Tom Schroeter
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TECHNICAL REPORT

GEOLOGICAL EVALUATION

of the

CASSIAR GOLD CAMP

BRITISH COLUMBIA

for

CUSAC GOLD MINES LTD.

by

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1.0 SUMMARY

This report has been prepared at the request of Guilford Brett and Markus Seywerd of Cusac Gold Mines Ltd. The objective of the report is to provide an independent geological evaluation of the Cassiar Gold Camp and a strategy to guide exploration. The results of the evaluation show that high potential for gold vein deposits exists in the camp, and a two-phase exploration programme with a total budget of $2.3 million is recommended.

The camp comprises a number of high-grade underground gold mines and placer workings in the Cassiar District of northern British Columbia. Total camp production to date is about 423,500 oz (13,172 kg) of gold. Current reserves from structures amenable to underground mining in all categories are about 27,500 oz (854 kg) of gold. Recent work by Cypress Canada Inc. and International Taurus Resources Inc. on bulk tonnage vein and alteration systems amenable to open pit mining has defined a drill-indicated resource of about 410,000 oz (12,752 kg) of gold.

The Cassiar Gold Camp comprises a 15 km long gold-bearing hydrothermal system that developed along and adjacent to the northerly-trending Erickson Creek Fault Zone. The vein systems extend outward from the fault zone within corridors spaced 400 m to 600 m apart in the southern portion of the camp and 1,500 m apart in the northern portion of the camp. Thorough exploration of unexplored corridors along the fault zone, which have geological features similar to productive areas, could result in discoveries of new vein systems, similar to the high-grade ones that have already produced gold, or significant bulk tonnage vein and alteration systems. Because the hydrothermal system also encompasses the unexplored adjacent Beaton Creek, Boomerang-Lyla Fault Zones, similar structures along Finlayson Creek, eastern side of Table Mountain and Huntergroup Massif, these areas also have a potential for discoveries of high-grade vein systems.

The author concludes that the Cassiar Gold Camp has a high potential for discovering new high-grade gold vein systems similar to the ones already mined, and for bulk tonnage gold vein and alteration systems. Persistent exploration could result in discoveries, similar to the successful producers in the camp. The author recommends a two-phase exploration program. Phase I, with a budget of about $1.3 million, is proposed to explore four high priority targets: Target 1 - Gap Area, Sky-Jill Gap Area, Jill Vein Extension, Hot Vein Extension, Sky Vein Extension; Target 2 - Bear Vein Extension, Jennie-Maura-Alison Vein Extension; Target C - Taurus-88 Hill Vein System; and Target B - Wings Canyon Vein System (Figure 3 after page 17 and Figure 4 after page 23). Phase II, with a budget of about $1 million, is proposed to explore four lower priority targets: Target 3 - North Pete Vein System, Pooley Pass Area; Target 4 - Kelly Vein Extension, Switchback Vein Extension; Target 5 - Beaton Creek Fault Zone; and Target A - Newcoast-Van Vein System (Figure 3 after page 17 and Figure 4 after page 23). In addition to these eight targets, a potential exists for finding volcanogenic massive sulphide deposits along an unexplored stratigraphic unit with several known massive sulphide occurrences.

2.0 INTRODUCTION

This report has been prepared at the request of Guilford Brett and Markus Seywerd of Cusac Gold Mines Ltd. The objective of this report is to provide an independent geological evaluation of the Cassiar Gold Camp and a strategy to guide exploration.

The Cassiar Gold Camp comprises a number of high-grade narrow vein underground mines and placer workings in the Cassiar District of northern British Columbia. Total camp production to date is about 423,500 oz (13,172 kg) of gold. Current reserves from structures amenable to underground mining in all categories are about 27,500 oz (855 kg) of gold. Recent work by Cypress Canada Inc. and International Taurus Resources Inc. on low-grade bulk tonnage targets amenable to open pit mining has defined an indicated resource of 410,000 oz (12,752 kg) of gold.

The author of this report was associated with an earlier operator, Erickson Gold Mines Ltd., from 1983 to 1985. During this period, the author conducted geological studies on vein alteration and age dating for the purpose of M.Sc. thesis at The University of British Columbia, and he also worked as a project geologist for minesite exploration.

A site visit was conducted from September 8th to September 17th, 1998 at which time a review of data from Cusac Gold Mines Ltd.'s files was conducted. The assistance of Guilford Brett, President, Michael Glover, Mine Geologist, and Dan Brett, Site Supervisor, in reviewing and discussing various aspects of the camp is acknowledged.

The report is based on data from Cusac Gold Mines Ltd.'s files provided by the company, which are believed to be accurate. Although all reasonable care has been taken in the preparation of this report and the author stands behind his interpretations, the author is not responsible for errors and inaccuracies arising from data that might not be accurate.

3.0 LAND TENURE AND PROPERTY

Cusac Gold Mines Ltd. presently controls all of the hard rock mining claims and a number of placer claims in the Cassiar Gold Camp, located in the Liard Mining District. The property has been acquired by direct staking, outright purchase and option agreements. Most of the claims are owned outright, with some subject to option payments and net smelter royalties, or net profit interests. The author has not verified the title to these claims or the underlying agreements, as these are beyond the scope of this report.

The Table Mountain processing and support facilities consist of a 300 ton-per-day gravity-floatation mill, power plant, service facilities, offices, core library, cookhouse, bunkhouses and recreation hall. A newly-completed and permitted tailings pond, with several years capacity, is adjacent to these facilities, which are centrally located in the camp adjacent to McDame Lake and Highway 37. Additional service facilities are located at the Cusac mine in the southern portion of the camp, and at the Taurus mine in the northern portion of the camp.

