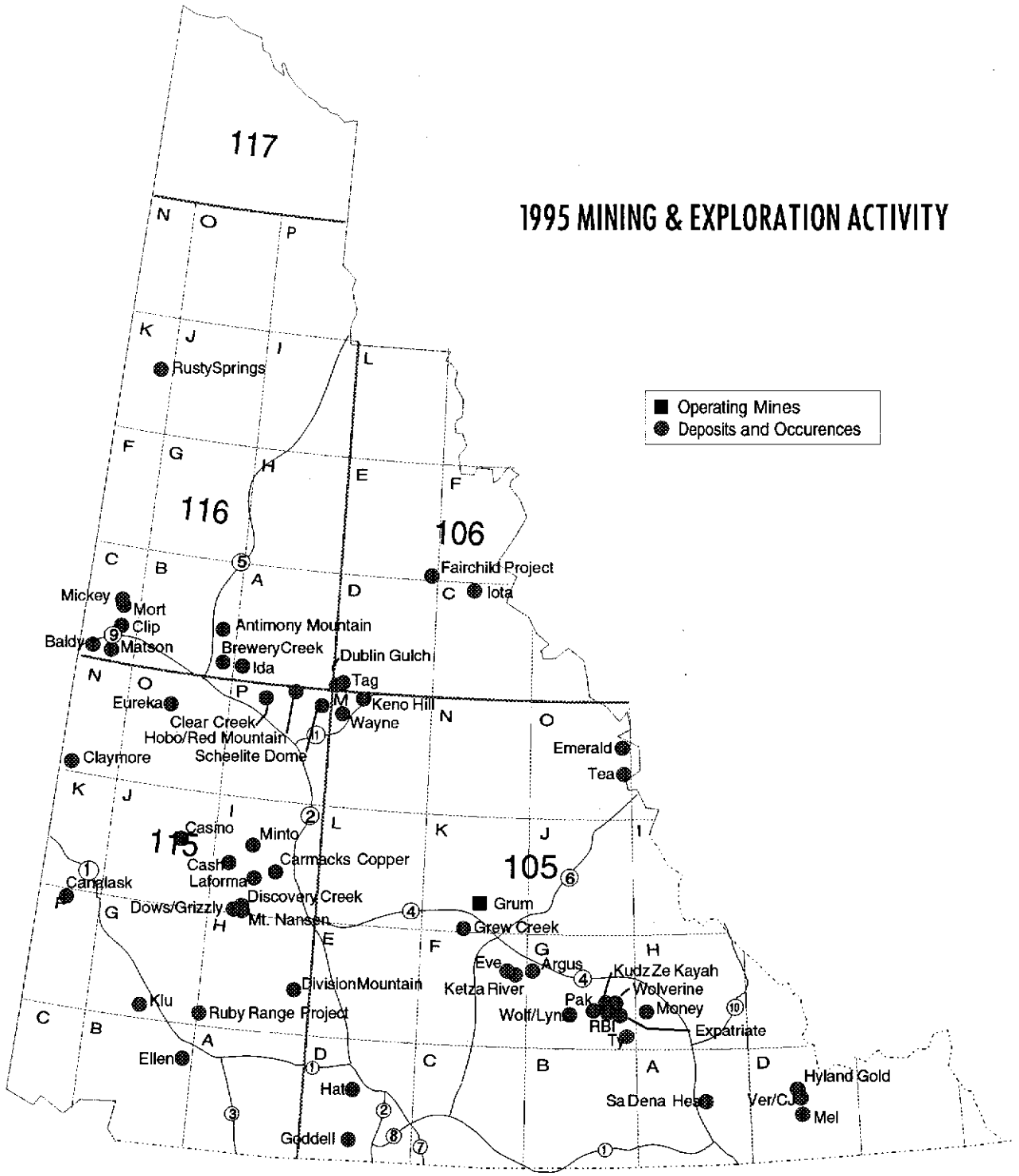

Figure 4: 1995 Mining & Exploration Activity

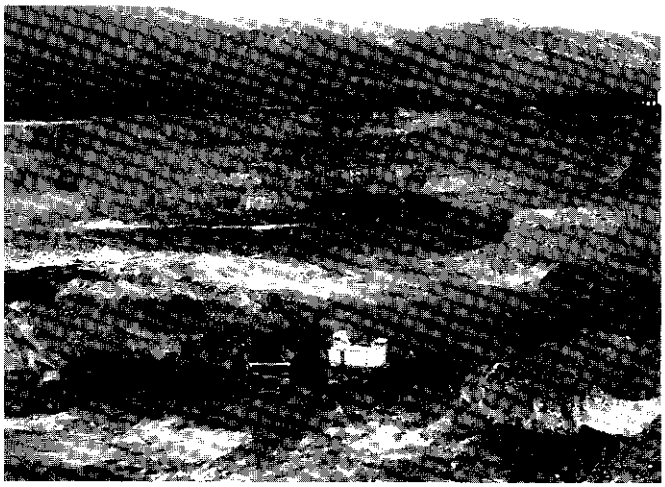

Figure 7: The shovel in the foreground is mining ore while the shovel in the backgound strips overburden from the Grum open pit at the reopened Faro Mine.

tonnes of glacial till and phyllite waste rock from the Grum orebody and mined 2.5 million tonnes of ore from the Vangorda and Grum deposits. Following a major upgrade of the concentrator in 1995, which included computerization, addition of regrind mills and a high intensity conditioner, ore processing commenced on August 6 and the first concentrate (Fig. 8) shipment left the Port of Skagway in September. The concentrator is currently processing 12-14,000 tonnes per day of ore and the mine will produce approximately 500,000 tonnes of lead and zinc concentrates per year.

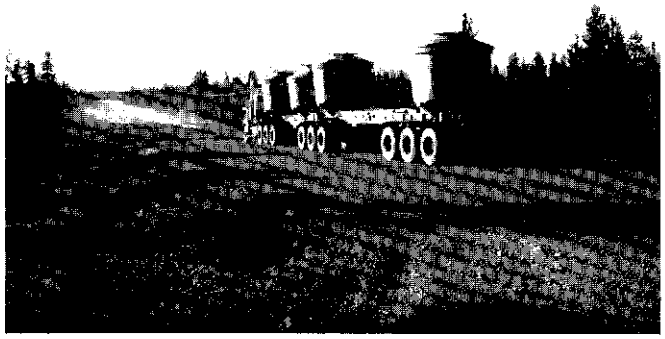

Figure 8: Concentrate trucks en route to the Port of Skagway from the Faro mine signalled the end of a two year gap in hard rock mineral production in Yukon.

Proven and probable reserves on the property before production recommenced stood at 37.7 million tonnes with an average grade of 8.34% combined lead and zinc, 52.6 g/T silver and 0.70 g/T gold in the Vangorda, Grum and Dy deposits. Although the area has considerable exploration potential, no major exploration programs have occurred on the property since 1981. Anvil Range plans on conducting an aggressive exploration program beginning in 1996 in order to extend the mine life beyond the year 2015 when it is anticipated that current reserves will be exhausted.

Sikanni Oilfield Construction produced 1300 ounces of free gold and 24 tonnes of concentrate grading approximately 1370 g/T Au from the **Claymore** property (Minfile #115N-024) in the Moosehorn Range (Fig.9). The property is underlain by foliated Klotassin granodiorite of Lower Jurassic age, cut by a series of parallel polymetallic veins. The veins are vuggy and non-calcareous and consist of quartz, free gold and banded sulphides, including stibnite, galena, sphalerite, tetrahedrite and arsenopyrite. The Claymore property appears to be an attractive target for a bulk tonnage gold deposit.

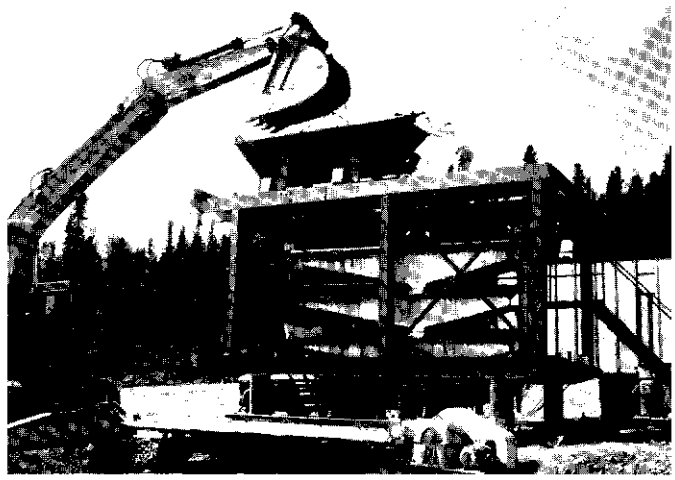

Figure 9: Sikanni Oilfield Construction installed a plant to process high grade gold vein material on its Claymore property in the Moosehorn Range.

ADVANCED DEVELOPMENT AND EXPLORATION

Gold

Loki Gold Corporation received its Class "A" Water Licence permit on August 9, 1995 for the **Brewery Creek** (Minfile # 116B-160) project, and immediately began development on the first heap leach gold mine in Yukon. Development in 1995 consisted of upgrading the access road from the property to the Dempster Highway, construction of a double lane haul road from the pad site to the Upper Fosters Zone, mining ore from the Upper Fosters Zone to be used for the pad overliner, and preparation of the heap leach pad and solution ditches and ponds (Fig 10). Development is expected to be completed in early 1996 and the mine will be producing gold in the fall of 1996. Loki also signed an agreement in principle with the Tr'on dek Hwech'in (Dawson First Nation) which covers such areas as job training and scholarships, contracting opportunities, environmental monitoring, trapper compensation, and opportunities for expanding the land base for a joint-venture exploration program.

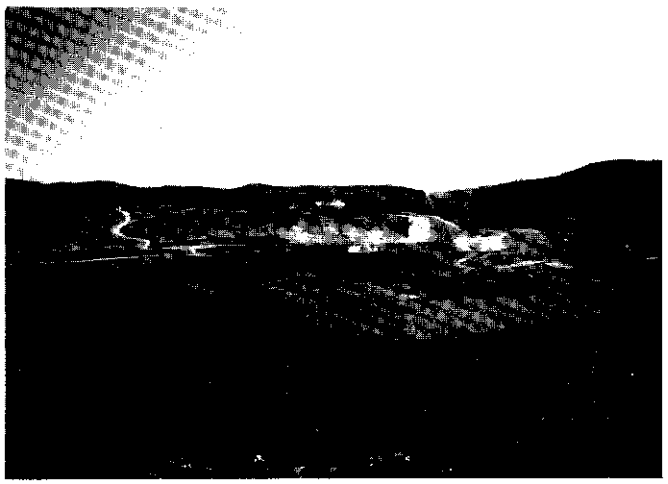

Figure 10: Development work on the heap leach pad, solution ditches and solution ponds began in 1995 at Loki Gold's Brewery Creek Mine. Construction will be completed in 1996 and production from the mine is slated for October, 1996.

The Brewery Creek property has a relatively short exploration history. The first claims were staked in 1987 by Noranda Exploration Co. Ltd. while following up a weak GSC regional silt anomaly. An aggressive exploration program has outlined a geologic resource estimated at 20 million tonnes grading 1.5 g/T Au in eight near surface oxide deposits, and continuing exploration by Loki has met with excellent success. The main targets of exploration in 1995 were oxide reserves within an economical haul distance of the heap leach pad. Two new zones discovered in 1994, the Big Rock Zone and the West Canadian Zone, were drilled to define reserves in these areas. Results include intersections up to 8.0 meters of 3.68 g/T Au in the Big Rock and 1.44 g/T Au over 22 meters in the West Canadian. Reserves for these areas are currently being calculated and should be released in early 1996. Excellent results obtained from four other zones which host mineable reserves are also expected to add to the reserve base. The sulphide potential of the property is recognized but has not received much attention during the efforts to define oxide reserves. Loki intends to begin exploring the sulphide potential of the property in 1996.

Figure 11: The mill at the Mt. Nansen mine is being upgraded to 700 tonnes per day and a carbon in pulp cyanide circut added. The Huestis vein that was a focus of exploration in 1995 is located behing the mill.

B.Y.G. Natural Resources Inc. began development work on the **Mt. Nansen** (Minfile #115I-64,65) property in anticipation of receiving permits in early 1996, which will clear the way for production. Development work consisted mainly of completing the final tailings impoundment design and stripping the borrow areas, rehabilitation of the existing kitchen and office buildings, installation of the camp and initiation of the upgrading of the existing mill. The mill is being upgraded to 700 tonnes per day (Fig.11) and a carbon in pulp cyanide circuit will be added. Upgrading of the mill can continue during the winter months and surface work will recommence in the spring. Production is expected to begin in summer, 1996.

In 1995, exploration drilling was done on three different targets in addition to continued geological work on the property and in the Mt. Nansen area. The reserves on the property are contained in veins which occupy northwest-trending shear zones cutting Cretaceous granodiorite and Paleozoic schist and gneiss.

The bulk of the drilling in 1995 consisted of short infill holes on the Flex zone, which consists of three principal veins in a branching system. The estimated geological reserve was revised upward to 109,000 tonnes grading 5.9 g/T Au and 268 g/T Ag, including 70,000 tonnes grading 6.0 g/T Au and 234 g/T Ag in the probable category.

Drilling was also successful in extending the Huestis deposit to the northwest. Two drill holes in this area encountered well-mineralized veins which assayed 50.47 g/T Au and 1221 g/T Ag over 0.74 meters in DDH 95-149 and 0.60 meters grading 15.67 g/T Au and 3475 g/T Ag in DDH 95-150. The Huestis vein was also the target of a deep hole drilled on the property. The hole encountered more than 130 meters of intense carbonate-sericite alteration at depth, and within the altered interval several mineralized veins were intersected. The best interval, at a vertical depth of 450 meters below surface, consisted of a quartz vein stockwork mineralized with fine grained, disseminated pyrite-arsenopyrite-galena-sphalerite-chalcopyrite-stibnite grading 4.07 g/T Au and 73.8 g/T Ag over 5.24 meters. These results are highly significant because present reserves on the property in all categories (953,000 tonnes grading 9.4 g/T Au and 189.6 g/T Ag) do not include mineralization below 150 meters vertical depth.

Figure 12: The Eagle zone seen in the foreground was the focus of First Dynasty Mines exploration program at the Dublin Gulch property. Placer workings can be seen in the valley bottoms.

First Dynasty Mines Ltd. conducted a large scale exploration program on the **Dublin Gulch** (Minfile #'s 106D-021-029) property located 60 kilometers north of Mayo in central Yukon. The goal of the 1995 program was to delineate a million-ounce heap leachable Au reserve within the inferred 99 million tonne 1.19 g/T Au geological resource. The program included a 14,000 meter reverse circulation and diamond drill program (Fig. 12), geotechnical studies for the open pit and heap leach pad sites, metallurgical testing, engineering, and environmental studies. A prefeasibility study is in progress and a production decision will be made early in 1996.

Dublin Gulch is a gold porphyry similar to the Fort Knox deposit near Fairbanks, and recent exploration on the property has been based on that model. Radiometric dating gives an age of 92.8 Ma ±0.5 Ma (D.Murphy and J. Mortensen, pers. comm) for Dublin Gulch. This is similar to the Fort Knox intrusion which yields a date of 92.5 Ma ± 0.5 Ma (D.Murphy and J. Mortensen, pers. comm). The deposit consists of sheeted Au-quartz veins hosted in mid-Cretaceous granodiorite. The veins are typically white or smoky quartz 5-10 mm wide and the density of veins varies from 1 to 15 per meter, averaging about five veins per meter within the ore zone. Gold occurs as free gold or on sulphide grain boundaries. The veins are extremely low in sulphide, and the sulphide content in the whole deposit is less than 0.2%.

The only results released from the 1995 program were from the first two reverse circulation holes drilled on the Eagle zone. Hole 95-80 returned 152.4 meters grading 1.31 g/T Au from 27.4 meters to 179.8 meters and 95-81 returned 158.5 meters grading 2.05 g/T Au from 16.8 meters to 175.3 meters. Results from the bottom of Hole 95-81 are still pending. A 1991 trench in the Eagle zone returned 240 meters grading 1.28 g/T Au. Contingent on a positive result from the prefeasibility study, First Dynasty will conduct a large program of additional drilling, road upgrading, minesite preparation and possibly stripping of the ore zone, prior to mining and stockpiling of the ore.

YGC Resources Ltd. conducted a 47 hole, 3400 meter diamond drill program on its **Ketza River** (Minfile #105F-019) property in 1995. A new oxide gold zone, the "Fork"

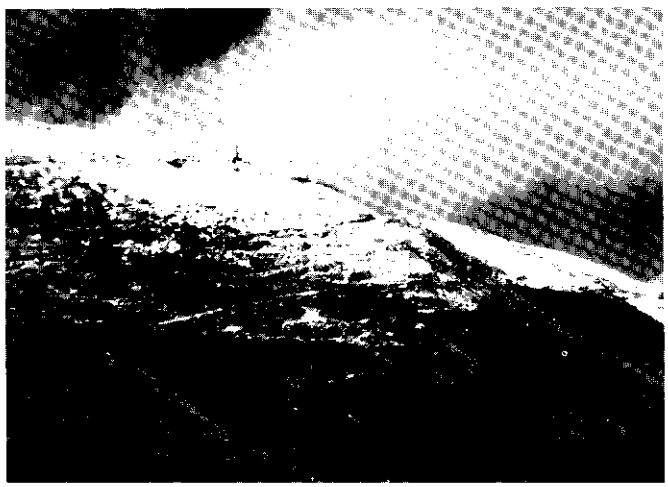

Figure 13: The Fork zone discovered by YGC Resources in 1995 lies beneath the lowermost roads seen in the center of this photo. The zone has added significant oxide reserves to the Ketza property.

zone (Fig. 13), was discovered early in the program. Thirty five drill holes outlined oxide mineralization over a strike length of more than 180 meters and a width of 25 to 40 meters. The zone has an average thickness of approximately 8 meters and is still open along strike. Intersections ranged up to 10.7 meters of 16.5 g/T Au and are expected to have an average grade similar to oxide ore previously mined at Ketza River.

Another new oxide zone, the McGiver zone, was also found in 1995. Intersections in two drillholes included 7.1 meters grading 15.4 g/T Au and 9.6 meters grading 10.3 g/T Au. In a step-out hole along strike, the B-mag Zone discovered by previous operators yeilded an 8.0m intersection of oxides grading 8.2 g/T Au. These newly discovered oxide gold zones and zones previously discovered on the property are benefiting from a reinterpretation of local geology. New evidence suggests that the dominant control on mineralization is stratigraphic rather than structural. A large drilling program in 1996 will test numerous oxide gold targets based on the new geological interpretation. Continued success could lead to a resumption of production at the Ketza River Mine by 1997.

Base Metals

The volcanic hosted massive sulphide **Kudz Ze Kayah** (Minfile # 105G-117) property was the focus of a large exploration program by Cominco in 1995. The ABM deposit, which was discovered in 1993, was drilled to the status of a mineable reserve. Open pit mineable reserves at the deposit are estimated at 11 million tonnes grading 0.9% Cu, 1.5% Pb, 5.9% Zn, 130 g/T Ag, 1.3 g/T Au. Fifteen NQ holes were also drilled into the deposit and added to a 40-tonne bulk sample that was collected near the end of the season. Cominco also drilled an additional seven holes on targets outside the deposit but still on the Kudz Ze Kayah claim block. An all-weather access road was constructed to the property during 1995 (Fig. 14). Engineering, metallurgical and environmental studies continued on the property and a final feasibility study will be completed early in 1996. A positive feasibility would result in production from the open pit ABM deposit as early as the fall of 1997.

Cominco continued exploration on its large block of claims outside the Kudz Ze Kayah property and also was involved in a large staking rush in the area. In 1996 Cominco will continue regional exploration and plans to drill some of its regional properties.

Cominco also conducted an underground drill program in the spring of 1995 at the **Sa Dena Hes** Mine (Minfile #105A-012,013) in southwestern Yukon. Cominco drilled 67 holes totalling 5700 meters on 12.5 meter sections into the Burnick Zone, which consists of tabular skarn lenses in Lower Cambrian crystalline limestone. The objective of the program was to confirm reserves estimated by previous operators and to provide information for a detailed mine plan. Reserves of 2.44 million tonnes grading 12.6% Zn, 1.1% Pb and 44.9 g/T Ag in the Burnick and Attila zones were estimated by Canamax Resources in 1988.

A large underground exploration program at **Keno Hill** (Minfile #105M-001) was undertaken in 1995 (Fig. 15) by United Keno Hill Mines Ltd, based on results from the large surface drilling program conducted in 1994. Two former producing silver veins (Bellekeno and Silver King) were selected as the best targets. The style of mineralization is quite different in each vein. The Bellekeno consists of sideritic galena-sphalerite veins while the Silver King

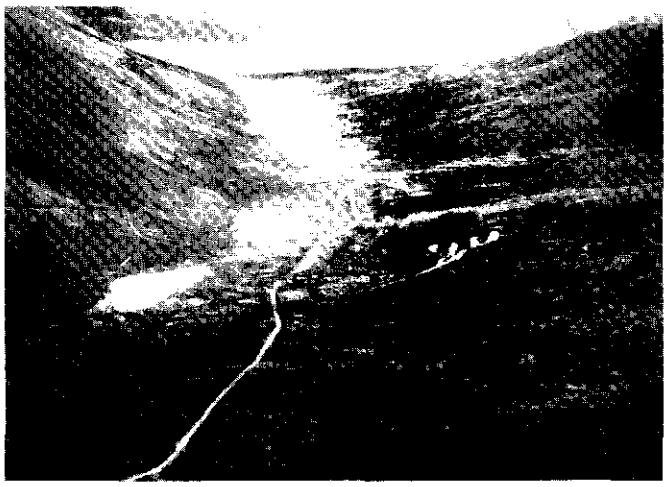

Figure 14: Cominco constructed an all weather road to the Kudz Ze Kayah property in 1995. The ABM deposit strikes across the valley between the two small beaver ponds seen in the foreground of this photo.

Figure 15: Underground exploration at the Bellekeno and Silver King mines was the focus of United Keno Hills' efforts in 1995.

consists of high-grade veins with native silver, ruby silver and galena. Exploration was targeted at the deeper levels of the mines and along strike from existing workings. The program was successful in expanding reserves at both the mines and total reserves on the entire property now stand at 595,000 tonnes grading 1033 g/T Ag, 6.48% Pb and 3.4% Zn.

The underground program also tested new mining methods. Previous operators conducted development along the veins and employed a large amount of expensive square-set timbering. United Keno Hill carried out its 1995 underground exploration in the footwall of the veins and conducted a successful test of overhand cut and fill mining in the Bellekeno Mine. Operating costs will be lowered by using these techniques when the mine resumes production.

Minto Explorations Ltd conducted a small exploration program on its **Minto** property (Minfile #115I-021,022) in 1995. The program involved drilling four of six aeromagnetic anomalies identified by reinterpreting 1993 magnetic data, using the magnetic core of the existing Cu-Ag-Au porphyry style orebody as a model. Mineralization encountered was dominated by magnetite and an interpretation of results which will aid further exploration is pending. A new zone intersected by nine drill holes in 1994 was not explored in 1995.

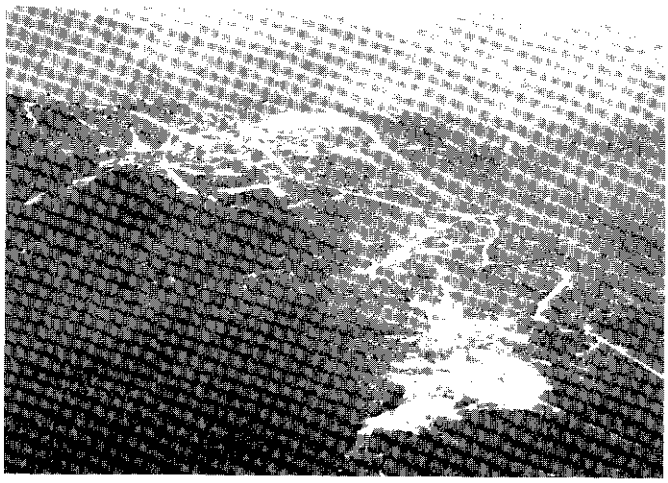

Figure 16: With successful permitting and financing the the Minto project could begin production in 1997.

The Minto Project received a positive feasibility study in early 1995 and the company has since directed most of its efforts toward engineering, geotechnical and environmental studies in support of permit applications. The feasibility study has outlined a mine and mill with a capacity of 434,000 tonnes per year, giving the mine an initial life of 12 years. Planned production for the first five years of the operation is 12.25 million kilograms of copper, 310,000 grams gold and 4.98 million grams silver per year. The average cash operating cost is estimated at $25.75 per tonne of ore for the life of the mine using metal prices of U.S.$1.05 per pound of copper, U.S.$380.00 per troy oz of gold, U.S.$5.25 per troy ounce of silver and an exchange rate of U.S.$1.00=Cdn$1.35. The in-situ geological reserve is 8,818,000 tonnes grading 1.73% Cu, 0.48 g/T Au, and 7.5 g/T Ag, using a cut-off grade of 0.5% Cu . Approximately 90% of this reserve is in the proven and probable category. The mine will be an open pit followed by an underground operation, and it is estimated that upon receipt of the appropriate permits the mine and mill can be developed in 18 months (Fig. 16).

The **Carmacks Copper** Project (Minfile# 115I-008) of Western Copper Holdings received a positive feasibility study in 1994 and in 1995 most of the Company's efforts were directed toward various studies required for environmental permitting. The oxidized Cu-Au porphyry deposit contains open pit mineable reserves of 14.1 million tonnes grading 1.01% Cu and 0.51 g/T Au. The copper can be extracted using solvent extraction/electrowinning technology (Fig. 17). A small amount of trenching was done on some of the 13 other known oxide copper occurences on the property. The ownership structure of the project changed in late 1995 when Prime Equities International of Vancouver acquired Teck Corporation's controlling position in Western Copper Holdings. Prime now owns a 25.5% interest in Western Copper and in the Carmacks Copper Project. Pending receipt of their permits in 1996 this project could also see production in 1997.

Figure 17: Ken McNaughton removes copper cathode from a pilot scale production plant that processed ore from the Carmacks Copper deposit in the winter of 1993.

Pacific Sentinel Gold Corporation completed a prefeasibility study on its **Casino** Property (Minfile #115J-028). The study indicates that conventional mining and milling is the optimum processing method for Casino.

Conventional crushing, grinding and floatation of sulphide supergene and hypogene ores will recover an average of 72% of the gold, 80% copper and 62% molybdenum from the porphyry deposit, which contains an open pit mineable reserve of 178.2 million tonnes grading 0.376 g/T Au, 0.303% Cu and 0.28% molybdenum. The waste to ore ratio will be 1.06:1 after prestripping and stockpiling of 50.6 million tonnes of lower grade oxide material. This plan will sustain a 25,000 tonne per day concentrator for 19 years. An additional 50.7 million tonnes of lower grade sulphide material will be stockpiled during mining to provide an additional six years of mill feed after open pit operations have ceased. Work on the property in 1996 consisted of continued baseline environmental studies.

EXPLORATION

Base Metals

The search for additional polymetallic volcanic hosted massive sulphide deposits in the Finlayson Lake area after Cominco's discovery of the ABM deposit in 1993 had its first major success in 1995. Westmin Resources optioned the Foot property (Minfile #105G-032) from Atna Resources and discovered the **Wolverine** deposit. The Westmin program was initially planned as a two-phase program of geological mapping and geochemistry followed by drilling of five stratigraphic holes. The mapping and geochemistry outlined favorable felsic volcanic rocks and coincident barium-lead-copper-zinc-gold-silver geochemical anomalies. A banded iron formation that serves as an excellent marker horizon in the hanging-wall of the Wolverine deposit was mapped over an eight-kilometer strike length. The first stratigraphic drill hole struck massive sulphide mineralization on August 10, 1995 and the program continued until it was halted at the end of November (Fig. 18). The project drilled 24 holes for a total of 6442 meters. Fifteen consecutive holes intersected the Wolverine zone with no misses. The Wolverine zone is currently defined over a 250-meter strike length and a dip length of some 400 meters and averages approximately 7 meters true thickness. The deposit is open along strike in both directions and also down-dip. Intersections have been spectacular with the highest grade occurring in Hole 4 which assayed 7.62 g/T Au, 1349 g/T Ag, 14.22% Zn, 0.56% Cu and 3.45% Pb over a true thickness of 8.3 meters.

The Fisher Zone located 8 kilometers to the northwest of the Wolverine Zone was also intersected by drilling and Hole 95-6 returned 2.4 meters of semi-massive sulphide that graded 0.14 g/T Au, 66.3 g/T Ag, 0.12% Cu, 1.41% Pb and 2.84% Zn. Follow-up drilling in the area of the Fisher discovery hole was hampered by difficult winter drilling conditions. High precious metal grades combined with the high zinc-copper-lead base metal content give the Wolverine Zone an impressive gross metal value of U.S.$273 per tonne.

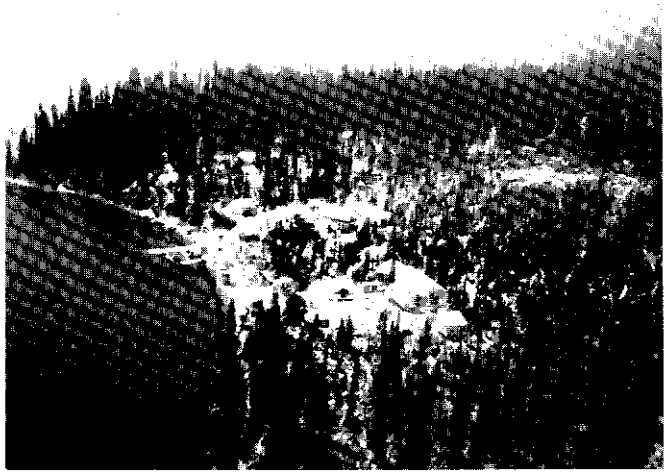

Figure 18: Westmin Resources constructed a fully winterized camp at Wolverine Lake to support their drilling program that was extended to the end of November, 1995.

The discovery of the Wolverine zone and the Fisher zone combined with the earlier discovery of Cominco's ABM deposit demonstrate the potential of the area to host a cluster of deposits similar to other volcanic hosted massive sulphide camps. The Wolverine Project will resume in early 1996 with a large exploration program that will allow the company to make a development decision in 1996. Westmin staked extensively in the area and has also aquired options on other properties. It also conducted a DIGEM helicopter-borne magnetometer and electromagnetometer survey in November and will be conducting regional programs in 1996 (Fig. 19).

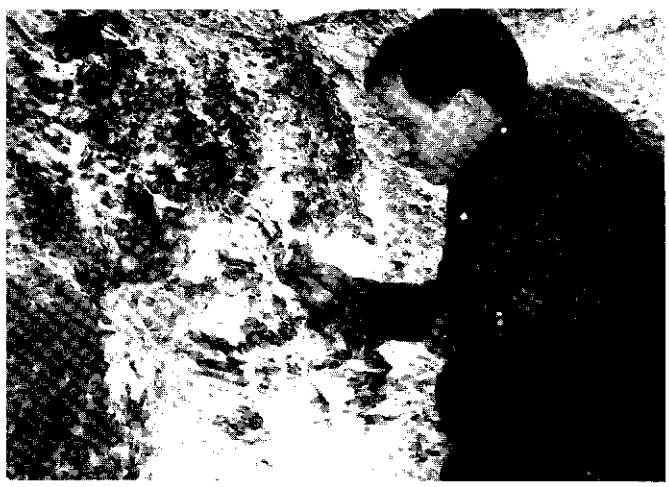

Figure 19: Terry Tucker of Westmin Resources examines low grade zinc-copper-gold mineralization in sericite-chlorite schist at the Fetish kill zone, the original showing at the Wolverine Lake Project.

Expatriate Resources was the third major party involved in the staking rush in the Finlayson/Wolverine Lake areas. In 1996 Expatriate conducted geology, geochemistry and prospecting on some of the claims and flew an airborne geophysical survey late in the year. Westmin Resources acquired 1,200,000 shares of Expatriate Resources late in November making it the largest shareholder of Expatriate.

Other properties in the area which received work in 1996 include the **TY** (Minfile #105G-083) claims of Pacific Bay Minerals which conducted a small geological and geochemical program and late in the season optioned the property to Westmin. Demand Gold also conducted a program of geology, geochemistry and geophysics on its **RBI** (Minfile #105G-117) claims southwest of Cominco's ABM deposit. Atna Resources conducted geological programs on the **Money, Fox-Wolf-Lynx** and **Argus** (Minfile #'s 105H-078,008,013) properties optioned from YGC Resources. All three of the properties optioned from YGC are known to host stratabound mineralization of the volcanogenic or sedimentary-exhalative types.

Atna also conducted programs on a number of properties also optioned from YGC Resources in the Dawson area. The **Baldy, Clip, Matson, Mickey** and **Mort** properties (Minfile#'s 116C-133,115,112,116,68) are all hosted in Yukon Tanana terrane and are being explored for their volcanogenic or sedimentary-exhalitive type mineralization.

In northeastern Yukon Newmont-Westmin-Pamicon-Equity conducted a 50 hole, 5800 meter helicopter supported drill program on several of their 14 properties in the region collectively termed the **Fairchild** Project (Minfile #106C,D,E-various). The companies are exploring Wernecke Breccias using the Olympic Dam type copper-gold-cobalt deposit as a model. The project which began in 1992 has not made any results public but is planning to explore several properties with further drilling in 1996.

The **Iota** property (Minfile #106C-014) was explored by Westlake Ltd. and Montoro Resources using the Olympic Dam model. Breccia bodies and fault controlled massive sulphide veins occur on the property. Mineralization in the veins consists of tetrahedrite, sphalerite and galena in a quartz gangue. Assays up to 5% Sb, 5% Co, 5% Cu, 15% Zn, 10% Pb, 8600 g/T Ag and 100 g/T Au were reported from one vein.

A new age for the Wenecke breccias has been provided by Derek Thorkelson of Simon Fraser University, formerly with the Canada-Yukon Geoscience Office, and Dr. Robert Creaser of the University of Alberta. Wernecke breccia at Slab Mountain (Minfile #106D-070) has been dated at approximately 1.6 billion years, which is the known age of mineralization at the world-class Olympic Dam copper-gold mine in Australia. This similarity in age supports previous suggestions that Yukon and Australia were previously side by side, and underwent a similar history of mineralization. The new data gives credence to exploration strategies based on the Olympic Dam model (Fig. 20).

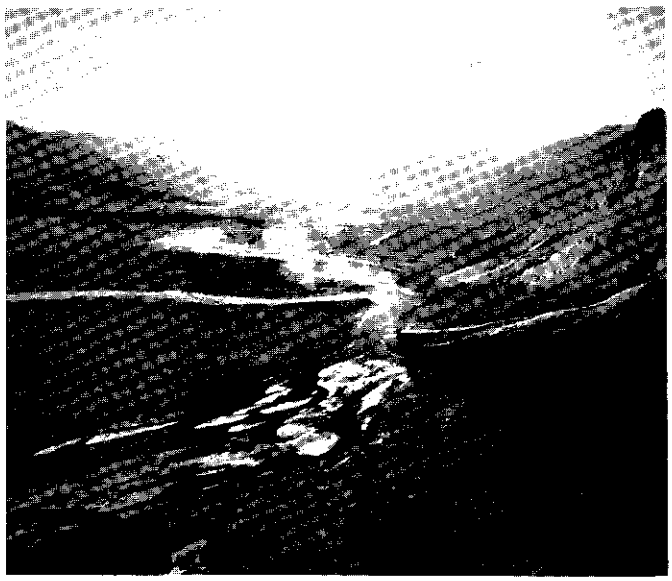

Figure 20: Wernecke breccia exposed at Slab mountain seen in the extreme right of this photo has recently been dated at 1.6 billion years, the same age as mineralization at the world-class Olympic Dam copper-gold mine in Australia.

The **Ellen** property (Minfile# 115A-041) located in southwestern Yukon was explored for volcanogenic massive sulphide mineralization in Wrangellia terrane by Probe Resources. Probe conducted a short drill program on the property which hosts several layers of massive pyrite and chalcopyrite in andesitic tuff and shale of Triassic age. Drilling intersected mineralization which consists of chalcopyrite, pyrrhotite and pyrite in disseminations and blebs over two intervals each approximately three meters thick.

Results from drilling include 5.5 meters of 1.94% Cu in Hole 95-1, 7.62 meters of 0.876% Cu in Hole 95-2, 6.1 meters grading 0.935% Cu in Hole 95-3. Holes 4 and 5 also intersected a serpentinite sill approximately 30 meters thick. The sill contained disseminated chalcopyrite and pyrrhotite. Hole 95-4 returned 32 meters grading 0.18% Ni from the serpentinite sill.

Cachet Enterprises began a drilling program on the **Canalask** property (Minfile# 115F- 045) in late November. The Main zone on the property consists of massive sulphide lenses in Permo-Pennsylvanian tuffs of the Station Creek

Formation and hosts reserves of approximately 450,000 tonnes of 1.5% Ni. The 1995 drilling is directed at mineralization in the Footwall zone where in 1994 Hole C94-64 intersected 3.0 m of mineralization which assayed 1.34% Ni, 0.10% Cu and 0.055% Co.

Eagle Plains Resources Ltd. conducted a two-phase exploration program on the **Rusty Springs** property (Minfile# 116K-003) in 1995. Eagle Plains drilled 1700 meters in 21 holes on two targets on the property, the Orma vein and Mike Hill. The Orma vein has been previously exposed by trenching over a 600 meter strike length. Previous drilling on the Orma produced assays up to 2023 g/T Ag, 24.6% Pb, and 2.5% Cu over 1.5 meters. The 1995 drilling was directed at a gap in previous drilling. Hole OR95-1intersected 1.7 meters grading 438.8 g/T Ag, 1.03% Cu, and 18.8% Pb and Hole OR95-2 drilled on the same section at a steeper angle intersected 1.5 meters of 133.7 g/T Ag, 1.31% Cu, and 11.4% Pb. The vein is open along strike in both directions.

The majority of the drilling in 1995 was conducted on Mike Hill where a strong linear coincident Ag, Pb, Cu, Zn, As, Sb soil anomaly has been traced over 700 meters. Trenching in 1994 on the anomaly exposed anomalous reddish soils and isoloated boulders of sulphide mineralization. The mineralization consists of brecciated and vuggy quartz-galena-tetrahedrite with malachite and azurite. Drilling intersected extremely broken and rubbly dolomite host rock with variable limonite and local zinc and copper oxides. No sulphides were intersected by drilling. Four holes returned significant assays the best occuring in Hole 95-7 which intersected 4.1 meters of 116.6 g/T Ag and 4.6% Cu and 15.3 meters of 517.7 g/T Ag, 3% Cu and 1.3% Zn. Drilling indicates a major structure underlies the trend outlined by geochemistry. Deeper drilling aimed at sulphide mineralization along this trend and possible sulphide replacement bodies at depth will be targeted in 1996 (Fig. 21).

The **Mel** property (Minfile# 95D-005) was drilled by International Barytex in 1995. Drilling was spaced over a 2.2 kilometer lead-zinc anomaly and a coincident IP anomaly north of the Jeri zone. Two holes drilled from the same setup encountered coarse grained sphalerite mineralization within a black chert unit at the same stratigraphic horizon as the Mel and Jeri occurances. Hole #5 intersected 5.1 meters of 15.6% Zn and Hole #4 intersected 9.9% Zn over 5.0 meters. Hole #4 was drilled at -60 degrees and Hole #5 was a vertical hole. The intersections are eight kilometers northwest of the Main zone which hosts reserves of 6.8 million tonnes grading 7.1% Zn, 2.0% Pb and 54.7% barite.

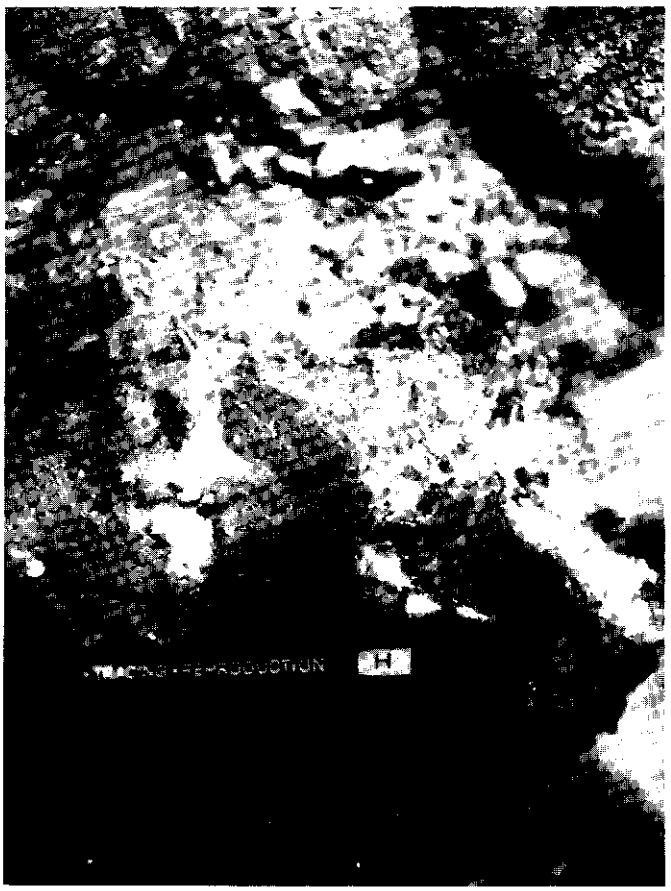

Figure 21:Massive galena mineralization filling vugs or replacing matrix in a dolomite breccia at the Rusty Springs property in north Yukon. Drilling for deeper sulphide mineralization is targeted for the 1996 drilling program on the property.

Gold

Intrusive related gold deposits were the target of several exploration programs in the Mayo-McQueston area in central Yukon. The mid-Cretaceous Tombstone Suite intrusions were explored by at least seven different programs including the large project at Dublin Gulch. Intrusive-hosted mineralization based on the Fort Knox model was the main focus of exploration but some programs also concentrated on wall-rock hosted mineralization in metasedimentary strata adjacent to the intrusions.

Kennecott Canada Inc. conducted a number of programs in the area including two drill programs at **Clear Creek** (Minfile#115P-011) and **Scheelite Dome** (Minfile# 115P- 033). On the Clear Creek property, Kennecott drilled with 27 reverse circulation holes totalling 1970 meters under an option agreement with First Dynasty Mines Ltd. The drilling tested a 1.5 by 2.5 kilometer area of anomalous gold geochemistry associated with sheeted quartz veins in the Rhosgobel stock. Results from the drilling have not been

Figure 22: Kennecott drilled disseminated quartz-arsenopyrite mineralization in Hyland group metasediments on their Scheelite Dome property near Mayo. The drill is located in the bottom of a placer mining pit on Highet Creek.

released. Kennecott also conducted a drill program on the Scheelite Dome property. The drilling on this property was directed at disseminated quartz-arsenopyrite mineralization in Upper Proterozoic to Lower Cambrian Hyland Group metasedimentary rocks (Fig. 22). Results from this program have also not been released but Kennecott will be returning to conduct more drilling on the property in 1996.

The **Red Mountain** property (Minfile#115P-006) was the target of two drill programs. Regent Ventures conducted a nine hole, 1233 meter reverse circulation program in March, 1995 and a follow-up program of diamond drilling in August. The target of drilling was an east-west mineralized structure within the Red Mountain stock. The RC program intersected significant mineralization in four of the nine holes. Results include 3.05 meters of 10.7 g/T Au and 3.05 meters of 8.6 g/T Au in Hole RC95-01 and 9.14 meters grading 4.8 g/T Au in Hole RC 95-05. The diamond drill program intersected mineralization in five of the twelve holes and selected results from that drilling include 30.8 meters of 0.69 g/T Au in DDH95-06 and 33.8 meters of 0.72 g/T Au in DDH95-10. Higher grade intersections up to 15.0 g/T Au over 1.5 meters (DDH95-03) were also encountered.

APC Ventures Inc. explored the eastern end of the belt of mid-Cretaceous intrusions. Samples from the Tom zone, an area of sheeted quartz veins which occurs at the contact of the **Emerald Lake** (Minfile# 105O-009) Pluton returned several high grade assays including 40.8 g/T Au across 20 meters. Mineralization consists of visible gold, bismuthinite and quartz in quartz-feldspar-pegmatite veins.

Redell Mining Corp. conducted a program of diamond drilling, trenching, and underground rehabilitation at the **Laforma** Gold Mine (Minfile#115I-054) north of Carmacks. Fourteen drill holes were completed on the G-3 extension, approximately 200 meters west of and roughly parallel to the G-3 vein, which contains drill-indicated reserves of 181,440 tonnes grading 11.3 g/t Au. The G-3 structure is a shear zone containing lenses of broken, brownish-stained vein quartz, occasionally grey with finely disseminated pyrite and arsenopyrite. Seams of crushed pyrite and occasional arsenopyrite, chalcopyrite, sphalerite and galena, are also present. The gold occurs mainly as finely disseminated free gold in the quartz. Granitic material in the shear zone is almost completely altered to clay and sericite and the wallrocks exhibit similar alteration. Assays have been reported from four holes on the G-3 extension over a 75 meter strike length. These mineralized intersections include 68.1 g/T Au over 1.5 meters in Hole 95-1, 8.2 g/T Au over 1.8 meters in Hole 95-10, 20.4 g/T Au over 1.5 meters in Hole 95-11 and 8.8 g/T Au over 2.1 meters in Hole 95-12.

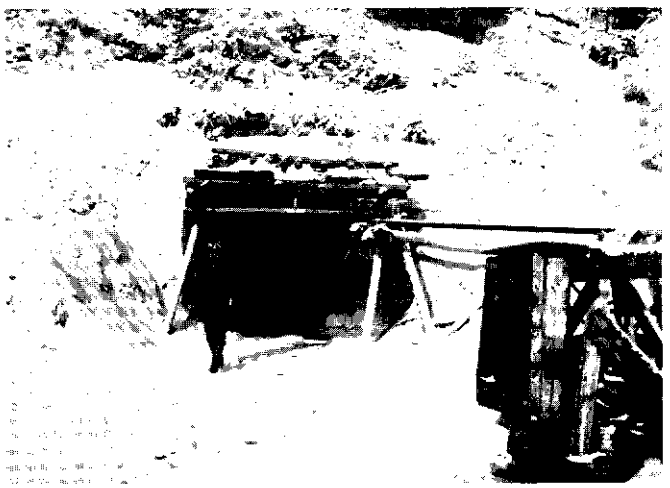

Figure 23: Main Street Mining of Whitehorse rehabilitated the No. 2 and No. 3 adits at the Laforma Mine.

Redell rehabilitated the existing #2 and #3 levels in the Laforma mine to a 3 x 3.6 meter (10 by 12 feet) trackless drift to accomodate equipment for a 10,000 tonne bulk test planned for 1996 (Fig. 23). The bulk test will provide information on bulk density, grade, underground mining methods, backfilling and will also test the Falcon concentrators (a gravity centrifuge recovery system). A fully winterized twenty-man camp has been constructed at the property and the concrete pad for the mill building has been completed. The mill and gravity concentrators will be constructed in early 1996.

On its **Ruby Range** Project (Minfile# 115H-047), Cash Resources Ltd. conducted a 14 hole, 1874 meter drill program to follow up auriferous quartz veins and soil anomalies outlined in 1994. Gold occurs in these veins and in the surrounding graphitic quartz-biotite schist wallrock. Most of the drillholes encountered vein swarms. Selected results from drilling include: 2.92 g/T Au over 4.05 meters, 1.19 g/T Au over 1.52 meters, 1.89 g/T Au over 1.0 meters, and 1.03 g/T Au over 9.26 meters in Hole 95-1, and 2.29 g/T Au over 3.8 meters and 2.72 g/T Au over 3.32 meters including 0.08 meters grading 48.6 g/T Au in Hole 95-4. The company also conducted excavator trenching on a number of targets and exposed similar styles of mineralization. The drill program was helicopter supported and all trenches on the property were reclaimed. The property is located in a lambing area for sheep and winter grazing area for caribou and Cash Resources did an excellent job in demonstrating the low impact that a well planned mining exploration program can have on the environment.

Omni Resources Inc. drilled four deep diamond drill holes on the **Goddell** Gold property (Minfile# 105D-025) 60 kilometers south of Whitehorse. A fifth hole is in progress and will be completed in early December. Drilling was directed at the Goddell shear zone where two holes in 1988 intersected 6.4 meters of 13.51 g/T Au and 11.3 meters of 20.91 g/T Au in altered quartz monzonite and thin andesite dykes containing fine grained pyrite and arsenopyrite. Hole 95-23, the first of the 1995 drillholes, intersected 3.81 meters grading 12.51 g/T Au, and hole 95-24 intersected 6.92 meters grading 13.7 g/T Au. The deep drilling has defined a zone of gold mineralization that currently has a 150 meter strike extent and 75 meter vertical extent. The zone is open in all directions.

Westmin flew airborne geophysics over their **VER/CJ** properties in southeastern Yukon. Westmin is exploring the property for Carlin-type mineralization. The VER/CJ claims surround the **Hyland** Gold property (Minfile# 95D-011) where Hemlo Gold drilled three diamond drill holes in 1995.

Coal

Cash Resources Ltd. continued exploration on its **Division Mountain** Coal Project (Minfile# 115H-013) with a program of drilling (Fig. 24), trenching, geological mapping and extensive environmental studies in 1995. The coal deposit is situated 20 kilometers west of the Klondike Highway and the Yukon Energy electrical transmission grid. The program was successful in quickly outlining additional geological reserves. Drill indicated, undiluted mineable reserves now total 31.7 million tonnes of High Volatile Bituminous "B" coal with a strip ratio of 3.36 bank cubic meters per tonne. A further 13.3 million tonnes of geological reserves have been identified, giving a total open pittable coal inventory of 45 million tonnes. This reserve would supply a forty megawatt mine-mouth power plant for over 200 years. Washability tests have demonstrated that the coal can be easily upgraded to an export quality product.

Figure 24: Photo of coal intersected by drilling at the Division Mountain Coal Property.

Barite

Coyne and Sons constructed a 40,000 tonne per year mill to process barite from their **Tea** Barite property (Minfile# 105O-020). The company processed a 600 tonne bulk sample from material stockpiled at the mill site and produced 15,000 40 kilogram bags of high quality product (Fig. 25). Specific gravity of the final product averaged 4.26. The Tea barite deposit hosts open pit mineable reserves of 250,000 tonnes with no stripping requirement. The geological reserve on the property is 1 million tonnes.

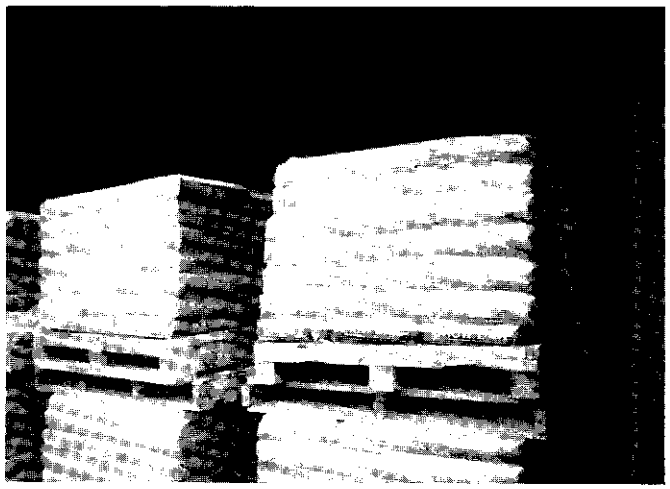

Figure 25: Coyne & Sons produced 15,000 forty kilogram bags of barite from a bulk sample processed at their mill in Ross River. The mill has a 40,000 tonne per year capacity at full production.