4.0 LOCATION

The Cassiar Gold Camp is in northern British Columbia, 115 km southwest of Watson Lake, Yukon, and 120 km northeast of Dease lake, British Columbia (Figure 1). The town of Cassiar is at the northwestern end of the camp; the settlement of Jade City is in the centre. Access to the camp is via Highway 37, which connects to Watson Lake and Dease Lake. Numerous secondary haul roads connect to all parts of the camp.

The camp covers these areas: McDame Creek valley at McDame Lake; the lower tributary valleys of Snowy Creek, Troutline Creek, Quartzrock Creek and Finlayson Creek; the upper valley of Pooley Creek; all of Table Mountain; and the lower slopes of Mount McDame and Huntergroup Massif. Placer workings extend from McDame Lake down McDame Creek for 20 km.

Other prominent geographic features frequently referred to include 88 Hill west of Taurus Mine, Wings Canyon at the confluence of Troutline Creek and Quartzrock Creek, McDame Lake in McDame Creek valley, Lang Creek west of McDame Lake, Callison Lake northeast of Erickson Mine and Needlepoint Mountain west of Cusac Mine.

Valley bottoms comprise shallow lakes and swamps with thick stunted growths of pine and spruce. Treed areas extend to upland areas where they give way to open brush and alpine meadows. Although the surrounding mountainous areas are rugged, much of the camp area has rolling topography.

5.0 HISTORY

Gold was discovered in the Cassiar District in 1874. The district developed into one of British Columbia's major placer camps with most production between 1874 and 1895. The largest nugget discovered in British Columbia, 73 oz, came from this camp (Barlee 1980). Minor small scale placer mining continues today.

Although placer production in the district was significant, little was done prior to 1933 to locate lode gold deposits. In 1934, the first gold-bearing quartz veins were found in Quartzrock Creek. Following this, numerous veins were discovered and many claims staked. The higher-grade portions of these veins were exploited by small-scale mining over the next forty years. At one point in time, half-a-dozen abandoned millsites with capacities of less than 12 tons per day existed in the area. Well-known individuals that played an important role in the early years of the emerging gold camp include John Vollaug, Hans Ericksen, J.R. Boulton, John Hope, F. Callison, Pete Hamlin, and Fred and Guilford Brett. Cusac's interest in the area began with the prospecting efforts of Fred and Guilford Brett who formed Glen Copper Mines Ltd., which evolved into Cusac Industries Ltd., and in 1995, Cusac Gold Mines Ltd.

The first larger operation started in 1978 when the Agnes and Jennie Mining Company Limited and Nu-Energy Development Corp., which later amalgamated to become Erickson Gold Mining Corporation, commenced production from the Jennie Vein in the Erickson Mine. In 1979 and