Appendix 1: 1995 EXPLORATION PROJECTS

PROPERTY	COMPANY	MINING DISTRICT	MINFILE #	WORK TYPE	COMMODITY
Antimony Mountain	Kennecott Canada	Dawson	116B-001	GC, G	Au
Brewery Ck	Loki Gold Corporation	Dawson	116B-160	PD,T, G GC, F, D	Au
Canalask	Expatriate Resources Cachet Enteterprises	Whitehorse	115F-045	DD, G	Ni, Cu
Carmacks Copper	Western Copper Holdings Thermal Explorations	Whitehorse	115I-008	T, G, ES	Cu, Au
Casino	Pacific Sentinel Resources	Whitehorse	115I-028	PF, ES	Cu, Mo, Au
Claymore	Sikanni Oilfield Const.	Whitehorse	115N-024	G,GP, M	Au
Clear Creek	Kennecott	Dawson	115P-011	G, GC, DD	Au
Discovery Ck	Aurchem Exploration Ltd	Whitehorse	115I-093	G, GC	Au, Ag, Cu, Mo, Pb, Zn
Division	Cash Resources Ltd.	Whitehorse	115H-013	DD, T, G, ES	Coal
Dows/Grizzly	Atna	Whitehorse	115I-119/85	G, GC, T	Au, Ag
Dublin Gulch	First Dynasty Exploration	Mayo	106D-21-29	PD, DD, PF, ES	Au
Ellen	Probe Resources	Whitehorse	115A-041	G, DD	Cu, Au, Ni
Emerald	APC Ventures	Watson Lake	105O-009	G, GC, R	Au
Fairchild Project	Westmin Resources Newmont Exploration	Mayo	106C, D, E	DD, G, GC, GP, R	Cu, Au, Ag, Co
Faro (Grum)	Anvil Range Mining Corporation	Whitehorse	105K-46,55, 56,61	D, M	Pb, Zn, Ag, Au
Finlyson Project	Expatriate	Watson Lake		G, GC	Cu, Zn, Pb, Au, Ag
Grew Ck	YGC Resources	Whitehorse	105K-009	DD, G	Au
Goddell	Omni/Arkona	Whitehorse	105D-025	DD	Au
Hat	Rob Hamel	Whitehorse	105D-053	G, T	Cu, Au
Hobo/Red Mtn	Regent Ventures	Mayo	115P-006	PD, DD, GC, G	Au
Hyland Gold	Hemlo Gold	Watson Lake	095D-011	G, DD	Au
Iota	Westlake Ltd/Montoro	Mayo	106C-014	G, GC, T	Cu, Au, Ag, Co
Keno Hill	United Keno Hill Mines	Mayo	105M-001	U/GD, DD, PD, G	Pb, Zn, Ag
Ketza	YGC Resources	Watson Lake	105F-019	DD, G	Au
Ketza	Hemlo Gold	Watson Lake	105F-019	DD	Au
Klu	Inco Exploration	Whitehorse	Southwestern Yukon	G, GC	Cu, Ni
Kudz Ze Kayah	Cominco Ltd.	Watson Lake	105G-117	G, GC, GP, DD, R F, BS	Cu, Zn, Pb, Ag, Au
Laforma	Redell Mining Corp.	Whitehorse	115I-054	DD, T, U/GD	Au
Mel	International Barytex Resources	Watson Lake	95D-005	DD, G	Zn, Pb, Ba
Minto/DEF	Minto Explorations	Whitehorse	115I-21, 22	DD, G, F	Cu, Au, Ag
Mt Nansen	BYG Natural Resources	Whitehorse	115I-64, 65	DD, G	Au, Ag

Appendix 1: 1995 EXPLORATION PROJECTS

continued

PROPERTY	COMPANY	MINING DISTRICT	MINFILE #	WORK TYPE	COMMODITY
RBI	Demand Gold	Watson Lake	105G-117	G, GC, GP	Cu, Zn, Pb
Ruby Range Project	Cash Resources Ltd.	Whitehorse	115H-047	G, GC, GP, T, DD	Au
Rusty Springs	Eagle Plains Resources	Dawson	116K-003	G, GC, T, DD	Ag, Cu, Zn, Pb
Sa Dena Hes	Cominco/Teck	Watson Lake	105A-12, 13	G, DD	Pb, Zn, Ag
Scheelite Dome	Kennecott Canada	Mayo	115P-033	G, GC, T, DD	Au
Tag	HRC Developments	Mayo	106D-018	G, GC	Au
TY	Pacific Bay Minerals	Watson Lake	105G-083	G, GC	Cu, Zn, Pb, Au, Ag
Ver/CJ	Westmin Resources	Watson Lake	Southeastern Yukon	G, GP	Au
Various	Atna	Finlayson/Dawson areas		G, GC	Pb, Zn, Cu, Ag, Au
Various	Homestake	Yukon	Yukon	G, GC	
Wayne	Hemlo Gold	Mayo	105M-029	G, GC, GP	Au
Wolverine	Westmin/Atna	Watson Lake	105G-032	G, GC, GP, DD	Ag, Cu, Zn, Pb

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: 1995 DRILLING STATISTICS

PROPERTY	COMPANY	DIAMOND DRILL		RC/PERCUSSION DRILL	
		METERS	# HOLES	METERS	# HOLES
Brewery Ck	Loki Gold	1206	25	15048	316
Canalask	Patriate Resources Cachet Enterprises	760	6		
Clear Creek	Kennecott Canada Inc.			1970	27
Division	Cash Resources	1980	9		
Dublin Gulch	First Dynasty Mines Ltd.	5618	39	8347	40
Ellen	Probe Resoures	458	5		
Fairchild Project	Westmin-Newmont	5800	50		
Grew Ck	YGC Resources	1767	17		
Hyland Gold	Hemlo Gold Mines Inc.	439	3		
Keno Hill	United Keno	4480		1978	
Ketza	Hemlo Gold Mines Inc.	400	3		
Ketza	YGC Resources	3440	47		
Kudz Ze Kayah	Cominco	16540	131		
Laforma	Redell Mining	2134	21		
Mel	International Barytex	1165	11		
Minto	Minto Explorations	685	18		
Mt Nansen	BYG Resources	1490	21		
Goddell Gold	Omni Resources/Arkona	2855	5		
Red Mtn/Hobo	Regent Ventures	1625	12	1233	9
Ruby Range Project	Cash Resources	1874	14		
Rusty Springs	Eagle Plains Resources Ltd.	1703	21		
Sa Dena Hes	Cominco Exploration	5900	67		
Scheelite Dome	Kennecott Canada Inc.	1032	8		
Wolverine	Westmin Resources/Atna	6442	24		
TOTALS		69,793		28,576	

PART B

GOVERNMENT SERVICES

Introduction

In the Yukon Territory, government technical and financial assistance to the exploration and mining industry are administered through three programs. These are: Northern Affairs Program, Indian and Northern Affairs Canada; Department of Economic Development, Government of Yukon; and the Canada/Yukon Mineral Development Agreement. Each organization provides complementary services which together aim to provide a comprehensive geoscience data base, and technical and financial support. Further assistance and information on mining and exploration in the Yukon can be obtained at the following addresses.

1. **Mineral Resources Directorate, Northern Affairs Program**
   #345-300 Main Street
   Whitehorse, Yukon Y1A 2B5
   a) **Exploration and Geological Services Division**
      (403) 667-3200 (T.J. Bremner, Chief Geologist)
      (403) 667-3201 (Geoscience Information and Sales)
      (403) 667-3198 (FAX)
   b) **Mineral Development Division**
      (403) 667-3153 (A. Waroway, Regional Manager)
      (403) 667-3193 (FAX)
   c) **Mineral Rights Division**
      (403) 667-3260 (R. Ronaghan, Regional Manager)
      (403) 667-3193 (FAX)

2. **Department of Economic Development**
   Mailing Address:
   Department of Economic Development
   Government of Yukon
   Box 2703
   Whitehorse, Yukon
   Y1A 2C6
   Street Address:
   a) **Mining Facilitator:**
      #400 - 211 Main Street
      (403) 667-3422 (J. Duke, Mining Facilitator)
      (403) 667-8601 (FAX)
   b) **Mineral Resources Program and Canada/Yukon Geoscience Office**
      2099 Second Avenue
      (403) 667-5384 (R. Hill, Manager)
      (403) 667-8520 (J. Kowalchuk, MDA Coordinator)
      (403) 667-8516 (D. Murphy, Senior Project Geologist
      (403) 667-7074 (FAX)

Exploration and Geological Services Division (EGSD), Government of Canada

Exploration and Geological Services Division (EGSD) is part of the Mineral Resources Directorate, Northern Affairs Program, Indian and Northern Affairs Canada. The Mineral Resources Directorate is responsible for administration of mineral rights through the Yukon Quartz Mining and Placer Mining Acts. The primary role of EGSD is to accumulate and disseminate geological information, and provide related services that assist the exploration, development, and management of mineral resources in Yukon. Functions include detailed studies of mineral deposits and their geological setting, monitoring and reporting industry activities, and approval of technical reports for assessment credit. EGSD also maintains a core library and a Geoscience Information Sales Outlet. Indian and Northern Affairs Canada maintains a library with a collection of geological texts and journals which is open to the public.

Staff activities

Present staff include Trevor Bremner (Chief Geologist), Grant Abbott (Senior Geologist), Diane Emond and Hugh Copland (Environmental Geologists), Julie Hunt (Mineral Deposits Geologist), Bill LeBarge (Placer Geologist), Mike Burke (Staff Geologist), Rob Deklerk (Minfile Geologist) and Ali Wagner (Office Manager).

Trevor Bremner, Chief Geologist, is currently involved with planning government geoscience programs in Yukon. Grant Abbott is currently seconded to the MDA Geoscience office as scientific advisor. Diane Emond and Hugh Copland provide technical assistance to the Regional Environmental Review Committee, carry out geoscientific environment-related studies and are compiling a database of baseline information on surficial processes which can assist with the preparation of permit applications. Julie Hunt is currently beginning a 3 year regional study of mineral deposits in the Finlayson Lake volcanogenic massive sulphide camp. Mike Burke is responsible for approving quartz assessment reports, visiting active mining properties in Yukon, and compiling the annual Yukon Mining and Exploration Overview. Bill LeBarge is responsible for visiting placer mining properties, compiling information for the Yukon Placer Minfile, and approving placer assessment reports in Yukon. He is also currently engaged in a placer potential study of the Mayo area. Robert Deklerk compiles information on Yukon mineral occurrences and maintains the Yukon Minfile database. He is also responsible for the H.S. Bostock Core Library.

Publications

EGSD publishes and sells its own technical reports and those produced by the Canada/Yukon Mineral Development Agreement. Major products include this volume, and YUKON MINFILE, a database containing information on mineral occurrences in the Yukon. Yukon Exploration and Geology is published annually in late January or early February. YUKON MINFILE is updated annually and released in late spring. A recent addition is the Geological Processes Inventory (GPI) which includes a comprehensive database and set of maps covering terrain hazards, surficial geology, permafrost distribution, and seismic activity. This database is useful in providing baseline information for environmental reviews. Yukon Placer Minfile, a compilation of data on Quaternary geology and placer deposits, is under construction. From time to time EGSD also publish bulletins on geological studies undertaken by staff and colleagues. A complete publication list is available on request.

YUKON MINFILE is currently available in three formats: (1)hard copy (2)on diskettes as a set of word processor text files (3)as a database modelled on B.C.'s Minfile. Occurrence locations are recorded on 38 hard copy maps which cover all of Yukon, mostly at a scale of 1:250 000.

Geoscience Information and Sales

EGSD sells geological (surficial and bedrock) maps produced by EGSD and the Canada/Yukon Mineral Development Agreement.

Library

Northern Affairs Library Services maintains a collection of geological texts and journals along with material for other departments in Indian and Northern Affairs Canada. The public is welcome to use these facilities.

H.S. Bostock Core Library

The H.S. Bostock Core Library houses approximately 120,000 metres of diamond drill core from 179 Yukon properties. The facility is located across the street from the former Northern Affairs building at 200 Range Road. The core is stored in its original boxes, with no sample reduction. Confidentiality is maintained on the same basis as mineral claim assessment reports; a letter of release from the company owning the property must accompany a request to view confidential core. Status of specific core can be checked and arrangements to view or submit new core can be made by contacting the core librarian at 667-3205. Diamond saws, a core splitter and microscopes are available for use in heated examination rooms. Renovations to improve the core logging, sampling and the viewing area as well as the laboratory facilities will be completed by the spring of 1996.

Department of Economic Development, Government of Yukon

The Mining Facilitator is a senior management-level position designed to be the primary point of contact between exploration and mining companies and the Yukon Government. Jesse Duke assists companies with all aspects of the regulatory regime and with all Yukon Government programs and services.

The Mineral Resources Program is part of the Energy & Mines Branch, whose primary objective is to encourage the development of Yukon's mineral and energy resources. Services are provided in four main areas: Mining Programs, Mineral Policy, Mineral Assessments, and the Canada/Yukon Mineral Development Agreement (MDA). The Yukon Mining Incentive Program (YMIP) provides contributions for prospecting and mineral exploration in Yukon. The Energy Infrastructure Loans for Resource Development Program (EILRDP) provides loans for the development of energy infrastructure required by resource development projects. The staff strives to increase public knowledge of the mining industry, and are available to advise companies and individuals on the relevant legislation and support programs for the industry.

Rod Hill manages the Mineral Resources unit and the Canada/Yukon Geoscience Office, prepares briefings, and undertakes special projects at the request of the Minister or Deputy Minister. Shirley Abercrombie conducts mineral policy research projects relating to federal and territorial legislation and policies, and conducts economic and financial reviews of mining projects. Karen Pelletier administers the YMIP program and provides advice to individuals and companies on relevant legislation and other government programs. Danièle Héon conducts mineral resource assessments for areas under consideration as territorial parks, and is currently working on a project in the Eagle Plains region.

Yukon Mining Incentives Program

The Yukon Mining Incentives Program (YMIP) is designed to promote and enhance mineral prospecting, exploration and development activities in the Yukon. The program's function is to provide a portion of the risk capital required to locate and explore mineral deposits. Grassroots programs (Prospecting and Grubstake categories) are conducted on open ground (crown land) and Target Evaluation programs are conducted on newly-discovered prospects and targets covered by mineral claims, placer prospecting leases and claims, and coal licenses and leases. Technical assistance is offered to prospectors upon request.

Program funding for 1995/96 was $720,000. The number of grants approved in each category includes 27 in the Grassroots programs and 32 in the Target Evaluation Program. Approximately 29% of the total funding was allocated to placer gold exploration projects.

Energy Infrastructure Loans for Resource Development Program

This program assists the resource development sector in Yukon by helping to defer the capital cost of building energy infrastructure. The program provides loans to companies to help them create electrical infrastructure to meet their energy needs. So far in 95/96 no projects have been approved under this program.

Canada/Yukon Mineral Development Agreement

The Canada/Yukon Mineral Development Agreement (MDA) is funded (70% Federal; 30% Territorial) under the 1991-1996 Canada/Yukon Economic Development Agreement (EDA). The MDA includes three elements; 1)Geoscience, 2)Technology, and 3)Information. The Energy and Mines Branch, Department of Economic Development, Government of Yukon administers the agreement, and Northern Affairs Program has scientific authority. The Agreement is managed by a committee which includes representatives of Indian and Northern Affairs Canada, the Mining Sector of Natural Resources Canada, Government of Yukon, and the Yukon Chamber of Mines. Project proposals are also considered under all elements. Inquiries should be directed to the MDA Coordinator c/o the Canada/Yukon Geoscience Office. The EDA terminates on March 31, 1996, but DIAND and YTG have agreed to continue the geoscientific research component through a 50-50 cost-shared arrangement.

1. Geoscience Element

The long term objective of the Geoscience Element is to promote active and successful hardrock and placer exploration industries by accelerating the development of a comprehensive, modern geoscience information base. The main components of the program are bedrock geological mapping at 1:250,000 and 1;50,000 scales in more economically significant areas of the Yukon, placer deposit mapping, and regional geophysical and geochemical surveys.

Canada/Yukon Geoscience Office

The Canada/Yukon Geoscience office has been established in order to develop locally-based expertise in the regional geological setting of Yukon mineral deposits. The project manager is Rod Hill and the scientific authority is Grant Abbott. Geoscience Office staff includes Don Murphy (Senior Geologist), Ted Fuller (Placer Geologist), Craig Hart (Project Geologist), Steven Johnston (Project Geologist), John Kowalchuk (MDA Coordinator), Will van Randen (Draftsperson), and Dianne Carruthers (Administrative Assistant). Charlie Roots from the Geological Survey of Canada, and Grant Abbott from Exploration and Geological Services Division, Northern Affairs Program are being supported by the Geoscience Office. In 1995, field work was limited to field checks in previously mapped areas, and the geologists spent most of the year compiling data, refining maps and writing final reports summarizing four years of field work. Seasonal geological assistance was provided by Diane Brent and Jay Timmerman. Comprehensive project final reports and maps for most of the projects will be published as EGSD Bulletins in the spring of 1996. The areas to be discussed in these bulletins are shown on Figure 1 and cover the following:

a) C. Hart in the Whitehorse trough north of Whitehorse (105D/13,14,15 and 16).
b) S. Johnston in the Ruby Range near Aishihik Lake (115H/6,7). With the aid of data from airborne spectrometric surveys flown in 1993, and 1994 in the Dawson Range northwest of Carmacks Stephen is compiling and reinterpreting the geology of six sheets (115J/9,10 and 115I/3,5,6 and 12) at 1:100,000 scale.
c) D. Murphy in western Selwyn Basin along the North McQuesten River (115P/14,15,16 and 105M/13,14).
d) E. Fuller with D. Brent and Jay Timmerman in unglaciated surficial deposits, primarily high level terraces along the Yukon and Sixtymile River valleys (115O/5,12; 115N/9).
e) C. Roots in the Mayo map sheet, Selwyn Basin (105M)
f) G. Abbott along the boundary between Mackenzie Platform and Selwyn Basin in the eastern Ogilvie Mountains (116A/13,14)

Regional Surveys

Regional geochemical and geophysical surveys (Fig. 2) are conducted by the Geological Survey of Canada. A regional geochemical survey (RGS) was completed over the east half of the Watson Lake Sheet (105 A) and the Yukon portions of the Coal River (95 D) and Flat River (95 E) sheets. This information will be released in the summer of 1996.

Other Geoscience Programs

Several other research proposals were also funded under the Geoscience Element. Three projects nearing completion are: (1) Surficial mapping of the Dawson Area, under the supervision of Dr. Alejandra Duc-Rodkin of the Geological Survey of Canada; (2) A pegmatite study by Dr. Lee Groat of University of British Columbia; and (3) A geological compilation of the Western Yukon Tanana Terrane by Dr. Jim Mortensen of the University of British Columbia.

2. Technology Element

The objective of the Technology Element is to increase the efficiency of Yukon placer and hardrock mining operations, and to reduce or mitigate environmental impacts by encouraging innovative exploration, mining and processing technology. A technical report suitable for publication completes each project. Ongoing projects are: (1) Moss Mat Orientation study by MacKay, Falkiner and Associates; (2) Metal Sulphide Recovery Test of UKHM Tailings, by United Keno Hill Mines Ltd. and (3) Effluent Diffuser Study, by Forty Mile Placers.

3. Information Element

The objective of the Information Element is to communicate information about the mining industry to Yukon residents and to encourage businesses to take advantage of economic opportunities in the industry. Programs approved and operated under the information element include: (1) Curriculum Development - submitted and administered by the Yukon Chamber of Mines, and directed by the Department of Education, CYI and the Yukon Teacher's Association; (2) Yukon Gold Legacy Exhibit, by McBride Museum); (3) Yukon Minex CD-ROM, by the Yukon Chamber of Mines; and (4) Dawson City Gold Show Technical Seminar, by the Dawson City Gold Show Committee.

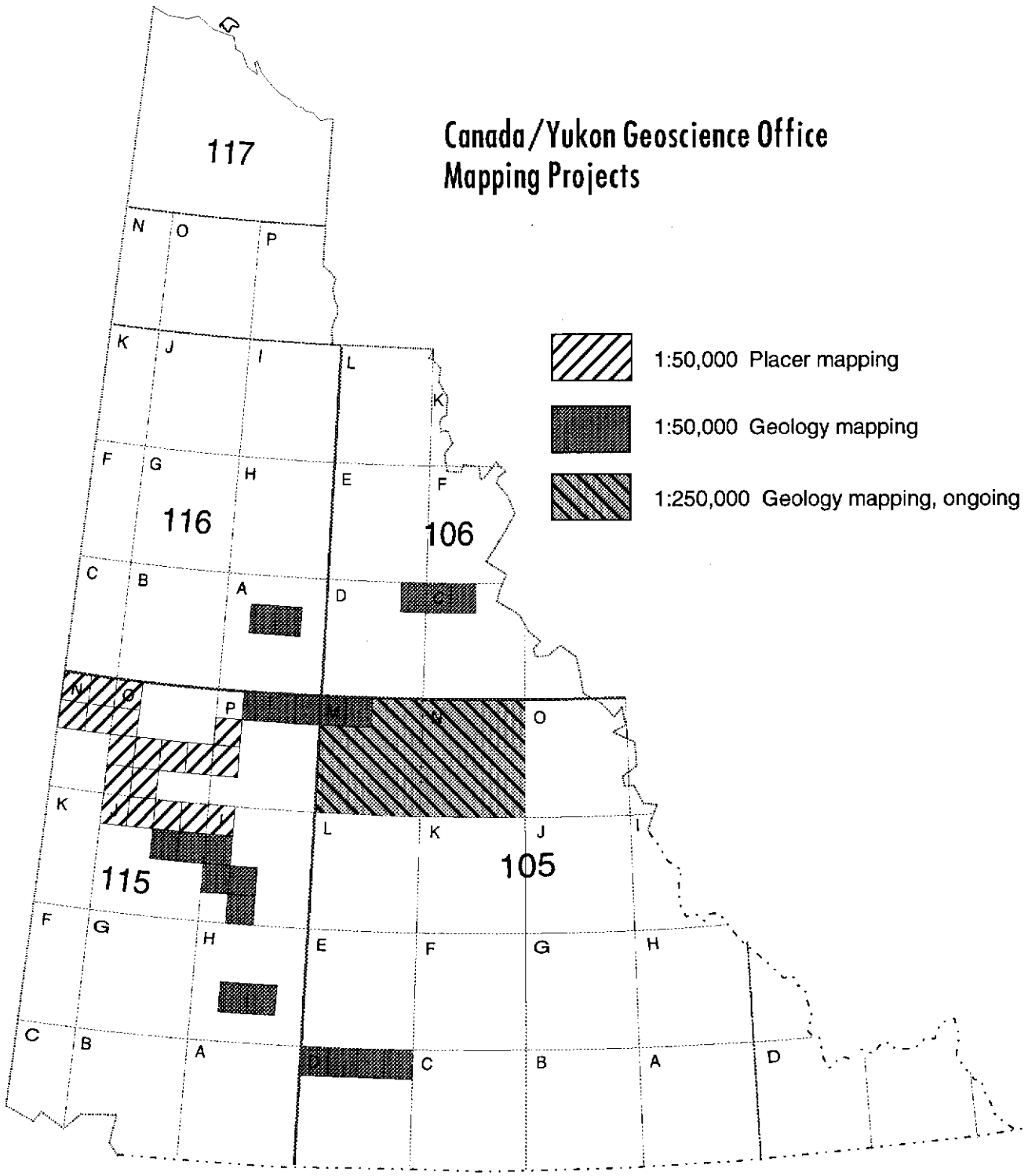

Figure 1: Canada/Yukon Geoscience Office Mapping Projects

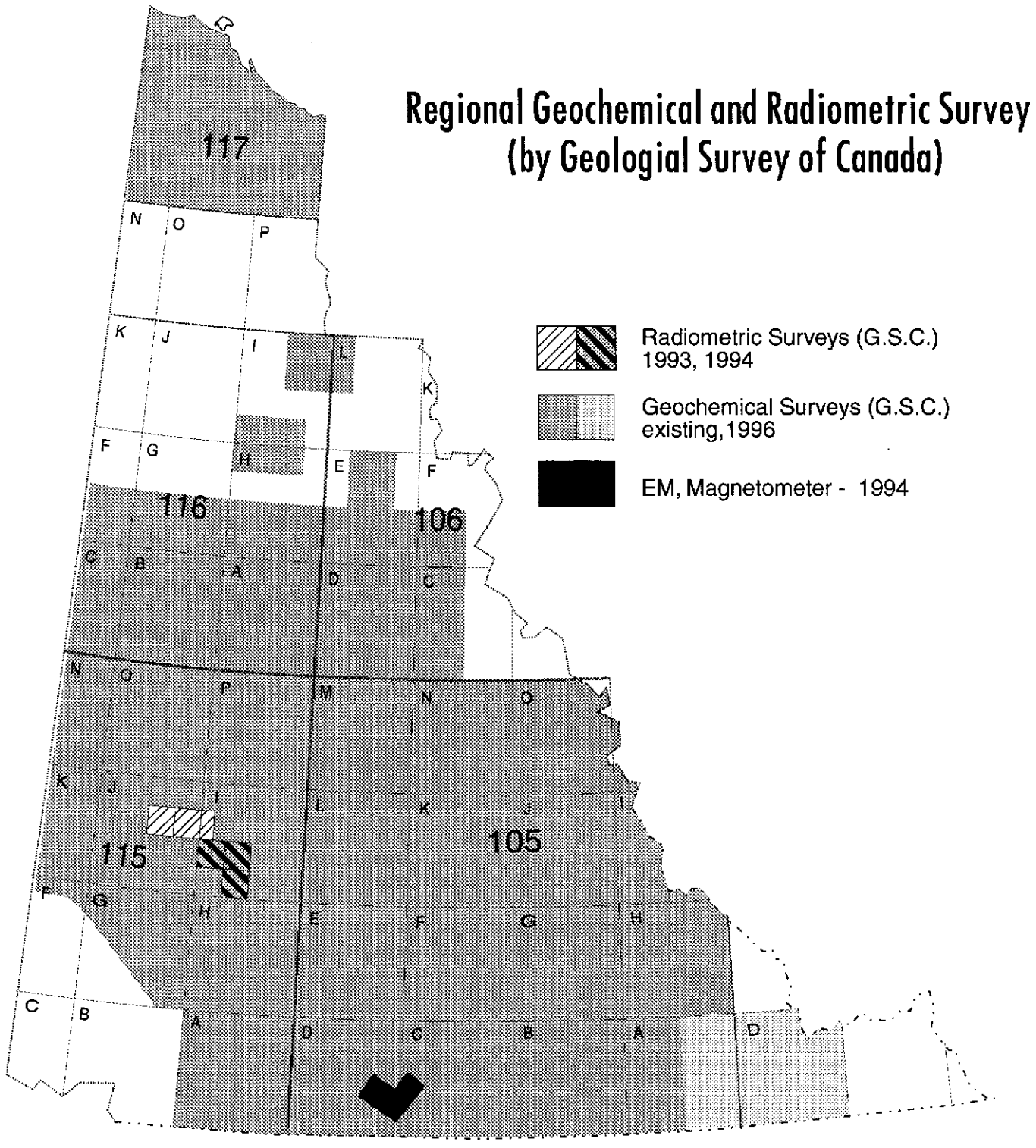

Figure 2: Areas in Yukon covered by government by regional geochemical and geophysical surveys.

PART C

GEOLOGICAL DESCRIPTIONS OF SELECTED PROPERTIES

SUMMARY OF THE KUDZ ZE KAYAH PROJECT, VOLCANIC HOSTED MASSIVE SULPHIDE DEPOSIT, YUKON TERRITORY

H. Chris Schultze
Cominco Ltd
Vancouver, British Columbia

Schultze, H.C., 1996. Summary of the Kudz Ze Kayah Project, Volcanic Hosted Massive Sulphide Deposit, Yukon Territory. In: Yukon Exploration and Geology, 1995, Exploration and Geological Services Division, Yukon, Indian and Northern Affairs Canada, p.29-32

Introduction

The ABM polymetallic Volcanic Hosted Massive Sulphide (VHMS) deposit (Minfile #105G-117) is located within the Pelly Mountains of southeast Yukon at 61°28'N, 130°36W, approximately 200 kilometers northwest of Watson Lake, Y.T. The claims comprising the Kudz Ze Kayah project are owned 100% by Cominco Ltd. The deposit underlies the Tag 17, 18, 22 and 23 claims.

History

The Tag claims were staked by Cominco in August, 1993 after an EM feature was identified in an area with high soil geochemistry, polymetallic sulphide float, and felsic volcanic rocks. The geophysical feature was drill tested April 20, 1994 resulting in the discovery of the ABM polymetallic VHMS deposit. By year's end a geological resource of 13 mt of 5.5% Zn, 1% Cu, 1.3% Pb, 125 g/t Ag, and 1.2 g/t Au was defined, based on 8300m of drilling in 50 NQ diameter holes drilled on 100m and 50m centers.

Description

The ABM deposit lies in a belt of metamorphosed rocks referred to as the Yukon-Tanana Terrane. The deposit is a volcanic hosted massive sulphide body within a thick complex of felsic tuffs and sills or flows interlayered with minor mafic sills or flows and sedimentary rocks. A subhorizontal to moderately north dipping, penetrative schistosity affects the deposit and the rocks which host it. Units exhibit isoclinal, recumbent folding with bedding generally paralleling schistosity. As a result of folding the ABM deposit itself, at least in part, is overturned. Evidence for overturning includes base and precious metal and barium zonation within the deposit, the position of proximal chloritic alteration above portions of the deposit and lithogeochemical signatures which suggest a petrogenetic link between units hosting the deposit and those overlying them.

The deposit subcrops beneath 2 to 20m of glacial overburden. It measures roughly 700 m east-west and extends as much as 400 m downdip. Over much of its areal extent, the deposit is sheetlike and forms a main, single layer; in the southwest part, two main layers of sulphides merge locally into a single thick zone. The sulphide sheets range in thickness from less than 2m to 39 m. The southeast part of the deposit has been down-dropped about 150 m by a fault which dips at 70 to 75 degrees towards 150 degrees. Geophysical data suggest that the down-dropped part of the ABM deposit is small but exploration drilling is incomplete in this area.

Current Work and Results

In 1995 an aggressive exploration schedule was undertaken, resulting in the completion of a feasibility study by year-end. All season access was created to the work site, the upper half of the deposit was drilled off on 25 m sections and the lower half on 50 m sections, mine permitting procedures were initiated along with environmental baseline work, a 40 tonne bulk sample was collected, and site engineering, and geotechnical investigations were carried out. In total 118 NQ diameter drill holes totalling 14,581 m were drilled in 1995. An open pit mineable ore reserve of 11 million tonnes grading 5.9% Zn, 0.9% Cu, 1.5% Pb, 130 grams of Ag per tonne, and 1.3 grams of Au per tonne has been estimated.

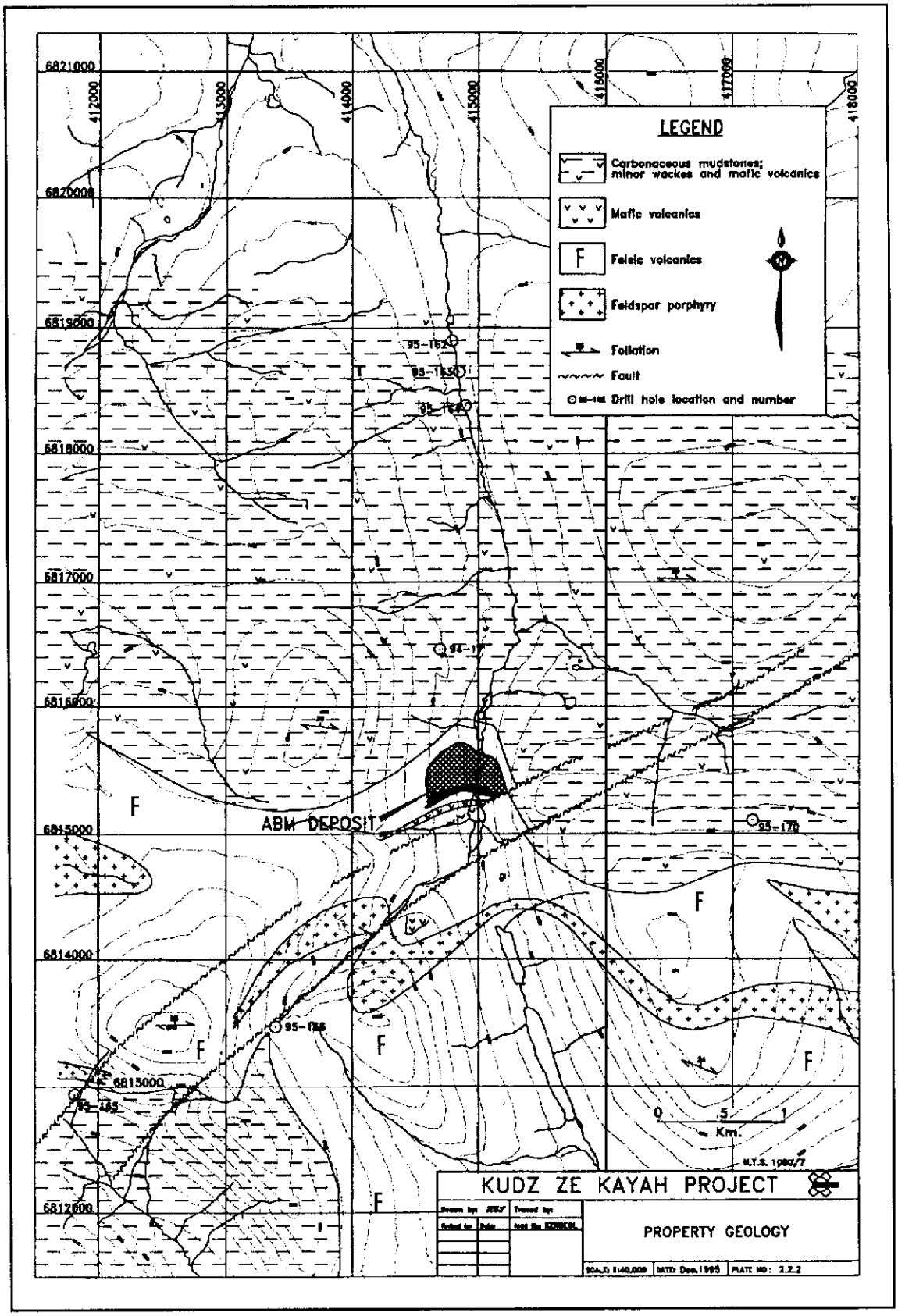

Figure 1: Kudz Ze Kayah Project, Property Geology

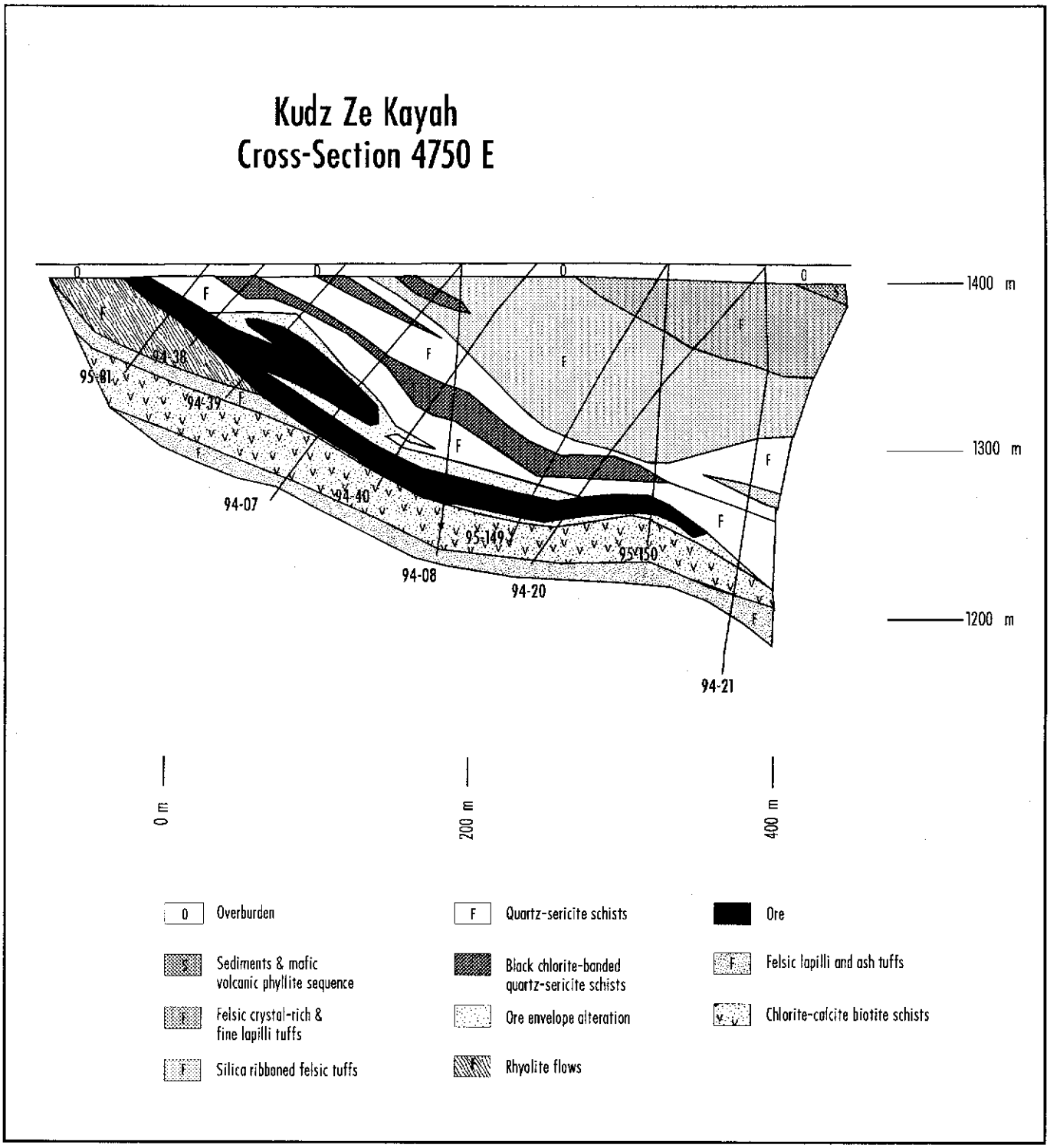

Figure 2: Kudz ze Kayah Cross Section 4750 E

SUMMARY INFORMATION ON THE DUBLIN GULCH PROJECT, YUKON TERRITORY

Hans Smit, Mike Sieb and Christine Swanson
First Dynasty Mines Ltd.

Smit, H., Sieb, M., and Swanson, C., Summary Information on the Dublin Gulch Project, Yukon Territory. In: Yukon Exploration and Geology, 1995, Exploration and Geological Services Division, Yukon, Indian and Northern Affairs Canada. p. 33-36

INTRODUCTION

The Dublin Gulch project (Minfile 106D 025) is an advanced exploration project on an intrusive-hosted gold deposit located near Mayo, Yukon (Fig. 1). In many respects the Dublin Gulch deposit closely resembles the 3.6 million ounce Fort Knox gold deposit near Fairbanks, Alaska. The project is 100% owned by First Dynasty Mines Ltd, a Yukon incorporated resource development company based in Denver. The company is currently completing a pre-feasibility and Initial Environmental Evaluation (IEE) on the property, with a target date of 1997 for production.

Favourable characteristics of the project include a large resource base in the Eagle zone, with potential for expansion; excellent exploration potential elsewhere on the property; good road access; low sulphide, non-acid generating ore which is amenable to heap leaching; and very low concentrations of environmentally hazardous elements.

HISTORY

Gold was first discovered in this area in 1895, and placer mining has continued to the present day. However, there has been no significant hard rock mineral production from this area to date.

The first lode claims were staked in 1901, and a 14 m adit was driven by 1904. By 1912, development work had been done on five separate properties. The property was subsequently acquired by Treadwell Yukon Ltd in 1938, Keno Hill Mining Co. Ltd in 1946, Peso Silver Mines Ltd in 1962, and Queenstake Resources Ltd and Canada Tungsten Mining Corp. in 1978. The latter conducted extensive mapping, geochemical and geophysical surveys and some backhoe trenching between 1978 and 1981. Queenstake drilled 4 holes (705 m) in 1986, and optioned the property to Can Pro Developments Ltd. Can Pro carried out more drilling in 1988, and trenched in 1989.

Following delineation of the Fort Knox deposit in Alaska, H-6000 Holdings Ltd optioned the property in 1991 in a joint venture with Fairbanks Gold Corp., which was by then a wholly owned subsidiary of Amax. Subsequent work entailed outlining the potential of the Dublin Gulch Stock to contain an intrusive hosted, bulk mineable, deposit. This included more mapping, geochemistry, geophysics and 16 diamond drillholes totalling 2500 m. Four mineralized zones were identified: the Eagle, Olive, Shamrock and Steiner zones.

In 1992 Amax drilled 46 RC holes totalling 5,651 m and conducted extensive sampling, mapping, and property evaluation. Late in 1992 Amax decided not to renew the option agreement and the property was returned to Ivanhoe Goldfields, formerly H-6000 Holdings. 1993 saw Ivanhoe drill 10 RC holes totaling 2,078 m. An inferred and potential resource of 98.6 million tonnes grading 1.19 g/T Au was calculated for the Eagle Zone.

In February 1994, Starmin Mining Inc. performed a reverse takeover of Ivanhoe acquiring the Dublin Gulch property in the process. Starmin changed its name to First Dynasty Mines Ltd. in August 1994 and undertook a major exploration program in 1995 focusing on the Eagle Zone.

GEOLOGY

The project area is underlain by Upper Proterozoic to Mississippian clastic rocks of the Selwyn Basin, principally grit and quartzite of the Late Paleozoic-Early Cambrian Hyland Group. These rocks have been deformed by Early Cretaceous thrust faulting and by later regional-scale open folds. Subsequent to this deformation, the clastic rocks were intruded by granitic rocks of the Tombstone Suite.

Alteration and mineralization on the property is related to the Dublin Gulch Stock, a medium grained phaneritic granodiorite body dated at 92.8 ±0.5 Ma (Fig. 2,3). The stock outcrops over an area 5.5 x 2.0 km and is elongated in the direction 070°. A contact aureole of andalusite and biotite hornfels is developed around the intrusion. Skarns are locally developed in calcareous beds. A pervasive fabric related to the Cretaceous thrust faulting event is still visible.

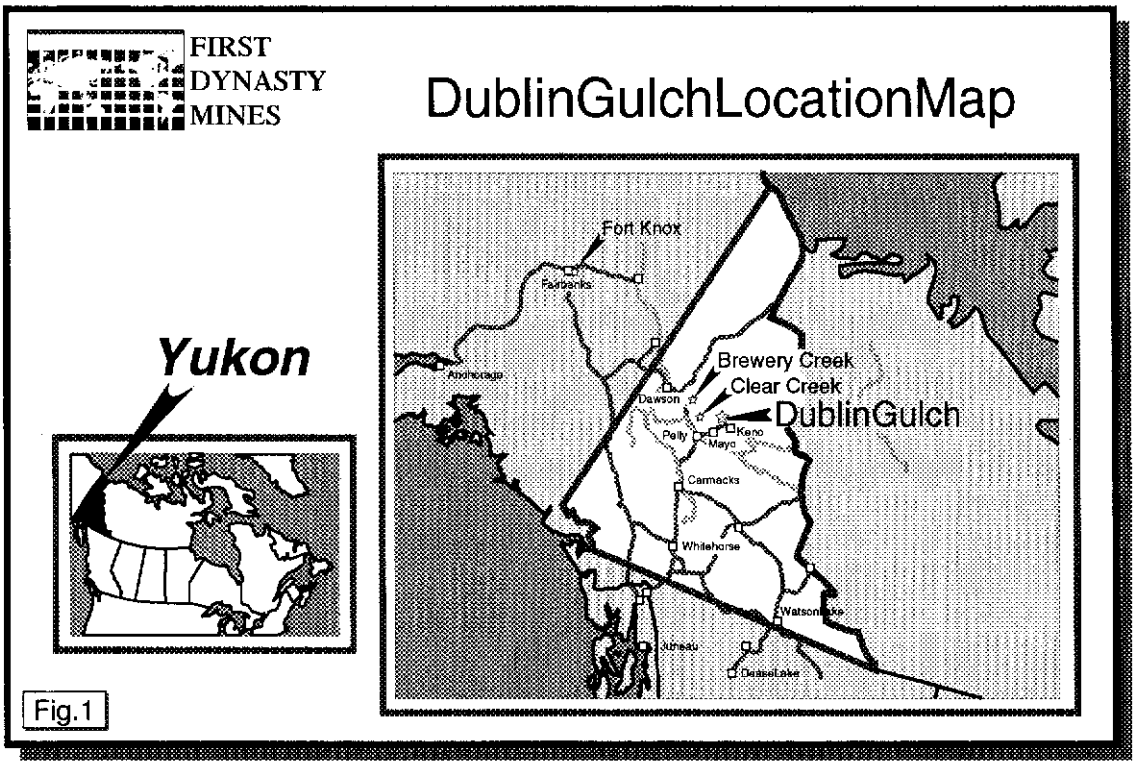

Figure 1: Dublin Gulch Location Map

MINERALIZATION

The following types of mineralization are associated with the Dublin Gulch stock:

- Sheeted, low-sulphide quartz veins cutting granodiorite along the north side of the intrusion. As in the Fort Knox deposit (Alaska), these veins contain gold and bismuth.
- Zones of pyroxene-scheelite skarn, notably the Mar tungsten deposit (Minfile 106D 027) on the southeast side of the stock. This deposit contains an estimated resource of 5.4 million tonnes grading 0.82% WO_3.
- Structurally controlled, auriferous quartz-arsenopyrite veins cutting both the intrusion and the surrounding hornfels. These veins are particularly abundant near the northern margin of the stock.
- Cassiterite in a tourmalinized breccia zone located on Tin Dome (Minfile 106D 024), north of Dublin Gulch.
- Argentiferous quartz-sulphide veins, located distal to but on trend with the stock (e.g. Peso and Rex veins (Minfile 106D 021).

In the Eagle Zone, sheeted quartz veins occur predominantly in the intrusion and only locally extend into the metasedimentary rocks. Veins are commonly 0.5-1.0cm wide, and are oriented with a strike of 065° to 080° and a dip of 60° to 85° to the southeast.

Alteration and mineralization are directly linked to the intrusion and therefore changed character over time as the magma cooled. Transition from magmatic fluids in equilibrium with the host stock to hydrothermal fluids no longer in equilibrium resulted in increased alteration, a corresponding increase in sulphide mineralization and a decrease in gold deposition.

The earliest mineralization consists of veins of albite +/- K feldspar +/- quartz, which fill fractures and impregnate the wallrock. These veins are not associated with any wallrock fabric, and they either lack alteration envelopes or have narrow feldspar +/- sericite selvages. They contain gold and bismuth and have a low sulphide content.

After feldspathic alteration assemblages ceased to be stable, a quartz-sericite-carbonate alteration assemblage became predominant. The earlier veins grade into veins with distinct sericite selvages, a lower gold and bismuth content, a more abundant but still low sulphide content (arsenopyrite, pyrite-pyrrhotite), and narrow zones of deformation occur along the selvages.

Further cooling resulted in veins with wide zones of sericite alteration, very little gold deposition and up to 1% sulphide in the wallrock. Brittle deformation and narrow ductile zones prevailed.

Clay zones in the deposit are mainly localized along zones of deformation and are inferred to result from surficial weathering rather than from the passage of hydrothermal fluids.

Gold occurs as native gold liberated in the gangue or associated with bismuth minerals. Grains are relatively large, with an average size of 120-150 microns. Lesser amounts of gold are encapsulated in arsenopyrite. Although individual veins grade from 10 to 30 g/T Au, a typical 1.5 m sample interval which includes both the vein and granodiorite host rock ranges from 0.8 to 2.0 g/T in the ore zone. Silver values are generally lower than gold values.

CURRENT WORK

First Dynasty spent $U.S. 3.2 million on the Dublin Gulch project in 1995. Work included 14 000 m of reverse circulation and diamond drilling, with a goal of outlining 30-40 million tonnes of mineable reserve centred within the larger Eagle Zone. Engineering, economic, environmental and social aspects of the project were studied, to enable the completion of pre-feasibility and Initial Environmental Evaluation (IEE) reports by January, 1996.

Current plans include a 20 000 to 25 000 tonne/day open pit mine with an approximate 1:1 ore to waste stripping ratio, coupled with a cyanide heap leach extraction process. Recovery rates are expected to be quite high due to the high percentage of free gold, gold situated along the boundaries of other minerals, and in relatively weak veins.