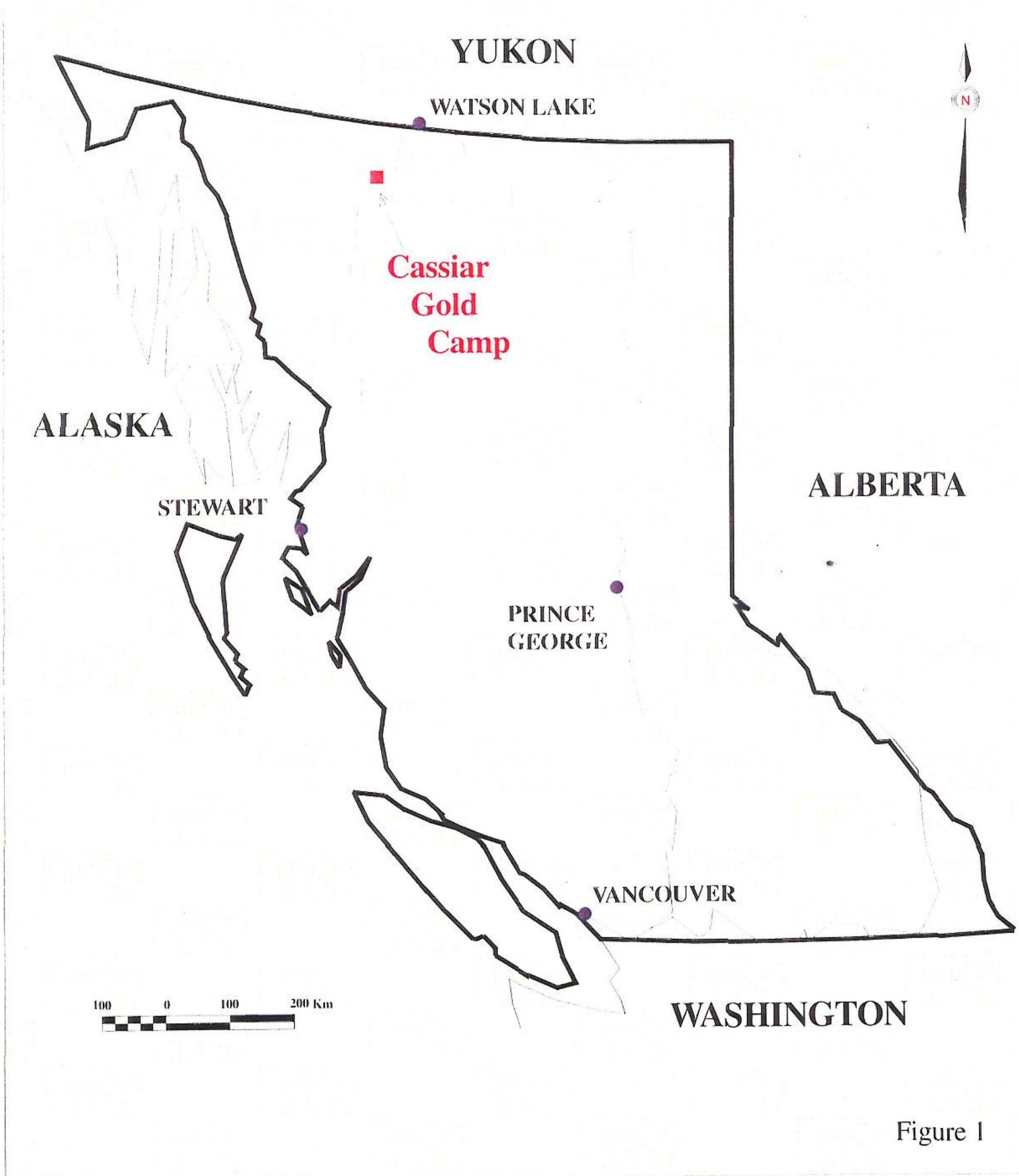

Figure 1

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1980, Cusac conducted work in the area of the Cusac Mine. During 1980, Plaza Mining Corporation commenced open pit production from the eastern portion of the Vollaug Vein. Between 1978 and 1984, development of the Erickson Mine, also known as the Main Mine, was expanded to include workings on four main levels to exploit the Jennie, Maura, Alison and Bear Veins. Esso Resources Canada Limited conducted exploration around the Main Mine in the early 1980's.

Exploration around Quartzrock Creek by United Hearne Resources Limited in the late 1970's lead to commencement of production at the Taurus Mine in 1981, which continued until 1988. At the same time, Sable Resources Ltd. and Plaza Resources Ltd. developed underground workings on the east side of 88 Hill.

Cusac discovered several veins in 1982 and conducted minor work on them. In 1983, Erickson commenced production from the Troutline Mine at the eastern end of the Vollaug Vein and from various open pits along it. Following this in 1984, Cusac optioned its property to Erickson, which had acquired Plaza in the previous year, and continued to expand its property holdings.

In 1985, Total Compagnie Francaise des Petroles acquired operating control of Erickson, renamed the company Total Energold Corporation, commenced production from the Eileen Vein (Cusac Mine) in 1986, and discovered additional veins in the area. During 1988, Total started work on the 10 level, a 2.5 km drift to access the Michelle High Grade zone, which could not be accessed from the Cusac Mine because of high water flows. Production from the Cusac Mine and Main Mine ceased, with only minor production continuing on the Vollaug Vein. Work on level 10 ceased in 1989 due to high costs and high water flows.

Total elected to divest themselves of all North American mineral assets in 1991. Cusac purchased these assets, free and clear of any royalties to Total, re-opened the Cusac Mine, and in 1993 commenced production on the Bain Vein.

In 1995, Cyprus Canada Inc. entered into agreements with International Taurus Resources Inc and Cusac to conduct the Taurus project in the northern portion of the camp with the objective of defining a low-grade bulk tonnage resource amenable to open pit mining. Cyprus conducted extensive drilling and defined an inferred resource. In 1996, Cyprus withdrew from the project and Cusac entered into an agreement with Taurus, who conducted additional drilling and defined and indicated resource. In 1998, Cusac entered into an agreement with Taurus to option their claims. This agreement, which was completed in late September, 1998, is the first consolidation of all property holding in the Cassiar Gold Camp under one operator.

6.0 GEOLOGICAL SETTING

The Cassiar Gold Camp is in the Sylvester Allochthon of the Slide Mountain Terrane (Gabrielse 1963; Gordy et *al.* 1982; Harms 1984, 1986, 1989; Harms et *al. 1989*; Nelson and Bradford 1989, 1993). The allochthon occupies the flat-bottomed McDame synclinorium, which lies on autochthonous rocks of the Cassiar Terrane. It comprises gabbro, pillowed and massive basalt, banded chert, carbonate, argillite, ultramafics and minor arenite of Late Devonian to Late Triassic age.

The internal structure of the Sylvester Allochthon is characterized by many interleaved tectonic slices, bounded by subhorizontal, layer-parallel faults. These lithotectonic slices are an order of magnitude smaller than the terrane itself, and they consist of a single rock type, or a few repeated rock types. Small numbers of slices occur together in larger second-order packages, which are also fault-bounded and lensoidal (Harms 1986).

Nelson and Bradford (1989, 1993) divided the allochthon into three stacked structural-lithological packages. Division I, the lowest, is a sedimentary sequence that occurs along the margins. The middle, Division II, is an ophiolitic assemblage that occupies the central portion and contains two major ultramafic sheets. Division III, the upper, is an island-arc unit that caps the Division II at higher elevations. The Cassiar Gold Camp is within Division II.

The Sylvester Allochthon responded to Jurassic compressional tectonics by thrusting along easterly-directed thrusts rather than regional-scale folding. This resulted in the stacking of the three divisions into their present arrangement (Nelson and Bradford 1989, 1993). The synclinal geometry resulted from the formation of anticlinal stacks on either side during compression. In addition, emplacement of the Cassiar batholith uplifted the pile contributing to the consistent northeastward dip along its western margin.

7.0 CAMP GEOLOGY

7.1 Lithological Units

Rocks in the Cassiar Gold Camp have been informally divided into lower, middle and upper thrust sheets for mine geology purposes (Figure 2). The lower and middle thrust sheets belong to Division II of Nelson and Bradford (1989, 1993); the upper to Division III. The lower thrust sheet comprises three volcanic-sedimentary subunits; the middle, Table Mountain Sediments (TMS) and the upper, Huntergroup Volcanics. A major ultramafic sheet separates the lower and middle thrust sheets (Harms et *al.* 1989; Nelson and Bradford 1989, 1993).