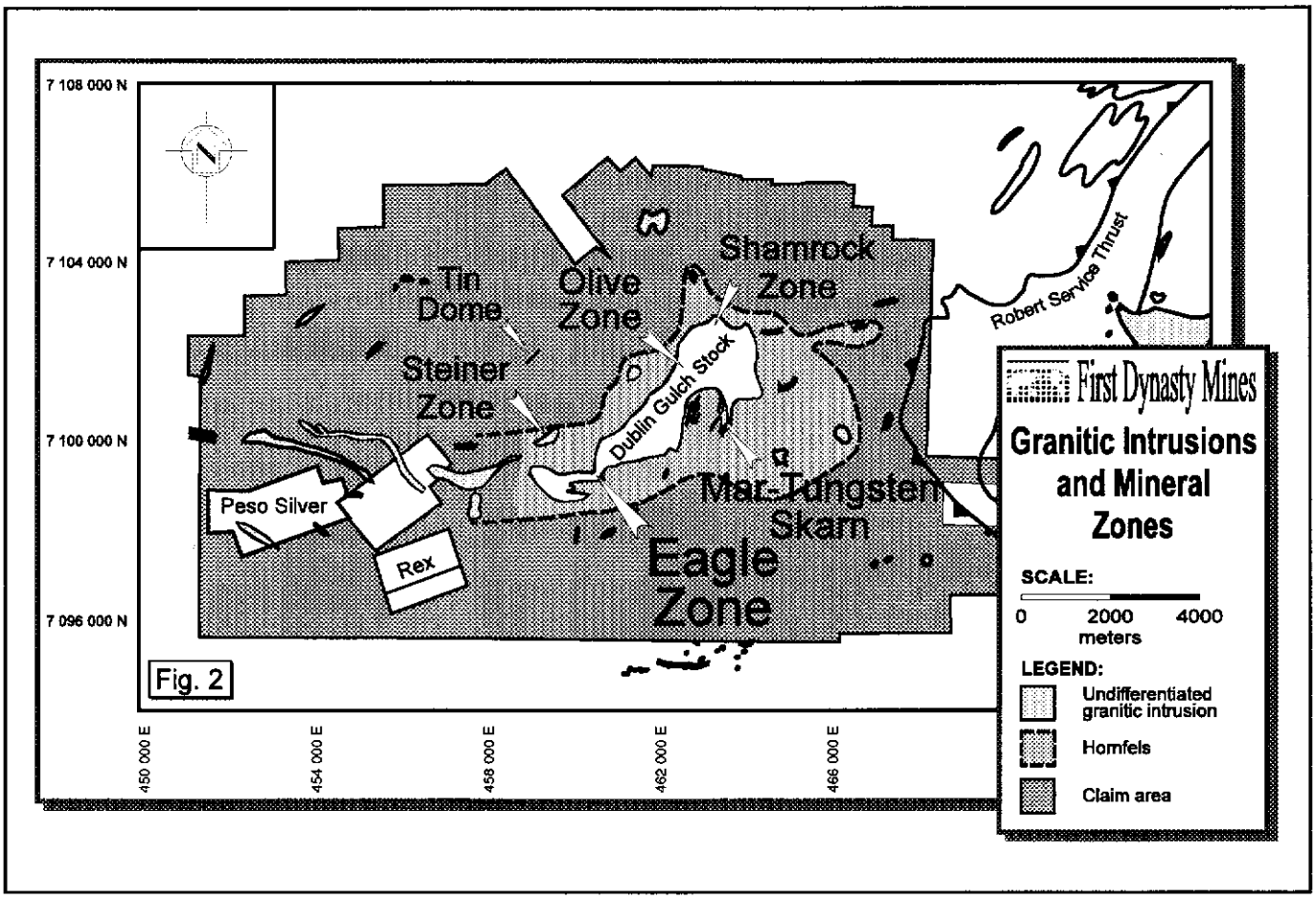

Figure 2: Granitic Intrusions and Mineral Zones

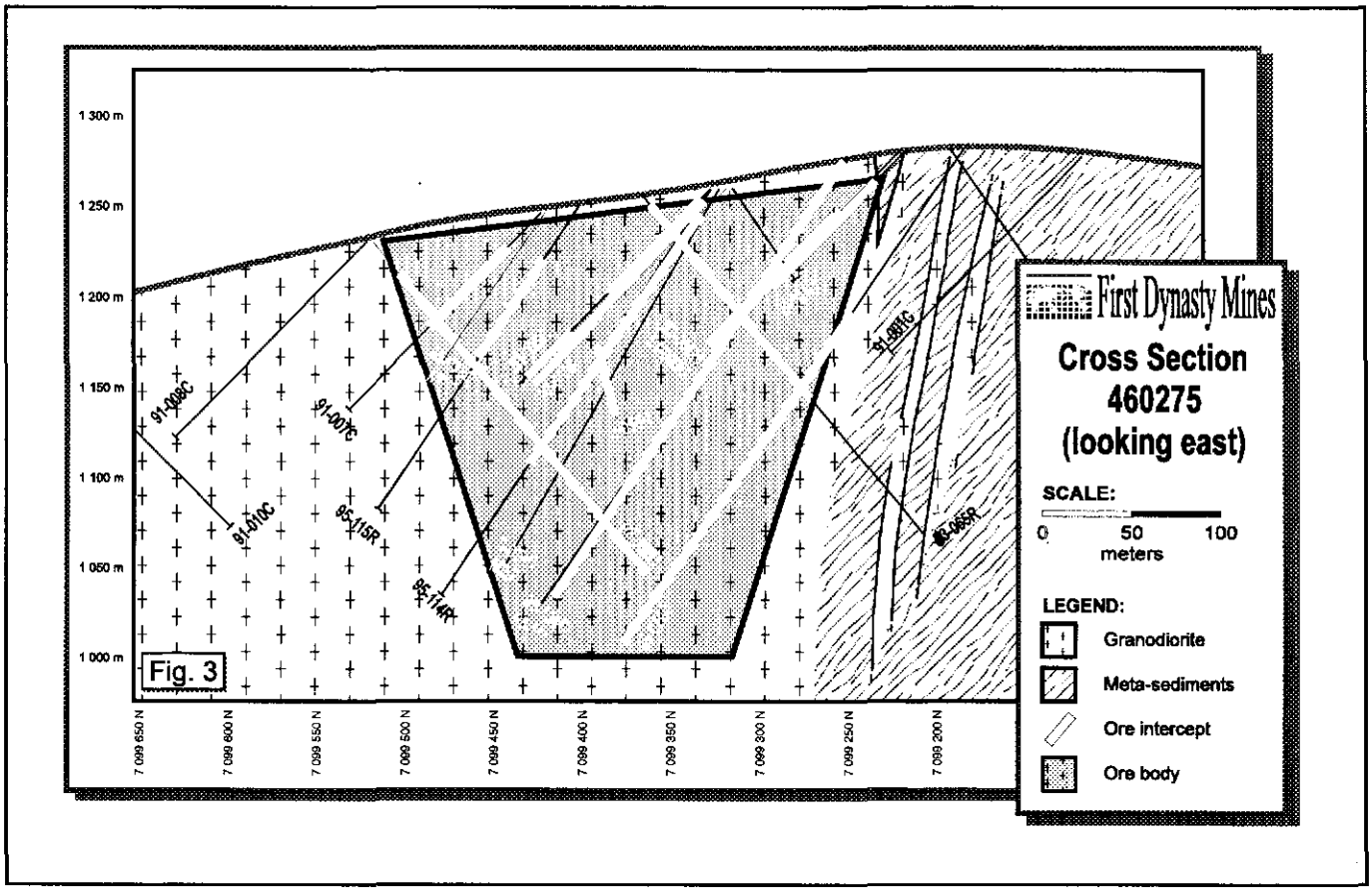

Figure 3: Dublin Gulch cross section 460275 E

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QUEENSTAKE RESOURCES LTD, May/92. *Assessment Report #093028 (drill logs) by C. Orssich et al.*

GEOLOGY OF THE DIVISION MOUNTAIN COAL DEPOSIT OF CASH RESOURCES LTD.

R.C. Carne and R.F. Gish
Archer, Cathro & Associates (1981) Limited
Vancouver, B.C.

Carne, R.C. and Gish, R.F., 1996. Geology of the Division Mountain Coal Deposit of Cash Resources Ltd. In: Yukon Exploration and Geology, 1995, Exploration and Geological Services Division, Yukon, Indian and Northern Affairs Canada, p. 37-42

SUMMARY

The Division Mountain coal deposit is located 90 km north-northwest of Whitehorse, Yukon Territory. Access is by a 31 km four-wheel drive road leaving the Klondike Highway at Braeburn. The main area of exploration interest lies 20 km west of the Klondike Highway and the Yukon Energy Corporation electrical transmission grid which follows the highway.

Territorial Coal Exploration Licences encompassing the Division Mountain area were acquired by Cash Resources Ltd. in October 1992. Exploration during the two year period between June 1993 and June 1995 consisted of geophysical surveys, excavator trenching and diamond drilling totalling 7845 m in 48 holes.

Exploration at Division Mountain has been directed toward outlining sufficient open pittable thermal coal reserves for a mine-mouth power plant. Drill indicated, undiluted mineable reserves now total 31.7 million tonnes of High Volatile Bituminous "B" coal with a strip ratio of 3.36 bank m^3/tonne. A further 13.3 million tonnes of geological reserves with a similar strip ratio have been outlined by wide spaced drilling for a total open pittable coal inventory of 45 million tonnes. This could represent over 200 years of reserves for forty megawatts of mine-mouth power generation. The deposit is open to extension down dip and along strike in both directions and there are several untested high potential targets located nearby on the property.

Results of Proximate Analysis and washability tests suggest that a high quality export thermal coal product can readily be produced with 4.4% total moisture, 9.9% ash, 30.1% volatile matter, 57.4% fixed carbon, 0.52% sulphur and a calorific value of 7019 cal/g (12,530 Btu/lb). These values meet or exceed specifications for the rapidly expanding Pacific Rim markets.

LOCATION

The Division Mountain area is located on NTS map sheet 115H/8, 90 km north-northwest of Whitehorse and 275 km from tidewater at Skagway, Alaska (Figure 1). The Whitehorse-Aishihik-Faro electrical transmission line lies along the Klondike Highway, 20 km east of the main area of coal reserves. Access is by 85 km of paved highway from Whitehorse to Braeburn and a 31 km all-season four-wheel drive road from Braeburn.

EXPLORATION HISTORY

In 1907 D. Cairnes of the Geological Survey of Canada mapped and sampled three coal seams in Teslin Creek canyon, 2 km north of Division Mountain. An additional coal occurrence was located by Cairnes near the base of Red Ridge approximately 5 km northwest of the Teslin Creek showings.

No exploration was carried out until 1970 when Arjay Kirker Resources Ltd. excavated seven bulldozer pits near the Teslin Creek coal outcrop. Eight seams were exposed ranging in thickness from 0.6 to 4.4 m. A 1047 m, six hole diamond drill program conducted in the Teslin Creek area by Arjay Kirker in 1972 outlined a geological reserve of 2.5 million tonnes.

In October 1992 Cash Resources Ltd. purchased Territorial Coal Exploration Licences enclosing the Division Mountain coal occurrences. During the 1993 field season 16 holes totalling 1810 m were completed to test the Teslin Creek area. This diamond drilling program defined four seams with an average raw coal aggregate thickness of 10 m over a 1 km strike length. Measured open pittable reserves were calculated at 2.6 million tonnes to a depth of 200 m, confirming the Arjay Kirker estimate. Hand trenching at Red Ridge 5 km to the north exposed a total thickness of 11.4 m of raw coal in three seams and demonstrated continuity of the coal measures.

An exploration program consisting of 5.2 km of excavator trenching and 6034 m of HQ-size diamond drilling in 32 holes was carried out during 1994 and 1995 to explore a 5 km long southeasterly extension of previously known coal-bearing strata along the limbs of a northerly-plunging syncline-anticline pair. This work was successful in discovering a new area of coal deposition with thicker seams than the Teslin Creek area and a dramatically lower strip ratio.

All coal drill intersections greater than 1 m thick were submitted for Proximate Analysis. Representative intersections of coal were composited for secondary tests

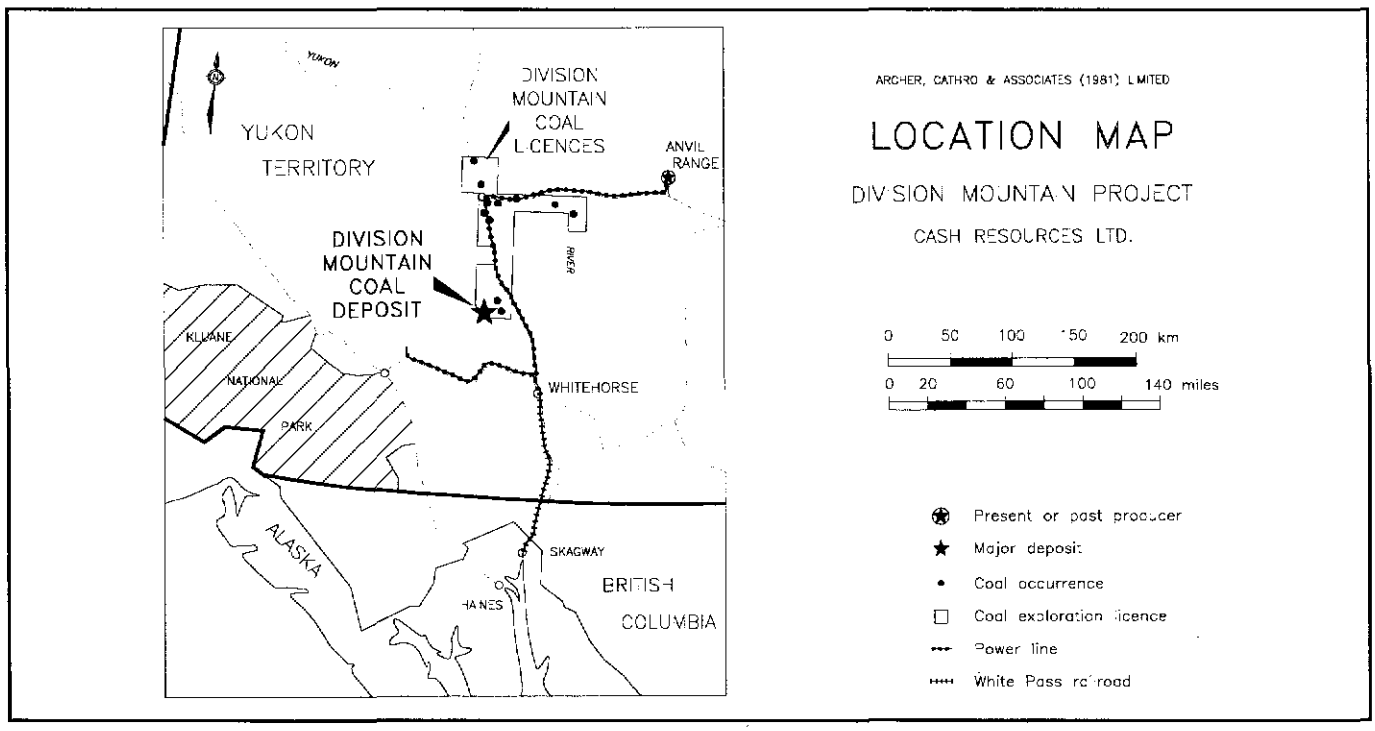

Figure 1: Location Map

such as grindability, washability, ash chemistry and Ultimate Analysis. Environmental surveys, including biological and botanical inventories and water quality assessment, were also carried out.

GEOMORPHOLOGY

Topography in the Division Mountain area is characterized by rolling hills and broad river valleys with local regions of moderate to steep relief along northerly-trending ridges. Elevations range between 670 and 1680 m. Most of the area is mantled by glacial till and outwash between 1 and 60 m thick. Permafrost is generally restricted to poorly drained areas of moderate to dense vegetation. Natural bedrock exposure is less than 5%, especially within the generally recessive coal measures.

GEOLOGICAL SETTING

The Division Mountain area lies within Whitehorse Trough, a northwest-trending fore-arc basin comprised of Mesozoic volcanic and sedimentary rocks. Bounded by the Omineca Crystalline Belt to the east and the Coast Plutonic Complex to the west, the Whitehorse Trough constitutes the northern end of the Intermontane Belt of the Canadian Cordillera. Descriptions of the geology of Whitehorse Trough, in general, and the Division Mountain area, in detail, are largely adapted from Dickie and Hein (1988), Dickie and Hein, (1992) and Dickie (1994).

During Late Triassic time an island arc assemblage consisting of a 7000 m thick succession of Lewes River Group aphyric to augite-phyric basaltic andesite flows, breccias and tuff, conglomerate, wacke, limestone and shale was deposited within Whitehorse Trough. Succeeding Jurassic basin-fill stratigraphy is more complex due to disconformities and hiatus in sedimentation and to diachronous or interfingering relationships in the shallow water and nearshore facies. In general, two sequences are present: Lower and Middle Jurassic conglomerate and sandstone turbidites of the marine to deltaic Laberge Group; and, Middle Jurassic to Cretaceous conglomerate, sandstone, mudstone and coal of the largely alluvial Tantalus Formation.

STRATIGRAPHY

Regional geology of the Division Mountain area is given on Figure 2. Detailed geology of the main area of exploration is shown on Figure 3.

The Laberge Group in the Division Mountain area is represented by the shallow marine Richthofen Formation and the fluvial-deltaic, coal-bearing Tanglefoot Formation. The lithologically distinctive Richthofen Formation serves as an easily recognizable base for the overlying coal measures. Brown weathering black mudstone, with wispy siltstone to fine sandstone laminae in the form of low amplitude cross-stratification, alternates with thick (>10 m) intervals of massive brown weathering calcareous sandstone. A Lower to

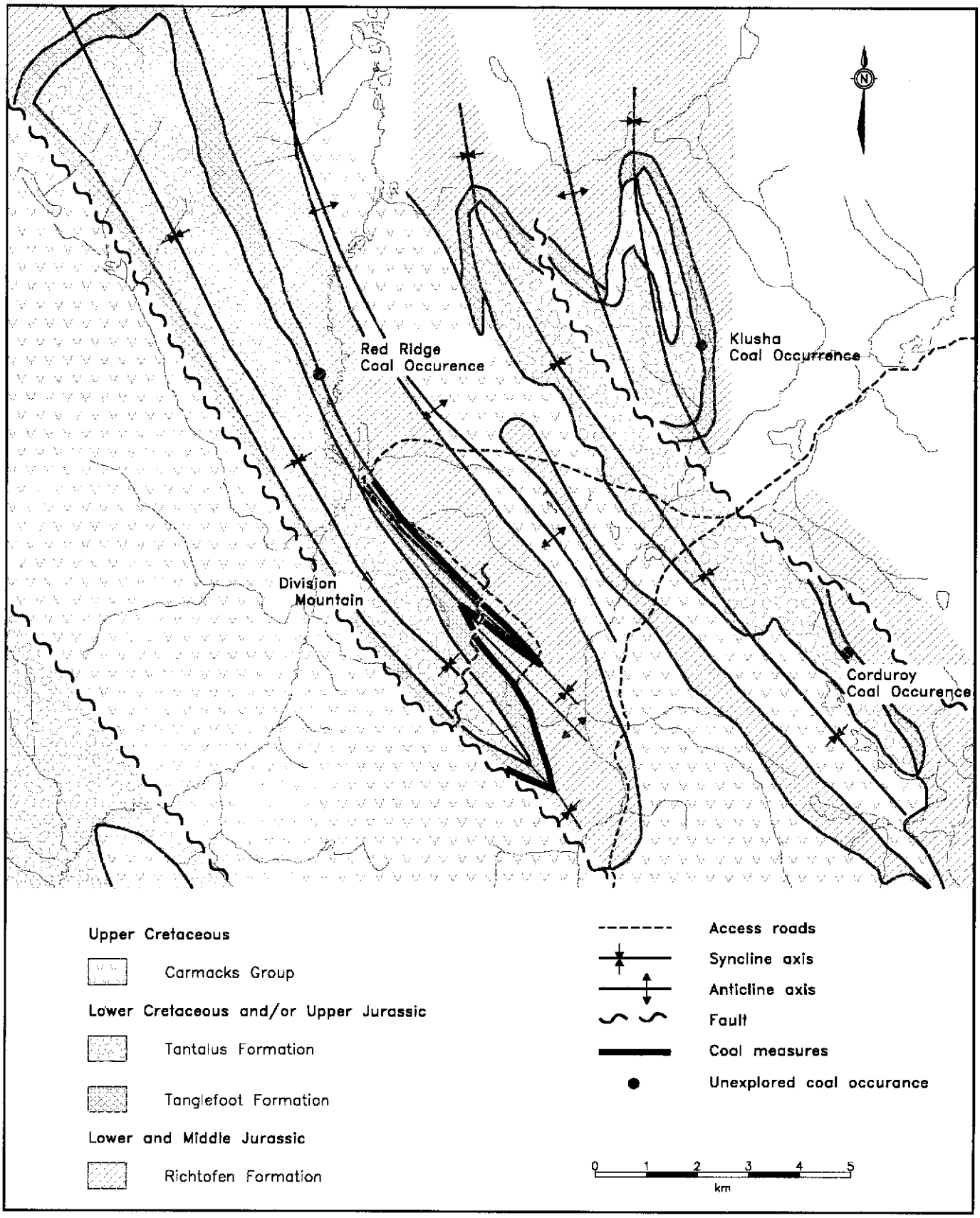

Figure 2: Division Mountain Project, Regional Geology

Middle Jurassic depositional span is recorded elsewhere in Whitehorse Trough for the unit but since this sequence is likely diachronous, being a record of a nearshore facies that migrated with basin fill, the precise age of the Richthofen Formation in this area will not be known until it is locally constrained by paleontological data.

Tanglefoot Formation strata in the Division Mountain area record a complex fluvial-deltaic depositional environment. Age is probably Middle Jurassic. In general the Tanglefoot Formation consists of upwardly fining sequences of alternating sandstone-conglomerate beds and black shale or shaly mudstone, the latter commonly containing coaly shale or coal seams. A section measured by Dickie (1994) near Division Mountain consists of fifteen sedimentary cycles, each on the order of approximately 10 m thick. A typical cycle consists of:

1) a scour-based arkosic pebble conglomerate containing fossil twigs and branches lying transverse to paleoflow along 1 to 2 m trough foresets;
2) conglomerate lags infilling troughs as lenticular beds;
3) a fining-upward zone of medium- to fine-grained arkose containing trough crossbeds which exhibit an upward decrease in set size;
4) grey organic-rich shale or shaly mudstone containing leaves, grasses and *Metasequoia* needles and twigs;
5) coaly shale to shaly coal, commonly rich in coalified twigs and branches;
6) banded coal; and,
7) either a transition back to grey shale or an abrupt termination by the basal pebbly conglomerate bed of the next cycle.

The depositional environment was one of a rapidly aggrading flood-dominated delta. Cross-bedded conglomerate-sandstone cycles represent point-bar deposits from a high energy fluvial system. Paleocurrent variance supports a meandering river interpretation. Of particular interest is that, despite the generally coarse-grained nature of the channel sandstones and conglomerates, the overbank deposits and related coals are relatively thick and demonstrate remarkable lateral continuity. Coal seams were deposited in long-lived delta plain swamps that served as collection sites for transported organic material and for generation of peat bogs. Closer to the Tanglefoot-Tantalus contact, coal becomes less abundant. Instead, grey shale and coaly shale predominate as much thinner beds than the coal seams lower in the succession.

Resistant beds of thick-bedded chert pebble conglomerate of the Tantalus Formation cap the Tanglefoot coal-bearing sequence, forming prominent topographic highs at Division Mountain and Red Ridge. Depositional environment of the Tantalus Formation appears to be one of an active flood plain. No coal has yet been discovered within the Tantalus Formation in the Division Mountain area even though this unit hosts coal seams that have been mined in the Carmacks area 100 km to the north.

Small stocks, dykes and sills of porphyritic basalt, andesite and dacite intrude the Tanglefoot Formation coal measures. The presence of glassy chill zones and rare amygdaloidal textures are indicative of emplacement in a near surface setting. Age of the intrusions is unknown but they are probably related to regionally extensive volcanic rocks of the Cretaceous Carmacks Group which unconformably overlie the Laberge and Tantalus stratigraphy in the Division Mountain area.

STRUCTURE

Deformation in the Whitehorse Trough occurred primarily as flexural slip folding during the mid-Cretaceous. Synclinal and anticlinal axes trend north-northwest, parallel to the trough axis. Fold wavelengths are generally between 500 m and 2 km, although complex tight folds with wavelengths less than 3 m have been noted. The coal-bearing Cairnes Syncline outlined by 1994-95 exploration trends 310° and plunges 9° to the northwest. The east limb dips between 50 and 75° to the southwest while the west limb dips between 25 and 45° to the northeast.

The folded stratigraphy has only been slightly modified by northwest- and northeast-trending normal faults with minor dip-slip displacement.

COAL

Aggregate coal thickness at Division Mountain (in seams greater than 1 m thick) ranges from about 10 m at Teslin Creek to 32 m in Hole 94-37 at the southern end of the explored area (Figure 3). The only detailed petrologic examination of the coal was carried out by Beaton et al (1992) on detailed samples taken from a trench exposure at Teslin Creek. The main seam here is typical of bulk coal reserves established at Division Mountain. It is 11.0 m thick, with two shale partings 65 and 38 cm thick. Petrographically, on a mineral matter free basis, the coals average 54% vitrinite, predominately desmocollinite. Macerals of the liptinite group (primarily sporangite) comprise, on average, 10% of the coal. Average total inertite content, principally fusinite, is 36%. Some anisotropic fusinite is present. Fusinite (pyrolitic carbon) is the wood char derived from peat fires. Mineral matter content varies throughout the seam, ranging from 4 to 47%, in direct proportion to the ash content. The most common minerals are quartz and kaolin with lesser calcite and siderite.

Whole core (HQ-size) samples of coal intersections were sent to Chemex Labs Ltd. of North Vancouver, B.C. Proximate Analysis, Ultimate Analysis and washability test results, summarized in Table I, indicate an ASTM rank classification of High Volatile Bituminous "B". The test data show that a high quality export product can readily be produced with 4.4% total moisture, 9.9% ash, 30.1% volatile

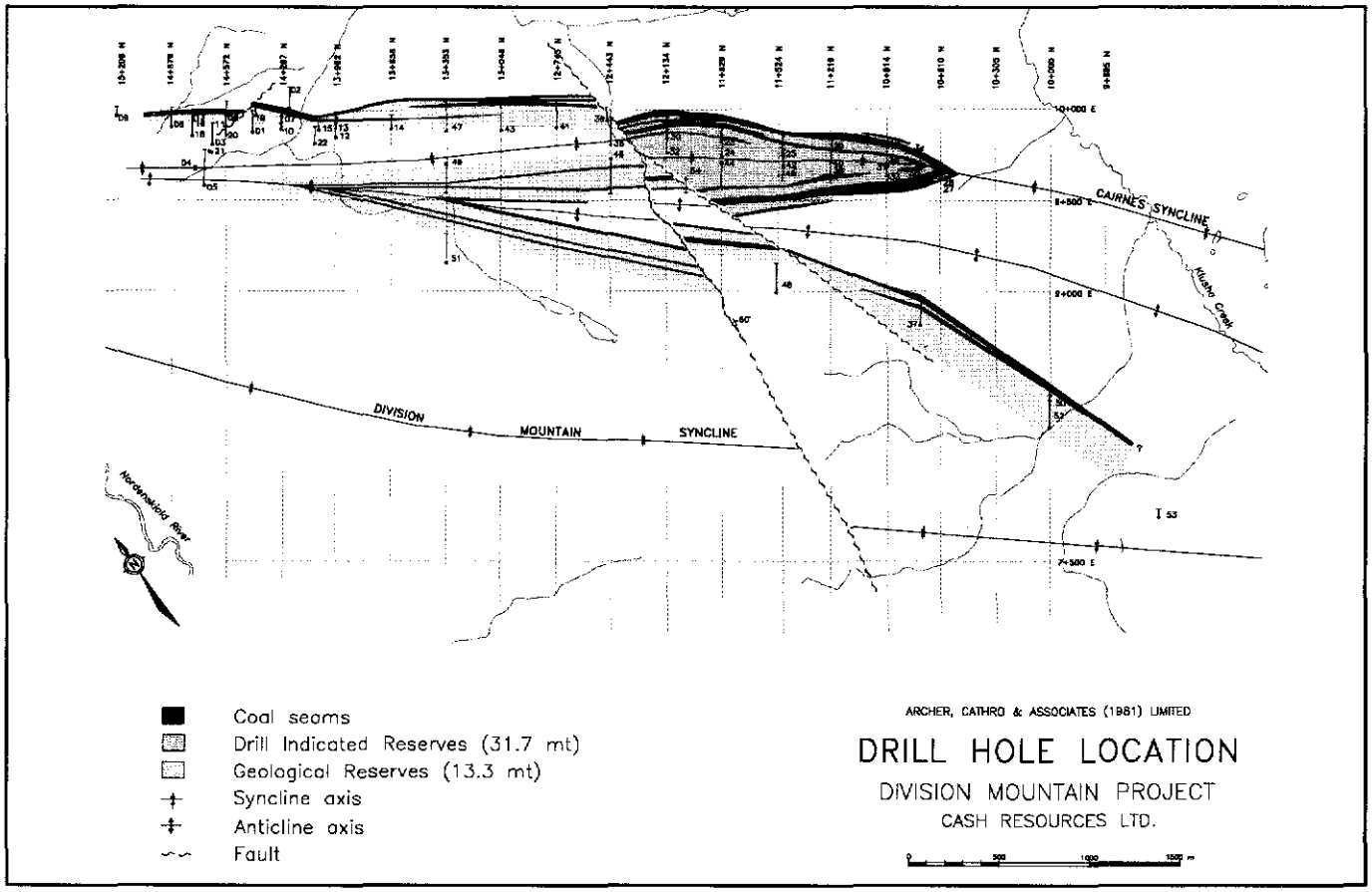

Figure 3: Division Mountain Project, Detailed Geology

TABLE I • CASH RESOURCES LTD.
DIVISION MOUNTAIN COAL PROJECT EXPORT THERMAL COAL COMPARISON

	IM %	TM %	Ash %	VM %	FC %	Sulphur %	CV kcal/kg	Ash Fusion C	Strip Ratio
Division clean coal (low ash)	1.9	4.4	9.9	30.1	57.4	0.52	7019	1310	3.4 (raw) 6.8 (clean)
Division clean coal (high ash)	1.9	4.4	14.3	29.1	54.3	0.49	6583	1310	3.4 (raw) 5.0 (clean)
Greenhills export coal	1.5	10	16	25-28	54-58	0.5	6900	1300	4.0 (raw)
Line Creek export coal	NA	8	17	21	NA	0.5	6400	NA	5.2 (clean)
Fording export coal	NA	8-12	7-15	20-31	55-66	0.35-0.75	7800-8700	NA	7.1 (clean)
Bullmoose export coal	2.5	8	15	22	55	0.5	7000	1250	4.5 (raw)
Telkwa export coal (proposed)	NA	10	11	24.5	NA	1	6480	1300	NA
Avg. B.C. export thermal coal	2	9	14	24	57	0.61	7016	1283	NA

NA = Not available • IM = inherent moisture (Division residual moisture data used) • TM = total moisture (Divsion equilibrium moisture data used) • VM = volatile matter • FC = fixed carbon • CV = calorific value • HGI = grindability (Hardgrove index) • Ash Fusion = initial fusion temperature in reducing atmosphere of ash from 3/8" x 28 mesh Division clean coal composite

matter, 57.4% fixed carbon, 0.52% sulphur and a calorific value of 7019 cal/g (12,530 Btu/lb). These characteristics meet or exceed qualities of thermal coals exported to Japan and elsewhere in the Pacific Rim from Alberta and British Columbia.

RESERVES

Drill indicated, undiluted raw coal reserves for all zones at Division Mountain total 31.7 million tonnes of coal with a strip ratio of 3.36 bank m^3/tonne. A further 13.3 million tonnes of geological reserves with a similar strip ratio have been outlined by wide spaced drilling for a total open pittable coal inventory of 45 million tonnes. Reserves are open to expansion along strike in both directions, and at depth. Further potential exists nearby in unexplored areas of favourable stratigraphy (Fig. 2).

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GEOLOGY AND GOLD DEPOSITS AT KETZA RIVER, YUKON TERRITORY
A PROGRESS REPORT

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Stroshein, R., 1996. Geology and gold deposits at Ketza River, Yukon Territory, a progress report. In: Yukon Exploration and Geology 1995, Exploration and Geological Services Division, Yukon, Indian and Northern Affairs Canada, p. 43-48

SUMMARY

Gold mineralization at the Ketza River Mine occurs in massive manto replacement deposits along preferred horizons within Lower Cambrian limestone. Auriferous sulphide deposits have been oxidized and gold values enriched within structural panels where normal faulting crosscuts the stratigraphy. The primary economic deposits occur on the south flank of the Ketza Uplift which is postulated to be related to a Cretaceous buried intrusion (Parry et al., 1984; Abbott, 1986).

Renewed exploration on the property has resulted in the discovery of additional oxide reserves and reinterpretation of the geological controls on the gold mineralization. Detailed core logging has identified three preferentially mineralized limestone layers within the massive Lower Cambrian limestone unit 1d. Structural deformation has repeated the favourable stratigraphic units and caused thickening of the deposits along fold hinges.

The Ketza Uplift appears to be associated with a major gold-bearing alteration system, with the potential for large disseminated and stringer-stockwork type gold deposits in Lower Cambrian clastic rocks. On the Ketza River property, the Shamrock zone has previously been explored for high grade gold vein deposits using reverse circulation and diamond drilling, but the structural setting and mineralogy of this zone is strongly suggestive of the Carlin-type deposits of Nevada. This zone has undergone the same strong deformation as the manto deposits, and further structural mapping is necessary to define the gold distribution within the mineralizing system.

YGC Resources Ltd has begun re-logging the approximately 34 000 metres of diamond drill core in 476 holes which were completed between 1984 and 1990. Future plans include careful re-mapping of the property and re-interpretation of the structure. Continued success in locating additional oxide ore reserves will result in re-opening of the mine and mill.

INTRODUCTION

YGC Resources Ltd. (YGC) is the owner of the Ketza River Mine Property which consists of 322 quartz claims, fractions, and mining leases totalling 6 248 hectares (14 906 acres). The property is located on the headwaters of the Ketza River approximately 80 kilometres by road southeast of Ross River, Yukon Territory (Figure 1).

YGC acquired the property after previous operators constructed a 320 Tpd CIP mill and mined 340 000 tonnes of oxide ore between 1988 and 1990. The operation produced over 100 000 ounces of gold.

YGC carried out diamond drilling during 1994 and 1995 totalling 5 622 metres in 72 drill holes. The exploration resulted in the discovery of three new oxide deposits and led to a reevaluation of the geology in the area. Field examination and mapping of outcrops indicated that the mineralization had been deformed or was occupying stratigraphic horizons that had previously been folded and faulted.

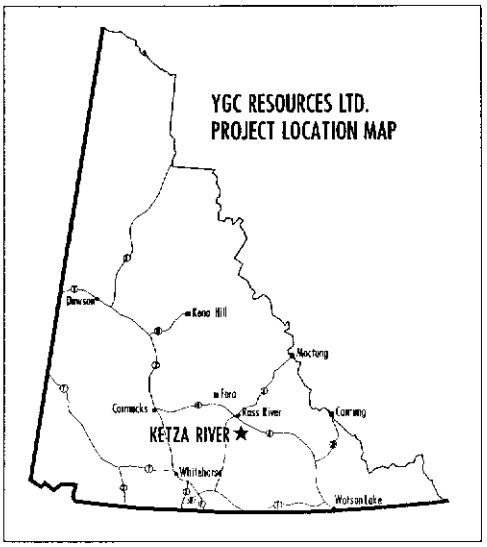

Figure 1: Ketza River Mine Location Map

REGIONAL GEOLOGY

The Ketza River Mine is located in the Pelly Mountains of central Yukon. The Pelly mountains are made up of miogeoclinal rocks of the Cassiar Platform, a displaced part of the ancient North American continental margin lying west of the Tintina Fault. Carbonate, clastic and volcanic rocks ranging in age from Late Proterozoic to Triassic are deformed as a result of a Mesozoic arc-continent collision, and subsequently intruded by mid Cretaceous stocks. Emplacement of the intrusions resulted in local doming and uplift, forming an elongate northwest-trending structure known as the the Ketza-Seagull Arch (Abbott, 1986). The Cassiar Platform was displaced at least 450 kilometres to the northwest as a result of dextral strike-slip movement on the Tintina Fault during the Cretaceous and Tertiary periods.

Four significant thrust faults, the McConnell, Porcupine-Seagull, Cloutier and St. Cyr Thrusts, run parallel to the Tintina Fault and dip generally southwest (Abbott, 1986). Thrusting is believed to have occurred during the Late Jurasssic and Early Cretaceous. Rocks of the Ketza-Seagull Arch belong to the Cloutier Thrust Sheet, and are exposed within an erosional window beneath the Porcupine-Seagull Thrust. The rocks within the erosional window are cut by steeply dipping normal faults. Within the Ketza-Seagull Arch, buried intrusions are inferred to lie beneath two local areas known as the Ketza Uplift and the Seagull Uplift.

The Ketza Uplift is centred on the headwaters of the Ketza River, where it has has exposed the oldest rocks of the Cloutier Thrust Sheet, including Lower Cambrian carbonates and older clastic rocks. Evidence for a buried intrusion in the area includes doming and normal faulting of the sedimentary rocks, a concentric pattern of mineral zoning around the uplift, hornfelsing of sedimentary rocks and the presence of a magnetic anomaly in the core, the development of skarn in the basal part of the Lower Cambrian limestone, and the development of a large area of hydrothermal alteration in the Shamrock zone north of the Ketza River gold deposit. Potassium-argon dating of the hornfels returned a whole rock age of 101 +/- 4 Ma (Cathro, 1988).

GEOLOGY AND GOLD DEPOSITS

Figure 2 shows that the Ketza River property is underlain by Lower Cambrian carbonate and clastic sedimentary rocks. The Lower Cambrian units (Map Units 1a, 1b, 1c, 1d, and 1e) form a conformable sequence unconformably overlain by black shale of Late Cambrian age.

The stratigraphic sequence is disrupted by thrust faults and related folds, cut by multiple sets of steeply dipping normal faults. Faulting near the deposits is complex and probably controlled the location of the mineralization and provided conduits for oxidizing fluids. Intense folding has result in overturned stratigraphy on fold limbs. Figure 3 reinterprets the Peel and Ridge Zone ore deposits, formerly interpreted as a manto and chimney system, as a single orebody deformed by a southeast-overturned fold. The Ridge Zone orebody is cut off by the Peel Fault, a thrust fault which juxtaposes Lower Cambrian argillite (unit 1a) against Lower Cambrian limestone (unit 1d). The orientation of the Peel fault changes from near vertical east of the Ridge zone to nearly horizontal west of the Ridge zone. Northwest-trending normal faults cut the Peel fault.

There are two types of gold deposits on the Ketza River property: (a) manto type limestone replacement sulphide/oxide deposits, and (b) sediment-hosted (Carlin-type) disseminated sulphides associated with stockworks of quartz-sulphide fissure veins. The manto deposits are confined to favourable limestone beds within deformed Lower Cambrian limestone of unit 1d, south of the Peel Fault. The vein stockwork-disseminated sulphide deposits occur in Lower Cambrian argillite and phyllite of unit 1a, north of the Peel Fault.

Three main oxide mantos were developed and mined by the previous operator. The Peel, Ridge and Break zone deposits produced 300 000 tonnes at an average grade of 13 g/t gold from underground and open pit mines. They are local replacement bodies within a distinctive blue crystalline limestone bed, which also hosts the newly discovered Fork and MacGiver zones. The blue limestone bed is approximately 20 metres thick, and is folded into a nearly recumbent syncline. The Peel and Ridge deposits occur on opposite limbs of this fold (Figure 3). Both the ore and the host limestone are dramatically thickened along the fold hinge. The deposits consist of irregular interconnected veins, pods and tubular bodies separated by barren limestone.

Auriferous massive sulphide mantos have also been intersected at two other horizons, one above and one below the blue limestone bed. The Peel West massive sulphide manto is hosted by a fine grained massive limestone bed approximately 15 metres above the blue limestone. The Chimney zone discovered in 1994 is an oxide deposit in the same limestone bed. The B-mag sulphide/oxide mineralization occurs in a massive limestone bed less than 10 metres below the blue limestone.

The mineralized zones in the three limestone horizons partially overlap each other. Detailed logging of recent and previous drill core allowed recognition of distinct layers

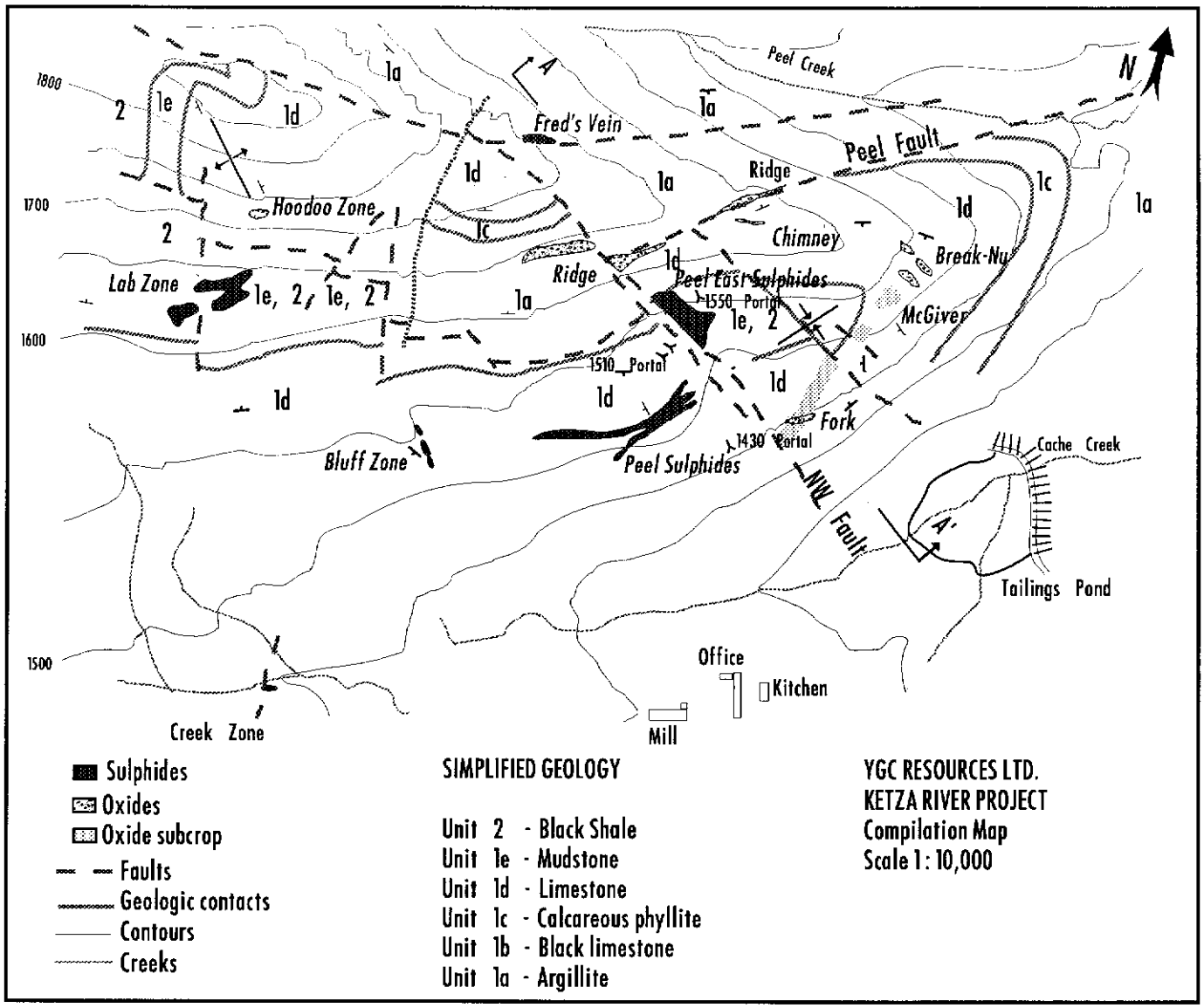

Figure 2: Ketza River Project Compilation Map

within the limestone unit, based on textural and compositional variations. These markers allow identification of the most prospective horizons.

Gold bearing quartz-sulphide vein and vein stockwork mineralization has been located within well bedded Lower Cambrian argillite, phyllite and quartzite north of the Peel Fault. The mineralized veining in the Shamrock area is widespread within an alteration zone of disseminated pyrite, sericitization, bleaching and silicification. The alteration zone forms a distinct, rusty coloured anomaly more than two square kilometres in extent, coincident with a gold soil anomaly which returns assays up to 31 000 ppb.

ECONOMIC ASSESSMENT

The deposits of the Ketza River Mine were initially sulphide replacement mantos in limestone. The favourable horizons are homogenous massive beds which fractured during brittle deformation. Brecciated layers within the massive limestone formed porous, permeable zones which allowed easy access by mineralizing fluids. The style of the sulphide replacement reflects the local intensity of deformation. After gaining access to the limestone beds along major fissures, ore forming fluids were focused into smaller structural openings including secondary faults, fold hinges or minor openings produced by processes of hydrothermal boring or corrosion. The thickest and most extensive mineralization was emplaced in areas with the highest density of structural discontinuities.

The oxide mineralization is mostly concentrated within a zone of intense faulting and fracturing which trends northwest-southeast through the Peel and Ridge deposits. Oxidation of the sulphide deposits has resulted in remobilization of the gold and its reconcentration near the hanging wall of the mantos. In order for deep supergene oxidation to occur, the primary sulphide deposits must have been accessible to subterranean watercourses carrying a strong flow of oxygenated water. It is not clear if the oxidation of the sulphides and remobilization of the gold were associated with the passage of late stage hydrothermal fluids from the intrusion or if they happened at a later time.

The magnetite-epidote mineralogy of the Fork zone and the 1430 E deposit indicates these are proximal skarn deposits (Figure 4). The nearest known intrusive rocks are syenite dykes of Mississippian age which outcrop south of Cache Creek, but like the hornfels zone and the alteration on the ridge north of the Ketza River minesite, the skarn is more likely related to a buried intrusion of Cretaceous age located north of Peel Creek.

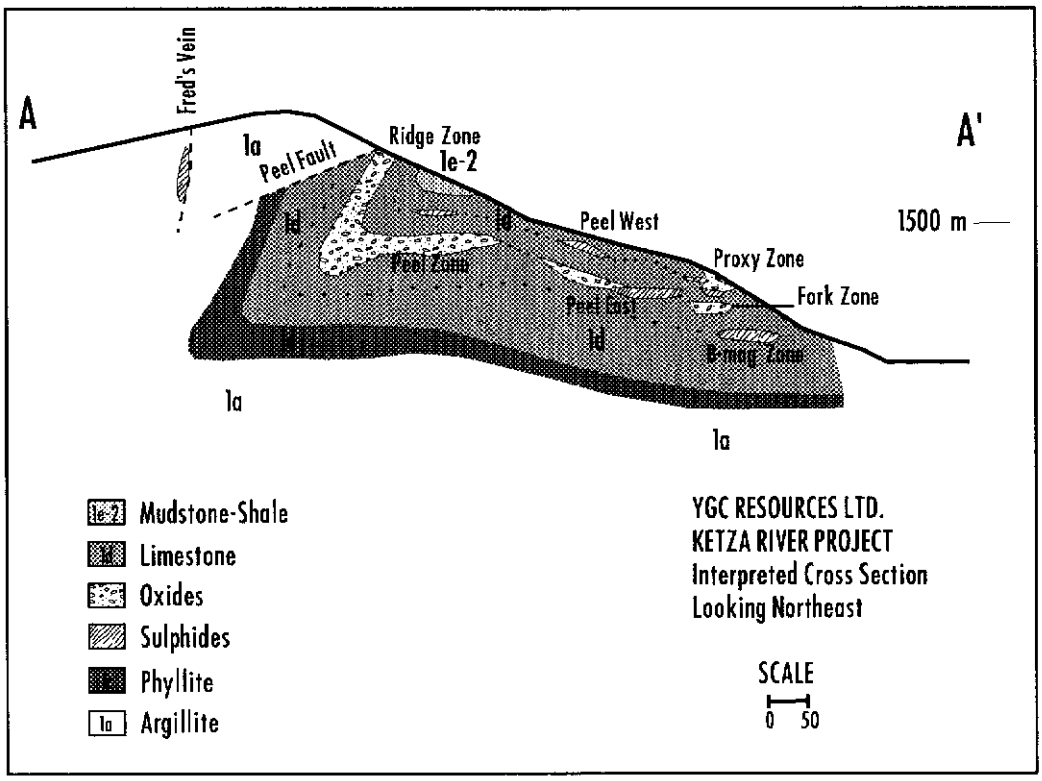

Figure 3: A-A' Interpretive Cross Section

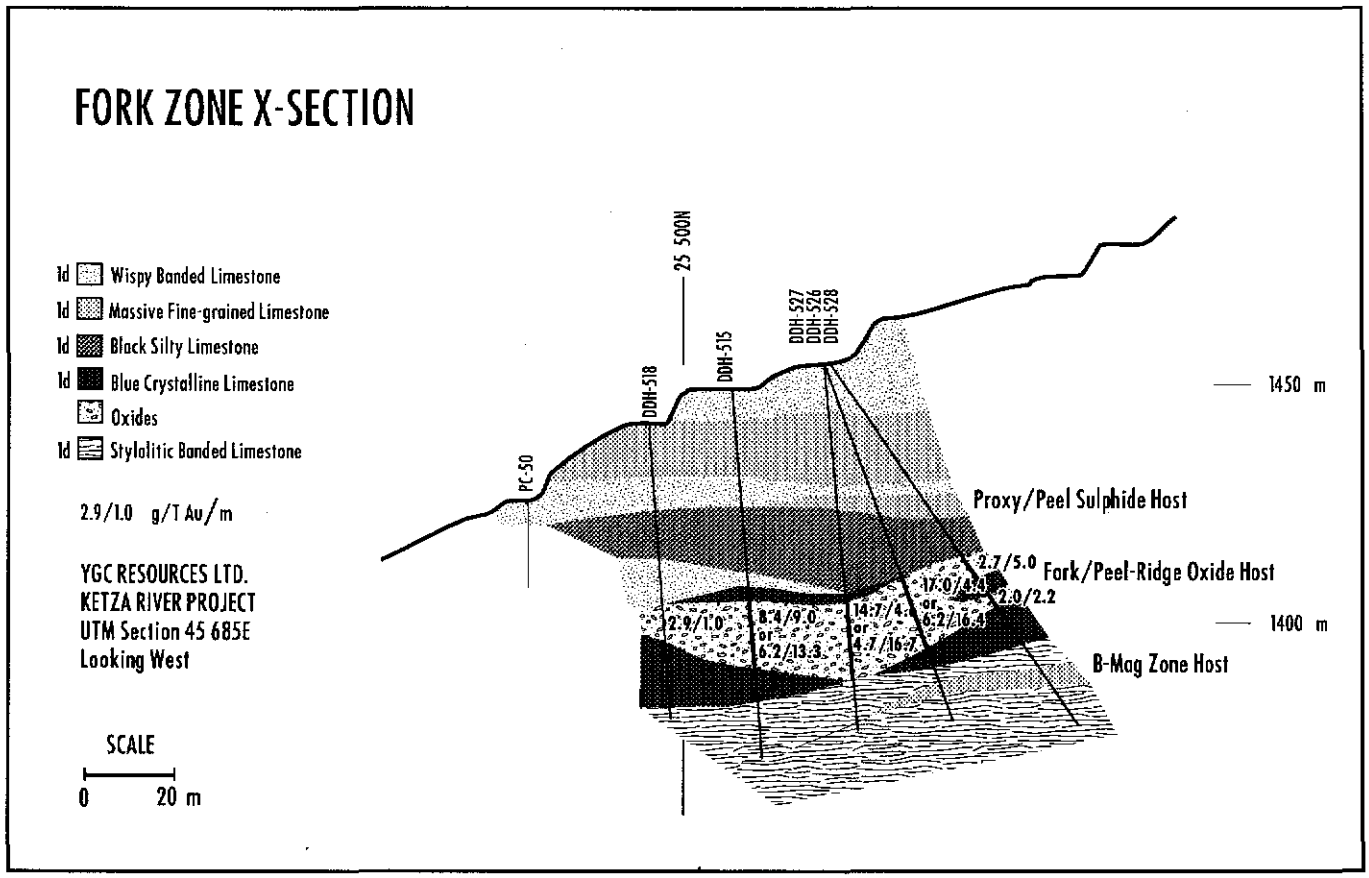

Figure 4: Fork Zone Cross Section

Because the sulphide mantos appear to have developed along permeable layers which were enhanced by Late Jurassic-Early Cretaceous structural deformation, the sulphide mineralization is most likely associated with the Cretaceous intrusive event. If the oxidation significantly postdated the intrusion, exothermic heat may be responsible for redistributing the gold. Detailed mapping and further research is needed to answer some of these questions.

The recent discovery of oxide gold deposits and favourable stratigraphy within a separate fault panel east of the Peel and Ridge zones indicates the oxygenation was widespread and suggests that there is excellent potential for developing further reserves, particularly in the area of the fold hinge east of the previously developed area. High grade stopes mined out in the hinge zone of the Peel - Ridge deposits locally averaged more than one ounce per ton gold over significant thicknesses.