The basal volcanic-sedimentary subunit of the lower thrust sheet comprises basalt, pillow-basalt breccias and tuff interbedded with black clastics. It is exposed west of the camp along the margins of the allochthon and was intersected at depth in drill holes in the western and northwestern part of the camp. The unit does not host any of the veins in the camp. It does host three known massive sulphide occurrences, as well as a silica-pyrite replacement body on Mt. McDame.

The middle subunit, which comprises mafic extrusive rocks interlayered with bedded chert and argillite, crops out along the northeastern and southwestern margins of the camp along ridges and valley sides. It does not crop out extensively within the camp; however, it underlies much of the camp as shown in drill hole intersections. Correlations are made using green to maroon and red

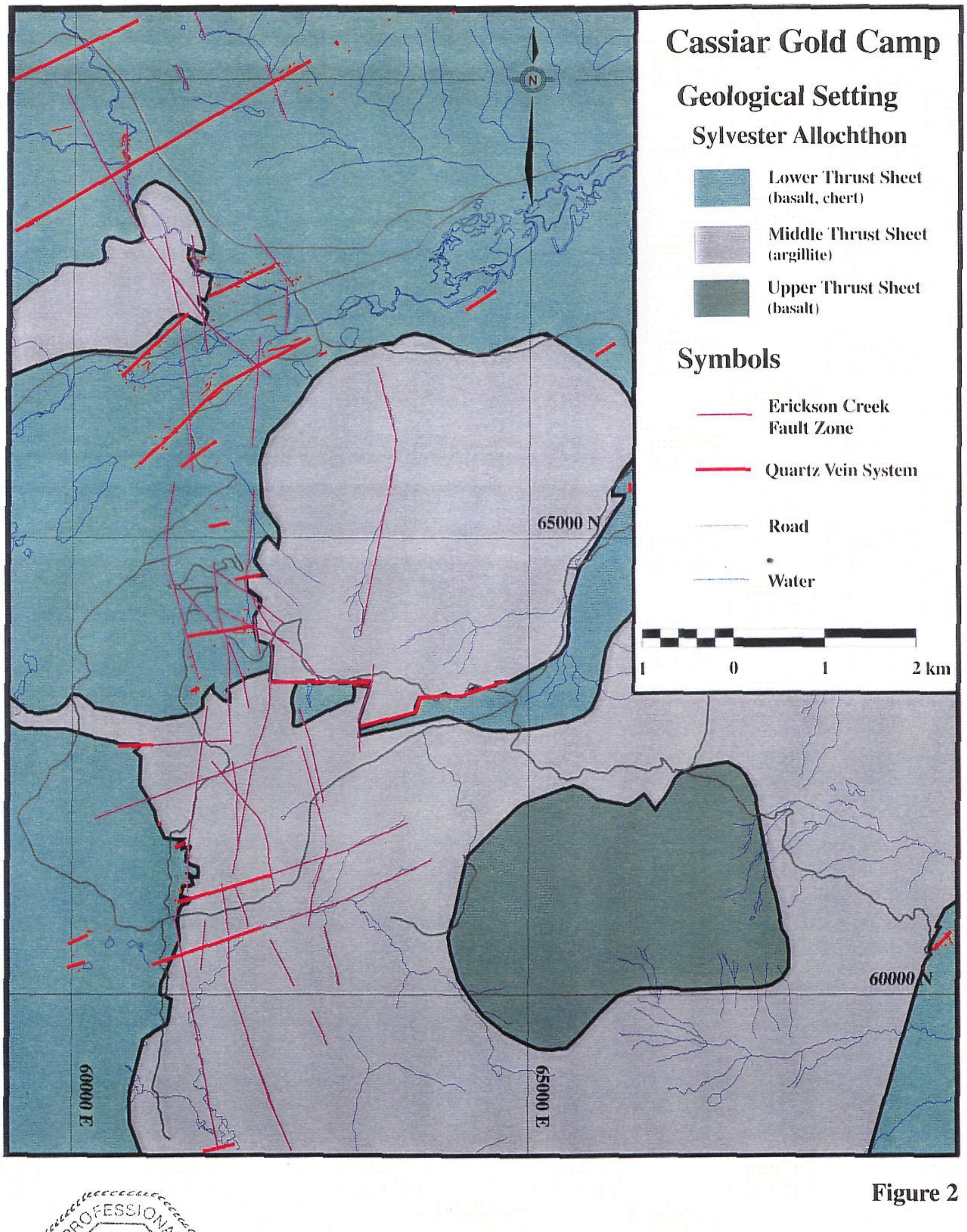

Figure 2

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chert, bedded rhodonite northeast of Taurus Mine and bedded magnetite in lower portion of Erickson Mine. The unit does not host significant veins and is more amenable to development of silicification as the rocks are brittle and shatter as noted in the lower levels of the Erickson Mine.

The upper subunit is the most widespread and crops out over most of the camp. It comprises massive and pillowed basalt with rare chert intercalations. The lower portion of this unit in the Taurus area is marked by magnetite and jasper-rich basalt. The presence of magnetite-rich basalt elsewhere in the camp suggests this rock type is more widespread than recognized. The non-magnetic and non-jasper-bearing basalt sequence hosts most of the vein systems in the camp and has been the focus of exploration.

TMS of the middle thrust sheet cap basalt of the lower thrust sheet. They crop out extensively in the southern portion of the camp on Table Mountain and in the lower areas surrounding the Huntergroup Massif. In the northern portion of the camp, they locally form thin klippen. They comprise thin-bedded slaty siltstone, sandstone, calcareous mudstones and grey limestone. Veins rarely extend up into these rocks.

A thin discontinuous sheet of ultramafic rocks occurs at the base of the TMS. The sheet locally thickens to large bodies in the order of hundreds of metres across. Near vein systems, these ultramafic rocks are altered to a quartz-carbonate-fuchsite assemblage, referred to as listwanite. Some of the carbonate-mica alteration extends up into the overlying black sedimentary rocks.