Low grade intersections in reverse circulation drill holes at the Shamrock Zone area north of the Peel fault indicate the potential for a large bulk mineable target. A 1987 drill hole intersected 105 metres of disseminated and stringer sulphides in altered argillite with an average grade of 3.77 g/t gold. The drill hole is located at the southern end of the Shamrock zone near a quartz breccia vein (QB), where a number of drill holes have outlined a quartz-sulphide zone with gold grades in the 0.5 to 1.5 g/t range. Disseminated and quartz-sulphide vein mineralization containing gold has been found in float, outcrop and drill holes over an area of approximately two square kilometres.

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GEOLOGY AND MINERALIZATION OF THE TOG, LISWAENTITE-HOSTED GOLD OCCURRENCE, SOUTHERN YUKON TERRITORY

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Introduction

The TOG (Tons of Gold) mineral occurrence (Minfile 105C 028) in southern Yukon represents a style of gold-vein mineralization that has recently been recognized in the southern Yukon Territory. Visible gold, low sulphide content and high gold grades associated with structurally controlled zones of intense carbonate alteration of the host ultramafic rocks are characteristics that the TOG occurrence shares with similar mineralization in the Atlin and Cassiar areas of British Columbia and the Mother Lode district in California. The TOG showing is evidence that economic deposits of this type have the potential to occur in the Yukon Territory. This report documents the salient geological features of the best understood Yukon occurrence in an effort to assist and encourage additional exploration for this occurrence type.

Location

The TOG property is located near Squanga Lake approximately 3 km south of the Alaska Highway, 24 km east of Jakes Corner and 100 km from Whitehorse (NTS 105C/5; 60°25'00"N, 133°37'20"W). The main showing is on the east side of a small hill at an elevation of 3400' above sea level. The property is accessible by a 5.5 km dirt road that is drivable by 2WD during most of the summer months.

History and Previous Exploration

While prospecting for nickel in 1972, local prospector Gordon McLeod discovered chromite in ultramafic rocks and staked claims in the area. Additional prospecting around the chromite occurrence in 1982 resulted in the discovery of chromium micas (mariposite/fuchsite) and visible gold in quartz. Additional prospecting in 1984 resulted in the discovery of a gold-bearing quartz vein along which further exploration (trenching and sampling) was concentrated. Bulldozer trenching and road building were undertaken in 1987.

The property was transferred to Dunvegan Explorations Ltd., and magnetometer and VLF-EM surveys were performed in 1989. In 1990, eight HQ diamond drill holes totaling 263 metres were drilled from three sites. All drill holes intersected the vein. Bulk samples submitted for metallurgical testing indicated possible recoveries of 70-80% by gravity concentration alone (Webster, 1990).

Regional Geology

The south-central Yukon is composed of several crustal blocks known as terranes. The TOG property is located entirely within the oceanic Cache Creek Terrane (Fig.1). Cache Creek Terrane is composed of structurally complex successions of Mississippian to Permian basalt, carbonate, chert and greywacke and ultramafite. These rocks are overlain by a package of structurally imbricated interbedded chert and greywacke of Triassic to Early Jurassic age.

Cache Creek Terrane is in fault contact with Stikinia and Quesnellia which are dominated by Late Triassic augite-phyric arc volcanic rocks and Jurassic marginal basin greywacke. On its east side, the Cache Creek Terrane is separated from Quesnellia by the Teslin Fault, a steep fault with inferred strike-slip displacement (Gordey and Stevens, 1994). On its west side, the Cache Creek Terrane is juxtaposed against Stikinia along the Nahlin Fault - an east-dipping thrust fault. Along its northern contact the Cache Creek Terrane is separated from Stikinia by a complex series of northeast-trending faults (including the Crag Lake Fault), and a series of northwest-trending normal faults. The Cache Creek Terrane is interpreted as a large thrust sheet overlying Stikinia (Gordey and Stevens 1994) and the complex map pattern results from differential offsets of normal faults which crosscut the thrust panel.

The juxtaposition of these two terranes occurred after the deposition of the youngest sedimentary rocks of Cache Creek Terrane (early Toarcian; Cordey et al., 1991) but prior to the intrusion of the Fourth of July/Mt. Bryde

plutonic suite at *circa* 172 Ma (Mihalynuk *et al.*, 1992; Gordey and Stevens, 1994). Large structures in Cache Creek rocks, including panel-bounding thrust faults and overturned folds, are thought to be coeval with terrane amalgamation during early Middle Jurassic time.

Understanding of the regional distribution of rock units in this areas of south-central Yukon has recently been enhanced by an airborne geophysical survey of the area by the Yukon Prospectors Association (Smith, 1994) and subsequent geological interpretations (Hunt *et al.*, 1995).

Property Geology and Mineralization

The TOG mineral occurrence occurs in a package of basalt, ultramafite and their altered and tectonized equivalents that structurally overlies a succession of carbonate and chert (Figure 1). The volcanic rocks consist mainly of massive, variably chloritized, aphanitic and aphyric basalt and greenstone. Fine grained gabbro and diorite are among the volcanic rocks. Locally, the entire volcanic package is cut by steep zones of north and northwest-trending shear zones. Chert occurs as lenses or large angular fragments within the volcanic rocks.

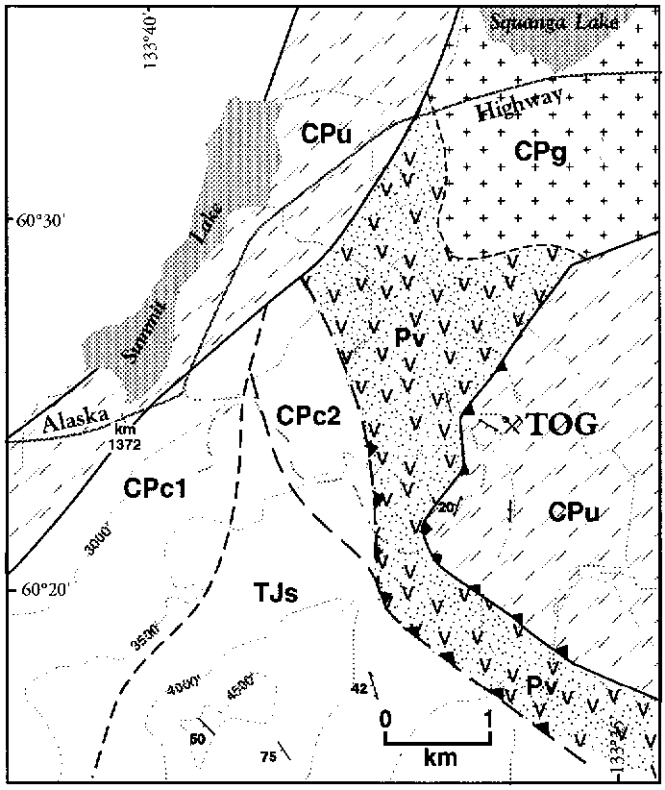

Figure 1. Regional geological setting of the TOG property among the structural packages of the Cache Creek Terrane. Geology modified from Hunt et al., (1995) and Gordey and Stevens (1994) with the assistance of geophysical maps of Smith (1994). Thick lines are faults. TJs -Triassic-Jurassic chert and greywacke; Pv-Permian mafic volcanics; CPg -Carboniferous-Permian gabbro; CPc1-Carboniferous-Permian carbonate; CPc2-Carboniferous-Permian chert, CPu-Carboniferous-Permian ultramafite.

The ultramafic rocks are serpentinized peridotite, and where tectonized, are reduced to talc-serpentine schist. Unserpentinized peridotite is coarsely crystalline with a mineral banding defined by pyroxene layers. The basal part of the ultramafic package is strongly sheared with a sub-horizontal fabric defined by lenses of scaly tectonized serpentinite. This shear zone is interpreted as a thrust fault separating the volcanic and ultramafic rocks from the underlying sedimentary rocks.

Chromite Showing

West of the main quartz vein, a small (1.2 x 1.7 m) pod-like mass of crystalline chromite occurs in serpentinized ultramafite. Five whole rock analyses (from Marchand, 1980) returned Cr_2O_3 values between 26 and 43%, with Cr:Fe ratios ranging from 1.5 to 4.3. Nickel values up to 2000 ppm were determined but anomalous platinum group elements were not detected. Microprobe analysis of the chromite indicate it to contain 49.4% Cr_2O_3 - a value considered to be of good metallurgical grade. The massive, as opposed to layered, nature of the mineralization increases the likelihood of encountering larger accumulations. However, the complexity of the host rocks suggests that exploration for chromite should confined to the competent rocks or concentrate on developing a better understanding of the style of structural deformation.

Gold-Quartz Showing

The main showing on the property is a gold-bearing quartz vein that cuts variably altered and tectonized mafic and ultramafic rocks (Figure 2 and 3). The vein is continuous within a shear zone that strikes approximately 140° and dips to the southwest at 25° to 33°. In the hanging-wall, carbonate-altered listwaenite grades upwards into serpentinized ultramafic rocks. The footwall is composed of black, graphitic cataclasite which may have a sedimentary protolith. Because of the low angle of the structure, the shear zone is inferred to be a thrust fault or a splay off a basal thrust fault.

The vein is exposed on surface for 26 metres, and coincident geophysical conductors suggest a strike length of at least 140 metres (Webster, 1990). Diamond drill hole intersections confirm that the vein is continuous over a strike length of at least 80 metres and continues for at least 30 m down-dip. The vein remains open at depth and in both directions. The vein's true width varies from 1.8 to 2.9 metres.

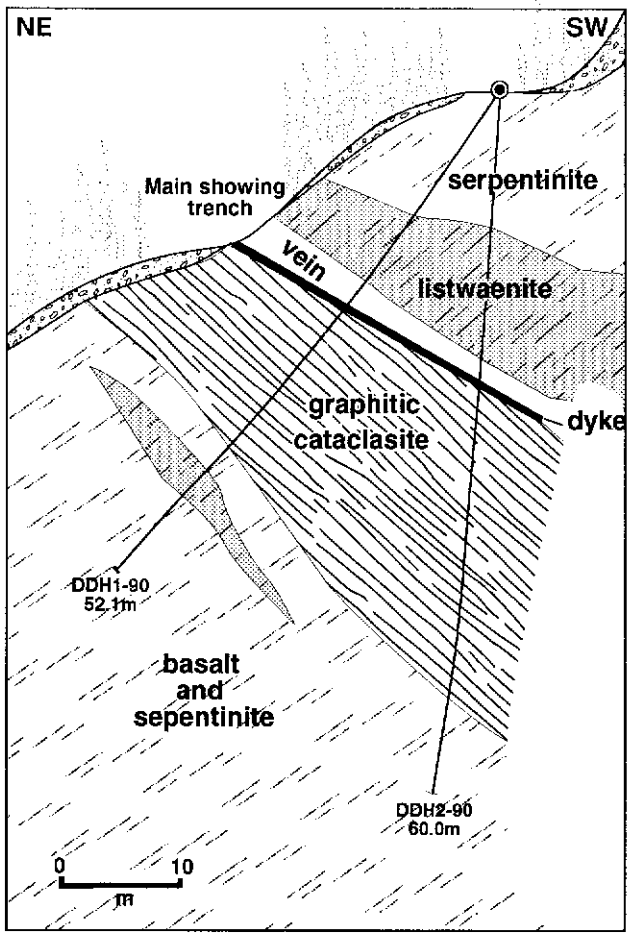

Figure 2. Cross-section (looking southeast) showing the relation of rock units hosting the TOG vein. The vein and dyke are probably localized along a thrust fault which formed the graphitic cataclasite and acted as a conduit for hydrothermal fluids that formed listwaenite and the quartz vein.

Most of the vein is composed of massive, structureless, white waxy bull quartz, but it is locally banded along its footwall margin. Thin, black, graphitic ribbons separate 0.5-5 cm wide bands of quartz and contain slickenslides (Figure 4). The footwall portion of the vein is locally cut by stringers of a younger phase of thin, grey, translucent, locally cockade and vuggy quartz which contains sparse accumulations of sulphide minerals (Figure 5).

Alteration

The volcanic and ultramafic rocks are typically chloritized and serpentinized. This ubiquitous alteration is overprinted by focused zones of intense hydrothermal metasomatism which are several 10's of metres wide and likely kilometres long. The metasomatism is associated with shear zones and is generally so intense that the original mineralogy of the rock is replaced entirely by carbonate minerals and silica. The carbonate-altered rocks weather to a distinctive orange colour and the silica causes these zones to be resistant. Fresh surfaces are white to light grey to pale green in colour, and appear granular as a result of the coarse nature of the carbonate minerals and disseminated grey flecks from refractory minerals. Microprobe analysis of the carbonate minerals indicates that they are dominated by magnesite and dolomite (Table 1).

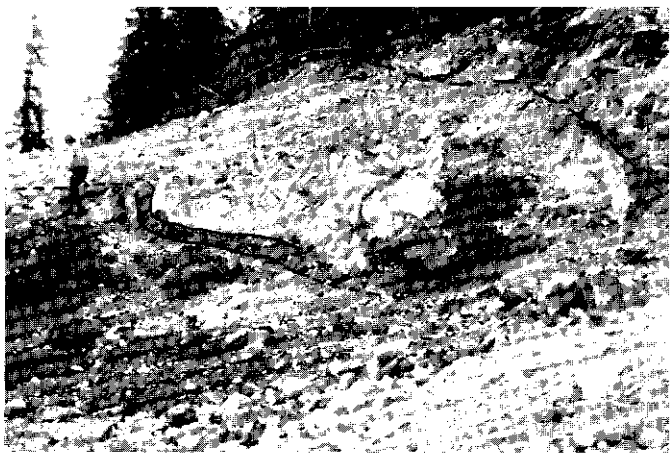

Figure 3. Looking southeasterly at the quartz vein (white material) in the TOG open cut. The footwall is dominated by graphitic cataclasite and the hanging wall is composed of listwaenite. The lamprophyre dyke is outlined in black.

Figure 4. The dark ribbons in the banded quartz are composed of slickensided graphitic layers that locally host visible gold.

	Magnesite	Magnesite	Magnesite	Dolomite	Dolomite
MgO	40.40	39.16	43.23	19.74	21.07
CaO	0.33	0.16	0.10	27.75	28.96
MnO	0.25	0.54	0.25	1.43	0.45
FeO	9.69	10.22	5.76	2.18	1.08
CO_2	49.33	49.91	50.67	48.90	48.44

	Rutile
SiO_2	1.21
TiO_2	93.27
Cr_2O_3	2.73

	Pyrite
S	53.40
Fe	44.77

	Fuchsite
SiO_2	47.20
MgO	3.30
Cr_2O_3	7.18
Na_2O	0.36
K_2O	9.13
CaO	0.02
Al_2O_3	26.26
MnO	0.41
FeO	0.39
BaO	0.56

Table 1. Microprobe analyses of selected alteration minerals by energy dispersive techniques at Ecole Polytechnique, Montreal, (Marchand 1980).

Also diagnostic of these alteration zones is the presence of disseminations, or masses of fine-grained mica with a vivid green colour similar to malachite. The mica is fuchsite, which has a high chromium and potassium content (Table 1). This carbonate-silica-fuchsite alteration assemblage is known as ***listwaenite***.

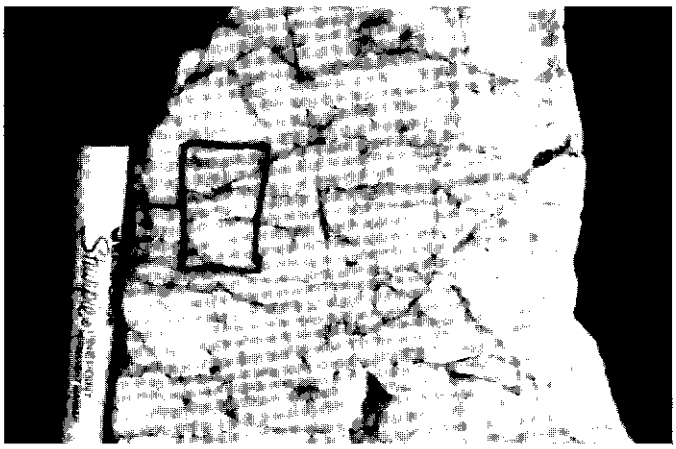

Figure 5. Cut and polished section of the footwall portion of the TOG vein. Note the network of light grey quartz that cuts the white, waxy bull quartz. The light grey quartz is locally vuggy and contains sulphide minerals and coarse gold.

Alteration of ultramafic rocks to form listwaenite results from extreme carbonate metasomatism of the original rock (Tables 2 and 3). Minerals composing the serpentinite are leached out by hot hydrothermal fluids and new minerals are emplaced by CO_2-rich fluids. The new mineralogy is dominated by dolomite, magnesite and ferroan dolomite with minor fuchsite and late calcite. This mineralogy requires a large net influx of CO_2, but also results in a depletion of most other elements. The influx of carbonate is depicted by large LOI values - double or triple the values in the serpentinite (Table 2). Some elements which are relatively insoluble remain in the listwaenite in significant, although somewhat depleted amounts. These include Cr, Co, Ti and Ni (Table 3). These refractory elements are important in forming fuchsite and rutile. A small amount of K enrichment is also necessary for the formation of fuchsite. Fuchsite-rich rocks contain between 0.5 and 2% elemental potassium. In addition, the breakdown of the original serpentine minerals to form carbonate minerals enriches the fluid in silica, which pervasively floods the listwaenite.

anhydrous	SiO2	TiO2	Al2O3	Fe2O3	MnO	MgO	CaO	Na2O	K2O	P2O5	Cr2O5	LOI	Total
list RB	45.1	0.03	1.4	8.51	0.09	40.6	3.48	0.02	0.34	0.02	0.41	0	100
list BUG-M	45.5	0.06	2.22	9.21	0.12	40.1	1.88	0.01	0.5	0.04	0.38	0	100
serp UM2	44.1	0.05	1.31	8.87	0.1	43.5	1.57	0.05	0.01	0.02	0.46	0	100
hydrous													
RB	29.4	0.02	0.9	5.55	0.06	26.5	2.27	0.01	0.22	0.01	0.27	33.83	99.02
BUG-M	30.7	0.04	1.5	6.22	0.08	27.1	1.27	0.01	0.34	0.03	0.26	32.45	99.99
UM2	38.0	0.04	1.1	7.64	0.09	37.4	1.35	0.04	0.01	0.02	0.4	13.49	99.63

Table 2: Whole-rock major oxide geochemical data of listwaenite and serpentinite. Analyses by XRF at Actlabs, Inc.

	Ca%	Fe%	Mg%	Al%	K%	Ba	Co	Cr	Ni	Sr
listwaenite										
n=20	2.0	3.4	11.0	0.08	0.02	41	35	196	372	85
serpentinite										
n=28	4.0	4.0	16.6	0.17	0.01	24	64	533	1354	174

Table 3. Compilation of mean elemental values from whole rock data of listwaenite and serpentinite. Analyses by ICP at Acme Analytical Labs. Ba, Co, Ni, Cr and Sr in ppm.

Lamprophyre Dyke

A 0.5-2.0 m wide, orange-weathering dyke is continuous along the footwall of the vein. The dyke is competent and composed of orange weathering, dark olive green, massive, homogeneous lamprophyre. The dyke's 5-10 cm margins are pale green, aphanitic and locally amygduloidal indicating rapid chilling. The bulk of the dyke is composed of crowded accumulations medium-grained (4-8mm) felt-textured dark brown biotite in an aphanitic matrix with sparse olivine phenocrysts. The hanging wall contact of the dyke with the vein is locally defined by the chilled dyke margin against the coarse, coxcomb texture of the original vein margin which indicates that the dyke intruded the space that the vein was growing into (Fig. 6). A dyke of this sort can be seen in a road-cut on the Alaska Highway at km 1396 where it cuts Permian volcanics at an attitude of 140/70 NE.

Chemically the dykes have a distinct composition for such silica-depleted rocks (Table 4). Despite the rock's low SiO2 content, the dykes at the TOG property have a very high percentage of K2O. Furthermore, despite the apparent fresh character of the rock, it has a high LOI.

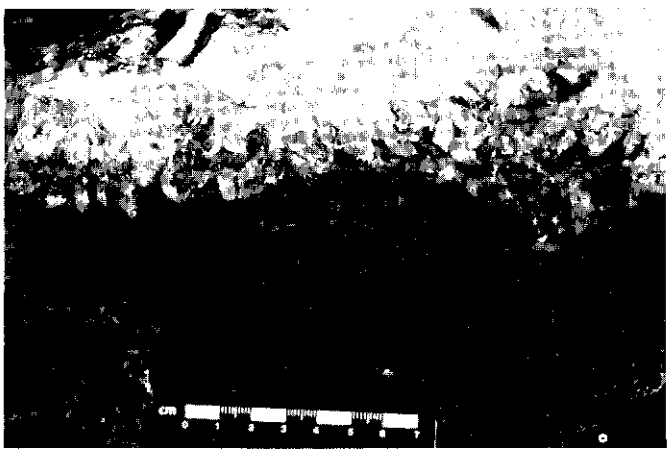

Figure 6. The open space that the cockade quartz in the footwall of the vein was growing into was invaded by the lamprophyre dyke. The dyke's margins are chilled.

	TOG dyke, margin		TOG dyke		Alaska Hwy., km 1396	
		anhydrous		anhydrous		anhydrous
Na2O	3.33	3.98	2.25	2.63	2.58	2.85
MgO	6.38	7.62	8.14	9.52	6.17	6.81
Al2O3	13.00	15.53	11.60	13.57	15.30	16.80
SiO2	40.04	48.27	42.10	49.24	43.20	47.70
P2O5	0.56	0.67	0.47	0.55	0.24	0.26
K2O	2.56	3.06	2.76	3.23	0.33	0.36
CaO	7.81	9.33	8.33	9.74	12.19	13.50
TiO2	1.22	1.46	1.21	1.42	1.26	1.39
Cr2O3	0.03	0.04	0.06	0.07	0.04	0.04
MnO	0.17	0.20	0.15	0.18	0.17	0.19
Fe2O3	8.23	9.83	8.42	9.85	9.18	10.10
LOI	14.8	0	13.5	0	9.29	0
SUM	98.5	100	99.0	100	99.87	100

Table 4. Whole rock major oxide chemical analyses of lamprophyre dykes. Analyses by XRF at XRAL Laboratories, Ltd.

Ore Mineralogy

Sulphide minerals are a sparse, but important feature in these veins. Sulphide minerals are typically fine- to medium grained and occur as small aggregates or thin stringers within the footwall portion of the quartz. They are paragenetically later than the white waxy quartz and are coeval with the deposition of grey translucent quartz. Sulphide mineralogy consists mostly of tetrahedrite, with lesser chalcopyrite. In addition, localized pods of brown sphalerite and rare galena can also be found.

Within the listwaenite, pyrite occurs as disseminated cubes. Local zones containing blebs of chalcopyrite were also observed.

Gold

High gold grades are restricted to the quartz veins and are not in the listwaenitic alteration. Gold values from grab samples of the main quartz vein range from spectacularly high (1200 g/t) to non-existent. Over a 26 m strike length of the exposed vein, visible gold was observed in 13 samples (Webster, 1990). Flakes of native gold are often visible in clusters or along planes. Study of high-grade specimens yielded the following observations:

- flakes of gold are often seen in small vugs on the surface of small euhedral quartz crystals;
- gold is observed on graphitic surfaces within, and parallel to the vein;
- gold is associated with blebs of sulphide minerals (tetrahedrite) that often fill small vugs;
- gold is localized near the footwall contact of the quartz vein;
- there is a spatial association between base metal sulphide minerals and gold values. However gold is not always in contact with sulphide minerals.

A good correlation is observed between gold and silver values, but gold correlates only weakly with base metals (Table 5). Good correlations were recorded between silver and lead, silver and copper, and copper and lead. Silver:gold ratios of mineralized quartz range between 1 and 10 except in high-grade specimens containing more than15 g/t gold.

Microprobe analysis of the native gold indicates that it is 93.5% Au and 6.0% Ag (S. B. Ballantyne, in Webster, 1990).

sample	Au ppb	Ag ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm	BM ppm	Ag/Au
maximum	100000	93.9	6818	20000	10243	259	2000	29956	27.39
minimum	1050	1.2	46	100	100	36	64	352	0.21
average	19396	27.4	969	5507	1917	122	1032	8627	4.97
median	6950	24.5	395	3339	1335	60	1194	5307	1.95
Correlation coefficients									
corr au		0.414	0.163	0.277	0.288			0.330	
corr Ag			0.583	0.566	0.202				
corr cu				0.772	-0.035				
corr Pb					-0.017				

Table 5. Statistics of metal values from 28 samples from the TOG property with gold values >1000 ppb. (BM=total base metals).

In addition to quartz vein, gold may also be associated with thin quartz stringers that cut graphitic cataclasite in the footwall of the main vein. Samples of 5-10 kg of this rock, processed in a small ball mill, yielded small amounts of coarse gold.

Discussion and Conclusion

The TOG gold-quartz vein and the associated lamprophyre dyke occur within a shear zone which acted as a the conduit for the both the hydrothermal fluids and the magma. The listwaenite alteration is the result of carbonate metasomatism of a serpentinized peridotite protolith by hot CO_2-rich fluids which were channeled along the fault. Mineralization was emplaced during a late fluid stage and may be contemporaneous with the intrusion of the lamprophyre dyke. Pb-Pb isotopic analysis of galena from the TOG suggest that mineralization likely took place during the Middle Jurassic (Hart and Hunt, 1995). This is consistent with Ar-Ar dates on alteration minerals from listwaenite of the Atlin area (Ash *et al.*, 1992).

Although the listwaenite failed to return significant gold values, it clearly envelopes the fault or shear zone which channeled the hot hydrothermal fluids. Thus, areas within and adjacent to the listwaenite are the most likely to host gold-bearing quartz veins.

The style of mineralization at the TOG occurrence is similar to that in the Atlin and Cassiar areas of northern British Columbia. Information from the Atlin camp may assist prospecting efforts in southern Yukon (Ash and Arksey 1990a, b; Ash, 1994 and references therein). In the Cassiar camp, greater than 500,000 tonnes of ore produced approximately 8 tonnes of gold between 1978-1988, for an average grade of 14 g/t. Additional potential reserves of one million tonnes of similar grade has been estimated, suggesting the potential tonnage and grades one could expect for similar deposits in southern Yukon.