Huntergroup Volcanics comprise the Huntergroup Massif, which caps TMS in the southeastern portion of the camp. It comprises augite porphyry flows, tuffs, breccias, tuffaceous sandstones and scattered limestone pods. The unit does not host any of the veins in the camp.

Diabase and lamprophyre dykes crosscut all lithologies including veins. Dykes are steeply dipping and strike easterly. Xenoliths of granitic rock occur in several dykes throughout the camp.

7.2 Structural Features

Structural features are divided into two temporal groups: an early one related to the formation of the allochthon with pre-and syn-mineralization structures; and a late one with post-mineralization structures. The early group contains thrust faults and related folds along with accompanying foliations and joints that parallel veins. The late group contains high-angle faults that offset veins. Some of the late faults are antecedent structures. Although they are clearly associated with mineralization, movement is post-mineralization.

7.2.1 Early Structural Features - Thrust Faults

The axis of the McDame Synclinorium lies along Quartzrock Creek and passes over Table Mountain through the centre of the Huntergroup Massif. The structural style along the axis is long, structurally-controlled flats characterized by klippen of TMS and Huntergroup Volcanics. Along the western margin of the allochthon, which is adjacent to Cassiar Gold Camp, the flats pass into short easterly dipping frontal ramps. On the eastern side of the synclinorium, the flats pass into westerly dipping frontal ramps.

On the eastern slope of Table Mountain, a frontal ramp places the older upper subunit of the lower thrust sheet over younger TMS of the middle thrust sheet. This structure is interpreted by Harms et *al.* (1989) to join up with a steeply north-dipping, easterly-trending fault along the south side of Table Mountain. The orientation of this fault, which is like a frontal ramp with Table Mountain on the northern up-thrown side, is anomalous. Ball (1989) suggests that it is associated with significant changes in orientation of the bottom of the middle thrust sheet. These ramps are interpreted to root into a flat beneath McDame Creek valley (Harms et *al.* 1989).

In the Taurus Mine and 88 Hill area, several moderately easterly-dipping reverse faults are present: Decline, Taurus West and unnamed faults (Broughton and Masson 1986; Read and Psutka 1983). Movement on these structures is post-mineralization; however, they may be antecedent frontal ramp structures that root into a flat developed along the hanging wall of argillite of the lower subunit of the lower thrust sheet. This argillite was intersected at depth in drill holes west of 88 Hill.

Smaller second order lithotectonic units are present along the sole of major thrust faults where structural imbrication is common. On the western side of Table Mountain below the sole of the middle thrust sheet that comprises TMS, a package of rocks referred to as the Sediment-Volcanic Unit crops out (Ball 1989). A thin ultramafic sheet locally altered to listwanite occupies its sole thrust fault. Rocks within this unit are brecciated and foliated to varying degrees. This is the greatest thickness of deformed rocks known in the camp. The presence of this anomalous thickening may be a reflection of doming that produced the Table Mountain anticline on the north side of the east-west frontal ramp that occurs along the south side of Table Mountain (see section 7.2.2 - Anomalous Folds). These features could be important in the formation of veins within the Erickson Mine, which was the largest producer in the camp. Similar structural patterns were noted in drill core at the same structural level on the eastern margin of Table Mountain. Mapping by Pantaleyev and Diakow (1982) in the northern portion of the camp along the lower reaches of Troutline Creek, Quartzrock Creek and Snowy Creek, outlined several suspected thrust faults that possibly bound second order lithotectonic units.

Deformation along some thrust faults is intense (Diakow and Panteleyev 1981; Gordey et *al.* 1982; Ball 1985, 1989). Along the sole thrust near Needlepoint Mountain and at the base of the middle thrust sheet comprising TMS, a weak transposition fabric is present that grades into a cataclastic foliation along the contact. Augen and blocks of more competent rocks are set in a sheared and rodded argillaceous shale matrix. The ultramafic sheet at the base of the TMS is marked by discontinuous tabular lenses of intensely-foliated serpentinite or listwanite up to 10 metres thick with a lateral extent several times larger. The ultramafic sheet is locally structurally-imbricated with adjacent lithologies. Listwanite is black adjacent to argillaceous rocks.

7.2.2 Early Structural Features - Folding

Synclinorium Folds

Folds, with a trend similar to the synclinorium and probably related to its formation, are widespread. Northwesterly-trending bedding that dips southwesterly and northeasterly supports this observation. Along the western margin of the synclinorium, a syncline was noted between Troutline Creek and Lang Creek (Diakow and Pantaleyev 1981). In the northern portion of the camp, a northwesterly-trending anticline occurs southeast of Taurus where chert of the middle subunit of the lower thrust sheet is exposed (Read and Psutka 1983; Broughton and Masson 1996). This anticline plunges into the Taurus Mine area where chert is encountered in the lower levels of the mine. Chert sequences were also encountered at depth in two other locations, 88 Hill and west Troutline Creek, and are probably anticlines (Broughton and Masson 1996). Northeast of Snowy Creek, a syncline-anticline pair occurs in the middle subunit of the lower thrust sheet (Diakow and Pantaleyev 1981). In the southern portion of the camp, a syncline occurs along the high point of Table Mountain (Diakow and Panteleyev 1981). Minor folds are locally common within outcrops of TMS. At the Cusac Mine, Ey (1986) documented various styles of minor folds trending northwesterly within chert units.

Cross-Folds

A second set of younger folds trending east-northeastly is present. These folds probably represent perpendicular cross-folding undulations that have been documented by Ey (1986) in various styles of minor folds within chert units at the Cusac Mine. Northeasterly-trending bedding that dips northwesterly and southeasterly is supportive of this observation. Diakow and Panteleyev (1981), and Nelson and Bradford (1993) also documented a northeasterly-trending set of minor folds. Klippen of TMS at Erickson Mine and north of McDame Lake trend east to northeasterly and may be preserved because of the cross-folding. Fold axes in the earlier northwesterly-trending folds plunge both northwesterly and southeasterly, which may be a reflection of the east-northeasterly-trending folds.

Anomalous Folds

The axis of a large anticline that forms Table Mountain and crests along the south side trends easterly. This fold orientation may be related to a steep east-west thrust fault on the south flank (Ball 1989; Harms et *al.* 1989). The orientation of this reverse fault, which is like a frontal ramp with Table Mountain on the northern up-thrown side, is anomalous. The development of the anticline may reflect doming, which is consistent with kinematic indicators on the Vollaug Vein (Ey 1987, Nelson 1990; Nelson and Bradford 1993) that indicate a southerly vergence for the middle thrust sheet comprising TMS. This is opposite of the expected vergence from a northeasterly-directed thrust system that stacked each of the lithotectonic packages higher in the sequence from sources further west (Nelson and Bradford 1993). Alternatively, the easterly-trending anticline may be a variant of the younger east-northeasterly-trending cross-folds influenced by the older east-west thrust fault. The slightly northeasterly elongate shape of the Table Mountain klippen is suggestive of this.

7.2.3 Early Structural Features - Planar Fabrics and High-Angle Faults

Synclinorium Fold Fabrics

A steep northwesterly-trending cleavage is common throughout the camp and is geometrically consistent with the older northwesterly-trending folds (Diakow and Panteleyev 1981; Ball 1985, 1988, 1989; Ey 1986; Nelson and Bradford 1993). Crenulation lineations parallel to these fold axes occur locally.

Cross Fold Fabrics

A northeasterly-trending shallowly-dipping cleavage is locally common (Diakow and Panteleyev 1981; Ball 1989) and may be related to the younger northeasterly-trending folds.

Joints-Fractures

A strong northeasterly-trending joint-fracture set is widespread (Gabrielse 1963; Diakow and Panteleyev 1981; Read and Psutka 1983; Ey 1986; Harms 1988; Ball 1989; Nelson and Bradford 1993). In most cases, these structures have negligible offset. Diakow and Panteleyev (1981) related them to the northeasterly-trending folds.

Northeasterly Faults

Along the western margin of the allochthon, northeasterly-trending faults offset the contact with underlying autochthonous rocks (Diakow and Panteleyev 1981; Panteleyev and Diakow 1982, Nelson and Bradford 1993). Prominent northeasterly-trending photo lineaments that extend into the camp suggest that some of these faults continue through. Read and Psutka (1983) mapped northeasterly-trending sinistral faults between Quartzrock and Snowy Creeks that offset lithological contacts. Vein systems are associated with east-northeasterly-trending shear faults that parallel veins, splay off them and lie within or form one of the walls (Read and Psutka 1983; Ball 1985, 1989; Ey 1986, 1987).

7.2.4 Late Structural Features - High-Angle Faults

Northwesterly and Northerly Faults

Late structural features consist of northerly and northwesterly-trending faults that offset veins and the northeasterly-trending faults. Most of these are high-angle structures. Exceptions are the northerly-trending Decline Fault and Taurus West Fault in the Taurus Mine area, which dip moderately to the east (Read and Psutka 1983; Broughton and Masson 1996), and the Maura West Fault in the Erickson Mine, which dips moderately to the northwest (Ball 1989).

Erickson Creek Fault Zone (ECFZ)

Prominent late structures occur in a northerly-trending belt, which extends for 15 km from south of Cusac Mine, through Erickson Mine to north of Taurus Mine. They are collectively referred to as the Erickson Creek Fault Zone (ECFZ). Movement along the ECFZ is dextral with the eastern side downdropped (Ey 1986).

In the southern portion of the camp south of McDame Lake, the ECFZ is dominated by a duplex fault and photo linear system spaced about 500 to 1,000 metres apart. Prominent structures that comprise the system are the Lily Fault in the Cusac Mine, and the 30-40 Fault, 2810 Fault and Maura East Fault in the Erickson Mine. Within the ECFZ, northwesterly and northeasterly-trending structures that offset veins are present locally.

In the northern portion of the camp north of McDame Lake, the ECFZ swings slightly west of north as it is offset by sinistral northeasterly-trending faults (Read and Psutka 1983). The system is not as well-defined in this area; however, the presence of strong northerly-trending structures along Wings Canyon and the Decline Fault, Taurus West Fault and adjacent faults in the Taurus Mine area indicate a zone of disruption (Read and Psutka 1983; Broughton and Masson 1996).

Beaton Creek Fault Zone (BCFZ)

A prominent northerly-trending simplex fault and photo linear system occurs 1,000 metres east of the ECFZ. It comprises the Beaton Creek Fault Zone (BCFZ), which offsets the Vollaug Vein with a dextral, east side down movement. Photo lineaments coincide with Beaton Creek, upper portions of Snowy Creek and tributaries to upper Pooley Creek.

Boomerang-Lyla Fault Zone (BLFZ)

A north-northeasterly-trending simplex fault system (Nelson and Bradford 1989, 1993), herein referred to as the Boomerang - Lyla Fault Zone (BLFZ), occurs within and along the western side of the allochthon. The Boomerang and Lyla veins occur along a klippen of TMS adjacent to this structure, which has east side down movement.