The possibility of bulk tonnage, low grade gold should not be overlooked. Recent discoveries of pyritic quartz stockworks and fine-grained disseminated pyritic horizon peripheral to the veins in the Cassiar area confirm the bulk tonnage potential of these geological settings (Northern Miner, 1995). Typical grades are in the range of 0.5-2 g/t but occur over drill intersections of 100-200 metres (George Cross Newsletter, 1995).

Acknowledgments

Thanks to Gordie McLeod for a tour of the TOG property and for access to company reports. A review by Trevor Bremner improved the original manuscript.

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BREWERY CREEK GOLD DEPOSIT

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Diment, R., 1996. Brewery Creek Gold Deposit. In: Yukon Exploration and Geology, 1995, Exploration and Geological Services Division, Yukon, Indian and Northern Affairs Canada, p. 57-66

INTRODUCTION

Brewery Creek is a bulk tonnage gold deposit located 76 km east of Dawson. The deposit contains a geological reserve of 18 204 000 tonnes grading 1.55 g/t Au, including a mineable reserve of 17 172 000 tonnes which is accessible by open pit with a stripping ratio of 1.3:1.

Noranda Exploration Co. Ltd discovered the property in 1987, using soil geochemistry, and outlined reserves in eight zones extending over a strike length of 12 km. Loki Gold Corp. optioned the property in 1990 and obtained a 100% interest in 1993. Following 2 years of development work and an extensive environmental review, Loki obtained a water licence in August, 1995 and began construction of a heap leach pad, constructing a berm and solution pond excavation ditch and stockpiling 300 000 tonnes of ore from the Upper Fosters Zone to be laid down as a pad overliner in spring, 1996. Present reserves will support production of 83 000 ounces per year for 8 years.

REGIONAL GEOLOGY

The Brewery Creek property is located in the foothills of the Ogilvie Mountains along the northeastern boundary of the Tintina Trench. This major topographic feature, the northwestern extension of the Rocky Mountain Trench, marks the trace of a dextral strike-slip fault system with an apparent offset of as much as 450 kilometres, and has apparently been active since at least mid-Cretaceous time (Gabrielse, 1991). At this latitude, the Tintina Fault juxtaposes late Proterozoic and Paleozoic rocks of the Selwyn Basin, to the northeast, against sheared, metamorphosed rocks of the Yukon-Tanana Terrane, to the southwest.

The property covers an area of clastic sedimentary rocks of the Cambrian to Lower Devonian Road River Group and the Devono-Mississippian Earn Group. Due to poor exposure, Earn Group rocks were not previously recognized in this area. Quartzite and argillite of the Late Proterozoic-Early Cambrian Hyland Group are exposed several kilometres west and north of the property. All of these rocks lie in the hanging wall of the south-dipping Robert Service Thrust, and are cut by stocks, dykes and sills ranging in composition from diorite to quartz monzonite and syenite. The intrusive rocks belong to the Tombstone Plutonic Suite of mid Cretaceous age.

Because this part of northern Yukon escaped continental glaciation during the most recent (McConnell) ice advance, a zone of deep weathering and oxidation was preserved which extends locally to depths of more than 100 metres. Another consequence of the lack of glaciation is that there are no till sheets to mask the geochemical response, and transport of geochemical anomalies is generally restricted to down-slope creep. Some areas of the property have a cover of 'loess' (windblown glacial silt or rock flour locally with admixed coarser material of local derivation) which may reach thicknesses of almost twenty metres locally (J.R. Allan, personal communication, October 1995). This has the effect of masking portions of geochemical patterns.

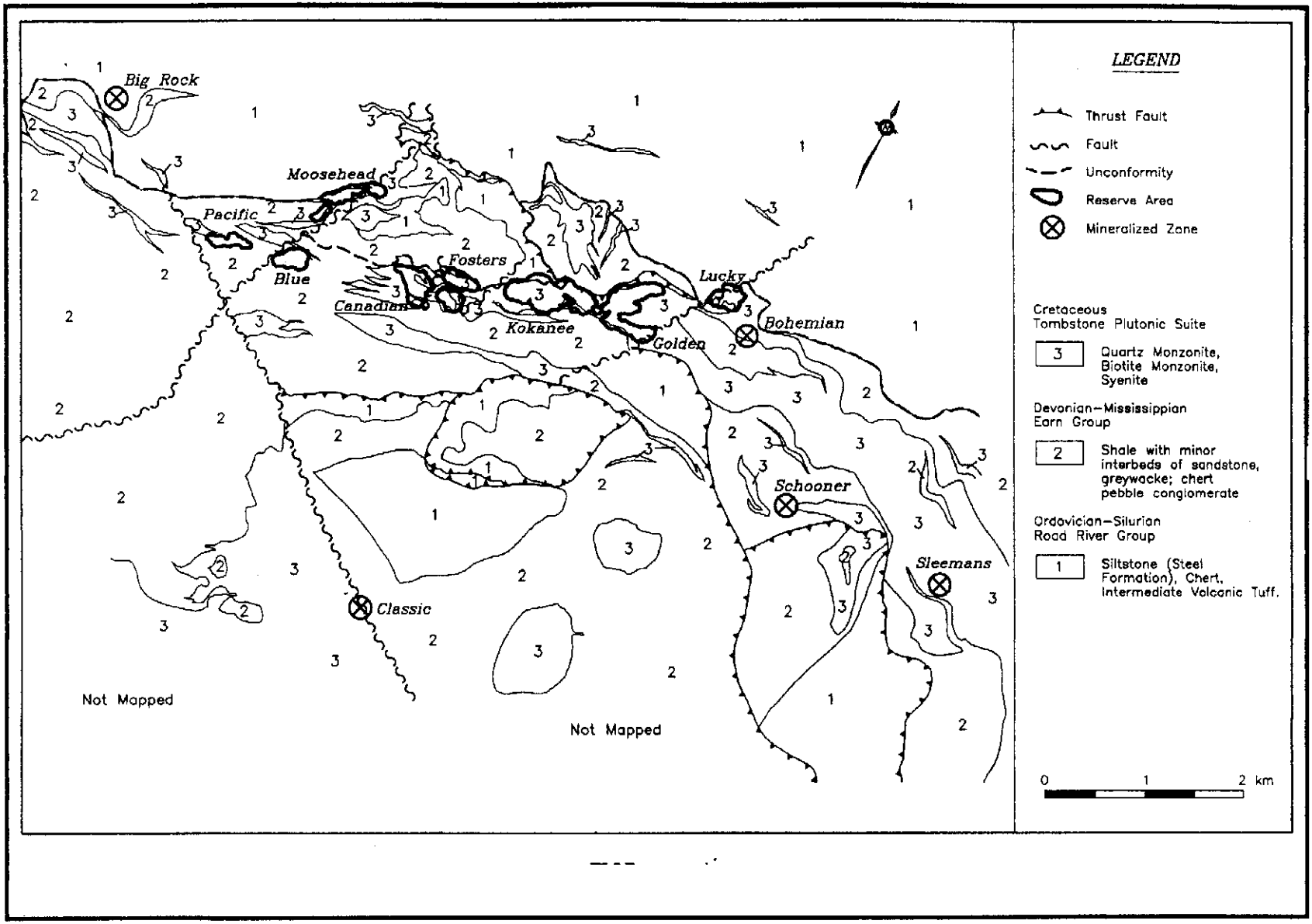
Property Geology

The following description of the geology of the Brewery Creek Property (see Figure 1) is derived largely from Diment (1995), and from an unpublished map prepared by Loki and based on the work of Bremner (1993-1994). Other information sources are cited as appropriate.

Stratigraphy

Two major packages of dominantly clastic sedimentary rocks are recognized at Brewery Creek (Bremner, 1993-1994; Diment, 1995). These units have been correlated with major packages within the Selwyn Basin stratigraphy.

The older strata, exposed on the northern portion of the property and generally lying north of the known mineralized zones, are correlated with units of the Road River Group. In the Nahanni map area to the southeast, this group was subdivided by Gordey and Anderson (1993) into the lower Duo Lake Formation of black siliceous graptolitic shale and chert overlain by the Steel Formation of orange-



Loki Gold Corporation
October 1995

Brewery Creek Project
Yukon Territory

G.R. Peatfield, Ph.D., P.Eng.
L.P. Taggart, P.Eng.

Figure 1: Brewery Creek Geology

weathering mudstone. At Brewery Creek, the Steel Formation consists of tan-weathering, wispy-laminated, 'burrowed' siltstones, with interbeds up to 10 metres thick of graphitic shale and chert, overlying massive black chert of the Duo Lake Formation, and calcareous andesitic flows, tuffs and breccias which are probably Late Cambrian or Early Ordovician in age, similar to the Menzie Creek volcanics at Faro. A conglomerate unit deposited at the top of the volcanic sequence consists of rounded volcanic clasts in a tuffaceous or calcareous matrix.

The top of the Road River succession was defined by Gordey and Anderson in the Nahanni map-area as the highest occurrence of wispy-laminated siltstone; the same criterion has been used at Brewery Creek. The contact between the Earn and Road River Groups is marked by a regional unconformity (Murphy and Héon, 1994).

At Brewery Creek, the Earn Group strata make up a heterogeneous package of rocks including shale, black graphitic argillite, greywacke, sandstone, tuffaceous chert and debris flow conglomerate, overlain by a distinctive sequence of felsic tuff, tuffaceous sandstone and tuffaceous shale. Volumetrically minor units include limestone, bedded barite and black graphitic argillite.

Structure

The stratified rocks generally strike northwest and dip moderately southwest. A few northerly dips show the presence of open, upright folds in the higher units of the Earn Group stratigraphy. Fold axes folds trend about 110° and plunge gently (about 10°) to the east. A well developed slaty cleavage occurs in finer grained clastic rocks. Local tight folds in Earn Group rocks probably reflect deformation related to thrust faulting and drag on normal faults.

The most important structures at Brewery Creek are imbricate low angle faults which strike generally west-northwest and dip to the south. Based on stratigraphic relationships, these are inferred to be thrust faults. They appear to have controlled the emplacement of Cretaceous quartz monzonite sills which host most of the gold mineralization. Later dip-slip movement on the faults is recorded by slickensiding and rotation of some of the sills and adjacent sedimentary rocks on curved fault surfaces, and the development of downward-stepping contacts and extensional fault wedges.

Shear zones with a prominent north-northeast (020° to 040°) vertical fracture cleavage cut the sills and sedimentary rocks overlying the thrust faults. Intense brecciation and silicification is associated with these shear zones, and in places they have been invaded by quartz monzonite dykes. The shear zones appear to terminate downward at the thrust surface, and may result from tear faulting contemporaneous with the thrusts. The relationship between the low angle faults, shear zones and quartz monzonite sills suggests that the intrusions are probably syntectonic, formed during an episode of Cretaceous deformation.

Other sets of subvertical fracture cleavages strike about 100° and are also mineralized. Both the 040° and 100° fracture sets show evidence of normal displacement in the form of steeply plunging slickensides, and offsets up to 3 metres. However, numerous subhorizontal slickensides suggest a significant component of strike slip motion.

The latest stage of faulting on the property involves unhealed structures. A north-northwest set consists of faults interpreted as steeply dipping reverse or normal faults which may have displaced stratigraphic units by as much as 50 metres. A second set strikes east-northeast and appears to have accomodated left-lateral displacements up to 200 metres. Both sets of faults truncate sulphide mineralization and all previously described structures, and thus will be of some importance during the detailed mine planning stage.

Intrusive Rocks

Several distinct intrusive rock types are present at Brewery Creek. The most important bodies from an economic point of view are semi-conformable sills of quartz monzonite, intruded into the upper Road River and lower Earn Group strata. These sills, which yielded a zircon age of 91.4 $\pm$ 0.2 Ma(Diment, 1995), have been exposed over a strike length of at least 12 kilometres and where cut by faults or shear zones, show evidence of gold mineralization over most of this distance. They appear to have been emplaced along Cretaceous thrust faults, mostly marked by zones of graphitic argillite; hornfels development is minimal, suggesting emplacement at a shallow depth. The sills range in thickness from 5 to 10 metres or less in the western portion of the property to greater than 100 metres in the east.

In the south-central portion of the property, stocks of syenite and biotite monzonite, as well as sills of the latter rock, have intruded tuffaceous shale, sandstone and chert of the Earn Group. These intrusive rocks tend to be relatively coarse-grained and equigranular, with well developed hornfels aureoles. With the exception of the Classic Zone, they appear to be unmineralized.

Mineralized Zones

There are at present eight defined ore zones (or groups of zones) and an additional five significant mineral occurrences presently known at Brewery Creek. Seven of the ore zones are distributed along a general easterly (mine grid) trend; the eighth lies to the north of this trend. From west to east along the trend, the zones are: Pacific, Blue, Canadian (and west Canadian), Fosters (upper and lower), Kokanee, Golden (upper and lower) and Lucky. The Moosehead Zone lies grid northeast of the Blue Zone. Southeastward along the main trend are the Bohemian, Schooner and Sleemans occurrences, while the newly discovered Big Rock area lies west of Pacific. The structurally unique Classic occurrence lies just over three kilometres south of Blue. The total distance between the occurrences at either end of the main trend is almost 12 kilometres.

Table 1 lists some generalized data on the shape, lateral dimensions and geological setting of the various zones. Some of the zones are at present little more than advanced exploration targets, and further work will change their dimensions. The lateral dimensions given are based on proposed pit outlines; in most cases, the actual deposit size is slightly smaller.

Zone	Dimensions	Geology	Comments
Pacific	450 x 150 m	mostly in sedimentary rocks	shallow oxidation
Blue	400 x 200 m	mostly in sedimentary rocks structurally complex, folded	shallow oxidation higher grade zone
Moosehead	750 x 150 m	quartz monzonite sill in seds dominantly fault controlled	north of the main trend includes small satellite shallow oxidation
Canadian	300 x 400 m	mostly limonite altered qtz. monz.	minor transition material
West Canadian	100 x 150 m	similar to Canadian zone	may be part of Canadian
Upper Fosters Lower Fosters	400 x 150 m 300 x 200 m	geology resembles Canadian two sills, faulted into sediments	minor transition material intercalated argillite
Kokanee	900 x 300 m	imbricate thrust sheets sills and intercalated sediments	some transition ore somewhat less oxidized
Upper Golden Lower Golden	650 x 250 m 550 x 150 m	imbricate thrust sheets sills and intercalated sediments	some transition ore lower zone less oxidized
Lucky	400 x 200 m	imbricate thrust sheets sills and intercalated sediments	some transition ore zone open down dip
Bohemian	not yet defined	at sill - argillite boundary	early stage target
Schooner	not yet defined	sills in intermediate tuffs	early stage target
Sleemans	not yet defined	sills and some argillite, oxidized	early stage target
Big Rock	not yet defined	thin sills in sediments	early stage target
Classic	not yet defined	within composite intrusive plug controlled by steep structure?	early stage target possible bulk tonnage

Table 1: Capsule Descriptions of Mineralized Zones

Mineralization and Alteration

Alteration

Alteration associated with the mineralized zones at Brewery Creek follows the major structures. Pervasive phyllic alteration predominates, and is best developed in the intrusive rocks. Altered rocks are characterized by destruction of mafic phenocrysts, alteration of feldspars to sericite (illite) and kaolinite, and introduction of secondary quartz with fine- grained pyrite and arsenopyrite. Intense kaolinization and silicification is localized in narrow vertical shear zones and is associated with high gold grades. A weak propylitic halo, characterized by chloritization of mafic phenocrysts and strong carbonatization, commonly occurs peripheral to mineralized zones.

Alteration, sulphide distribution and gold mineralization all appear to be lithologically controlled. Those units which deformed in a brittle fashion, such as intrusive rocks, sandstone, siltstone and tuff tend to be more strongly altered, due to fault-induced permeability. Shale and argillite tended to deform plastically and are much less altered and mineralized.

Mineralogy

Mineralogy at Brewery Creek appears to be very simple. Below the zone of weathering, fine-grained pyrite, arsenopyrite and some marcasite are disseminated within quartz veinlets and areas of pervasive silicification. Ion microprobe studies at the University of Western Ontario (Chryssoulis and Agha, 1990) on selected samples showed that gold occurs primarily as extremely fine (micron-sized) particles or as 'solid solutions' in arsenopyrite and pyrite growth bands around larger sulphide grains. The sulphide grains themselves are generally less than 250 microns in diameter. Other sulphide minerals noted by Chryssoulis and Agha included trace amounts of chalcopyrite, sphalerite and pyrrhotite.

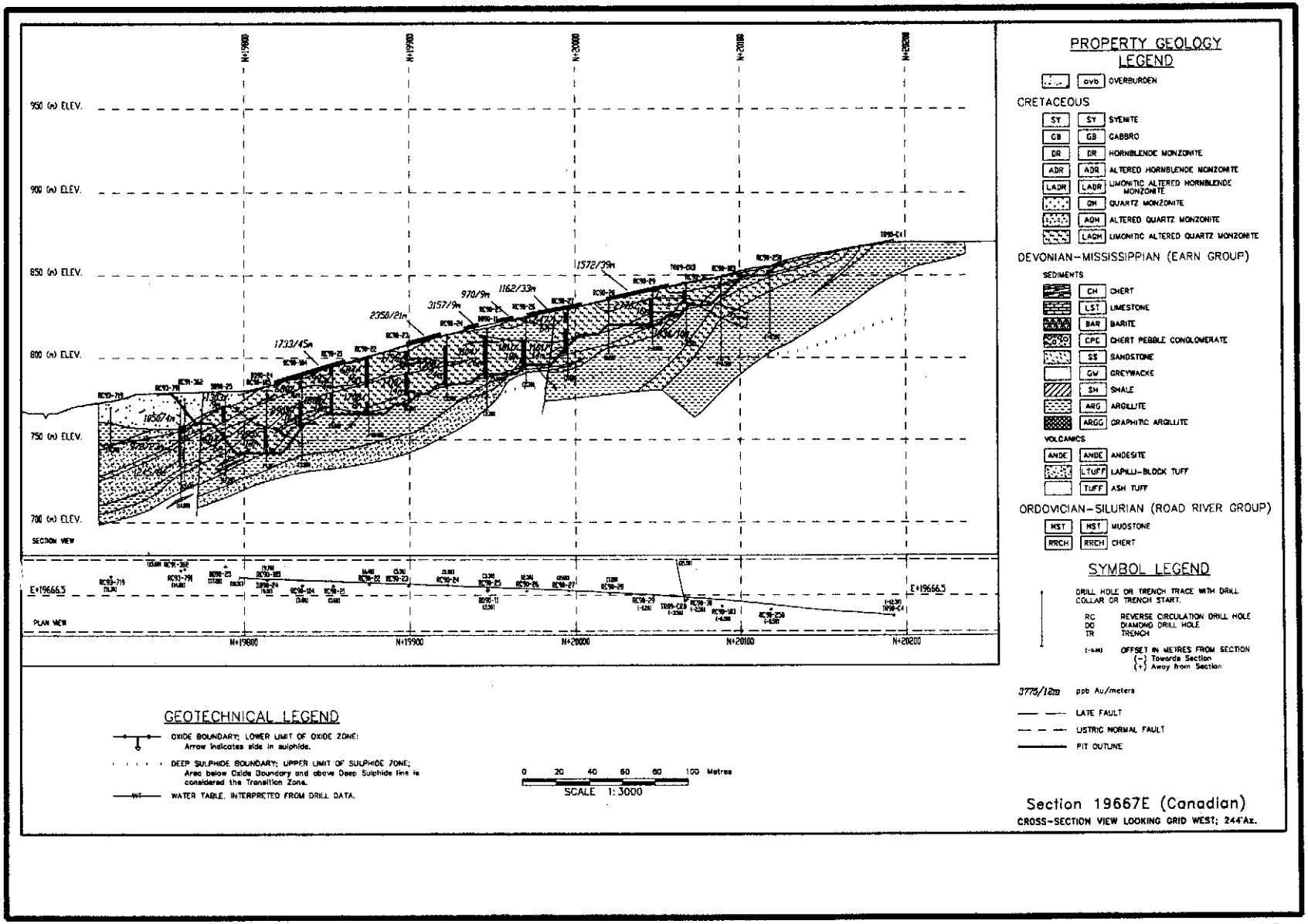
Within the zone of weathering, which is extensive and reaches an average depth of 50 metres, sulphides have in general been converted to goethite ($Fe_2O_3.H_2O$) and scorodite ($FeAsO_4.2H_2O$). Macroscopic free gold has not been observed. However, unoxidized veins of coarse-grained stibnite are commonly preserved. The stibnite veins appear to post-date the main period of mineralization, and rarely contain significant gold values.

Structural Controls

The primary control of sill emplacement and gold mineralization seems to be a series of imbricate east to east-southeast trending thrust faults, which have been traced for more than 12 kilometres and probably extend further in each direction. In a few cases, the thrust faults cross-cut stratigraphy. The faults juxtapose brittle coarse clastic, volcanic or intrusive rocks against underlying graphitic argillite. They are associated with parallel zones of mineralization which dip 5° to 60° south in the fractured and altered hanging wall rocks. Mineralized zones are contained within altered and fractured rocks lying above the faults and the footwall argillite is generally barren (Figure 2).

A further control on gold mineralization appears to have been exerted by subvertical west-northwest and north-northeast shears in the hanging wall rocks. These fractures are generally filled by narrow (less than 1 centimetre) en echelon quartz veinlets containing fine disseminated sulphides. Locally, as in the Golden Zone bulk sample trench, such fractures coalesce into quartz breccia zones up to several metres wide. These mineralized structures are not generally traceable into the footwall rocks.

In the case of the Classic Zone, low grade gold mineralization is hosted by a small hornblende monzonite stock three kilometres south of the main trend of ore bodies along a northwest-trending normal fault. A strong arsenic soil anomaly the trend of this structure for about three kilometres northwest to the Pacific Zone. The significance of this structure and its mineralization are as yet unknown and require further exploration.



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Brewery Creek Project
Yukon Territory

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Figure 2; Canadian Zone Cross-section

Lithologic Controls

Eighty-five percent of the known gold mineralization at Brewery Creek is contained within altered quartz monzonite. Biotite monzonite and syenite are hosts for gold mineralization at the presently under-explored Classic Zone, where the intrusive rocks form stocks rather than sills or dikes. Whole-rock analyses of intrusive rocks suggest a positive correlation between gold content and alteration, which is characterized by consistent sodium and potassium depletion and silica enrichment in the mineralized zones, except in the case of the Classic Zone, where high sodium levels are reported.

Only the Pacific, Blue and Moosehead zones contain significant amounts of gold mineralization in sedimentary rocks. Here, sandstone, shale and greywacke have been pervasively silica flooded, and en echelon hair-line quartz veinlets, commonly with envelopes of kaolin, occur along bedding planes. Sulphides, especially arsenopyrite, are finely disseminated in unweathered rocks, up to as much as 15 percent in places.

In the Schooner Zone, ash tuffs have been altered and cut by stockworks of chalcedonic quartz. Bleached sericite haloes have formed around the more siliceous zones; pyrite occurs on fracture surfaces and along bedding planes. Ash tuff appears to be a favourable host rock which has been under-explored to date.

Argillite, the most common rock type in most of the zones, is generally unmineralized. Elevated gold contents are in most cases confined to highly sheared graphitic contacts between argillite and overlying mineralized intrusive rock or coarser clastic lithologies.

'Preg-robbing' Rocks

Of special concern at Brewery Creek is the tendency for some of the shales and argillites to remove gold from the pregnant solutions in a heap leach environment and fix it so that it cannot be dissolved and recovered. Numerous tests have been performed on samples of both argillite and graphitic argillite, from surface exposures and drill holes.

Lenses of potentially preg-robbing argillite occur either below or within mineralized zones. The purpose of the testing was to examine the magnitude of the potential problem, and to estimate how much, if any, selective mining might be required. The results of the tests showed that there is a strong correlation between preg-robbing tendencies and both the oxide/sulphide interface and the position of the paleo-water table boundary, leading to the following conclusions:

1. Within the oxide zones of the deposits (i.e. areas with significant limonite content and an absence of visible sulphides) above the paleo-water table, argillite (whether obviously graphitic or not) does not have preg-robbing characteriostics. Neither the percentage of visible graphite nor its morphology (even where described as massive, 'sooty' graphite) appear to have any effect on leach rate or gold recovery.

2. Within the oxidized portions of the deposit lying below the paleo-water table, argillites may be weakly to moderately preg-robbing.

3. Within the 'transition zone', where both limonite and sulphides are noted, argillite is commonly weakly preg-robbing if lying above the paleo-water table and is moderately to strongly preg-robbing if lying below.

4. Within the sulphide zones of the deposits (i.e. in areas with > 1% sulphides and an absence of visible limonite), argillites are strongly preg-robbing.

Surprisingly, there appears to be no recognizable correlation between graphite content of argillite and the degree of preg-robbing characteristics.

AGE AND CLASSIFICATION OF DEPOSITS

Diment (1995) described the Brewery Creek deposit as a member of the "adularia-sericite" class of epithermal precious metal deposits, as described by Hayba et al. (1985), Heald et al. (1987) and Panteleyev (1991). This classification of Brewery Creek appears to have been based on several factors, perhaps the most important being the generally low concentrations of sulphides and the typical chemical signature of gold, silver, arsenic, antimony, mercury and barium. As with other adularia-sericite type deposits, gold mineralization does not appear to be confined to one rock host rock type.

The mineralization must be mid-Cretaceous or younger, based on its spatial relationship to brittle faults cutting the Cretaceous intrusions. Several quartz monzonite dykes have invaded steep shear zones which cut quartz monzonite sills in the same area, providing evidence of late magmatic activity which could be related to the gold mineralization.

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