Regional High-Angle Faults

Two prominent northerly-trending regional faults that parallel the ECFZ, BCFZ and BLFZ occur adjacent to the Cassiar Gold Camp. They comprise Marble Creek Fault (MCFZ) and Rosella Fault (RFZ) (Harms 1989; Nelson and Bradford 1989,1993). These faults have eastern sides down-dropped, similar to the ECFZ, BCFZ and BLFZ, which are dextral. The Marble Creek Fault and Rosella Fault occur within rocks of the Cassiar Terrane that underlie the Sylvester Allochthon. Although their proportions are not indicative of significant crustal breaks, they are large enough and probably extend deep enough to suggest that they could be a major controlling feature for a hydrothermal system.

Although movements on structures comprising the ECFZ are post-mineralization, at least some of them must be antecedent as most vein systems in the camp are spatially related to them. This relationship is also manifested at the Christine Vein on the east side of Table Mountain and at the Huntergroup Veins on the east side of the Huntergroup Massif. These are outside of the ECFZ and BCFZ; however, they are associated with northerly-trending structures.

East-Northeasterly Faults

A small set of faults trending east-northeasterly occurs throughout the camp. These include faults along the Sky, Lyla and southern part of the Vollaug veins. They are related to significant changes in the orientation of the bottom of the middle thrust sheet (Ball 1989). Some of these are antecedent structures as they control the veins.

8.0 MINERALIZATION

8.1 Mineralization Types

Previous Work

Veins have been well-described by Mandy (1935, 1937), Diakow and Panteleyev (1981), Grant (1981), Pantaleyev and Diakow (1982), Fjetland (1982), Hooper (1984), Dussel (1986), Ball (1985, 1989), Sketchley (1986, 1989), Gunning (1988), Broughton and Masson (1986), and Panteleyev et *al.* (1997). Panteleyev et *al.* (1997) developed a general model for mesothermal gold-bearing quartz veins of the Cassiar Gold Camp that illustrates the spatial relationships of the various vein types within lithotectonic units and a possible genetic connection to a cryptic intrusion (Nelson 1990; Nelson and Bradford (1989, 1993).

Vein Stages

Veins in the Cassiar Gold Camp consist of early barren quartz veins without visible alteration; main stage barren and gold-bearing quartz veins with sericite-ankerite alteration envelopes; and late barren quartz-carbonate veins with kaolinite-ankerite alteration envelopes. Early veins are widespread; main stage veins are generally confined to well-defined vein systems; and late veins locally crosscut and brecciate earlier veins.

Main stage white quartz veins form a continuum from barren to strongly mineralized. Barren and weakly-mineralized veins are usually single stage with minor sulphides, whereas strongly-mineralized veins are composite structures with abundant banding and varying amounts of sulphides. Several stages of white quartz veins are present: barren; silver-rich with low Au:Ag ratios; and gold-rich varieties with Au:Ag ratios about one.

Clear quartz veins, containing pyrite, sphalerite and tetrahedrite with uncommon chalcopyrite, galena and arsenopyrite, crosscut gold-bearing white quartz veins. Gold is usually associated with sulphides. Minor tourmaline is present in veins in the Taurus Mine area.

Spatial and Geometric Relationships

Panteleyev and Diakow (1982) recognized two fundamental vein types: Type I veins hosted by basalt of the upper subunit of the lower thrust sheet; and Type II veins that occur along the contact of the bottom of the middle thrust sheet as shown in Diagram 1 (Panteleyev et *al.* 1997). Gunning (1988) and Broughton and Masson (1996) described another style of mineralization; pyritic replacement zones.

Type I Veins

Type I veins occupy steeply-dipping east-northeasterly to northeasterly-trending, subparallel fractures that comprise the majority of veins in the camp. A small number of veins trend northerly. Most veins are short and narrow and pinch and swell along strike. Many are sigmoidal, dipping steeply north, and terminate by pinching, horsetailing or as knots or localized bulbous masses. North-northeasterly-trending tension gashes occur along the margins of individual veins indicating veins formed in a sinistral shear environment. Veins are typically up to one metre wide and several tens of metres long. Some are several metres wide and hundreds of metres long. Late crosscutting faults have broken veins into numerous segments that appear to be separate structures.

Type I veins occur within the lithostratigraphic horizon comprising basalt that lies above chert of the middle subunit of the lower thrust sheet and below the contact of the bottom of the middle thrust sheet that comprises TMS. Most veins in the areas around Cusac Mine, Erickson Mine and north of Taurus Mine lie immediately below TMS and form thicker structures that are more persistent. The upper 30 m of these veins are the most productive in the camp with gold grades decreasing and becoming more erratic down dip into the roots of the system. In the Taurus Mine area, most veins are lower in the lithostratigraphic sequence closer to the chert and form wider systems comprising narrower, less persistent structures that are lower in grade, but contain higher gold in altered wallrocks.

In summary, there appears to be a continuum from widespread, lower-grade systems of multiple veins with high gold contents in altered wallrock, upward into narrower, erratic and lower-grade single structures that pass into consistently higher-grade composite structures in wallrocks immediately under the cap of TMS. In the Cusac Mine and Erickson Mine, veins root into a prominent chert unit in the lower portions of the mines, although structural imbrication under the lower contact of the middle thrust sheet does complicate this relationship. In the central part of the camp, there is a transition from narrower, erratic and lower-grade single structures on the south side of McDame Lake to widespread, lower-grade systems of multiple veins under a cap of TMS on the north side of McDame Lake. This could be a function of a major structure along McDame Creek and/or a thinning of basalt that forms the upper subunit of the lower thrust sheet.

Type II Veins

Type II veins occupy the shallowly-dipping plane of the thrust fault that occurs at the bottom of the middle thrust sheet comprising TMS. Most veins are along the footwall of the ultramafic

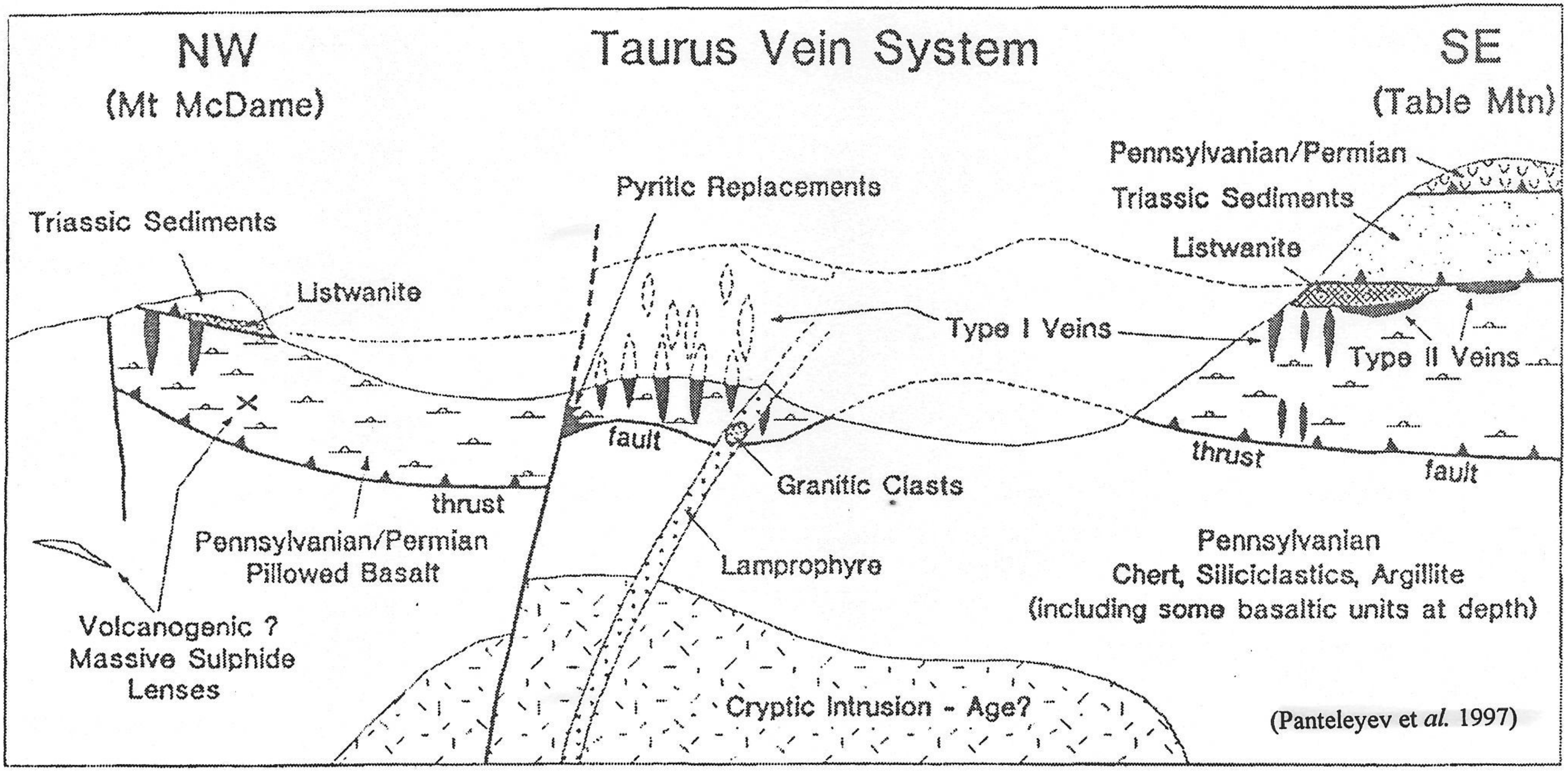


Diagram 1. Schematic model for gold mineralization in the Cassiar district showing relationship between Type I steep, volcanic-hosted veins and Type II ribboned, carbonaceous veins at volcanic-sediment contacts, commonly thrust faults, with listwanite alteration. A hypothetical cryptic intrusion (Nelson, 1990) is shown, as suggested by the presence of granitic clasts in lamprophyre dikes that cut mineralization.

sheet, which is generally altered to listwantite, or extend up into it. Uncommonly, veins extend up into TMS where they pinch rapidly. Veins have a characteristic ribboned appearance from carbon-rich stylolites. Veins are generally less than two metres thick, but can be up to four metres. Thicker, productive vein segments appear to be related to rolls along the contact or anomalous thickening of listwanite.

The best Type II vein example is the Vollaug Vein, which extends for almost three kilometres along Table Mountain. Other smaller veins or vein segments are the Jennie's Revenge Vein in the Erickson Mine, the tops of larger structures in the Cusac Mine and area, some of the Hunter Veins on the east side of Huntergroup Massif, and veins under klippen of TMS north of McDame Lake.

Pyritic Replacement Zones

Pyritic replacement zones occur in the Taurus West area and along the lower decline in the Taurus Mine. They are characterized by 10 % to 40 % fine-grained to euhedral pyrite in a carbonate-altered rock. Zones commonly display a finely-banded shear fabric. Quartz veins are notably absent, and contacts with unaltered basalt are typically very sharp.

8.2 Alteration Types

Strong wallrock alteration, which can be an important exploration guide, is associated with gold-bearing veins hosted by mafic and ultramafic rocks. Within mafic rocks, basalt is altered to a sericite-ankerite-quartz assemblage that forms well-developed envelopes around veins (Sketchley 1986,1989). Envelopes are surrounded by widespread propylitic alteration. More intense alteration adjacent to veins commonly contains coarse disseminated pyrite, commonly with anomalous gold values. Carbon-rich zones and crackle brecciation, comprising quartz and carbon, are locally common in more intense alteration. At the Taurus Mine, pyritic alteration envelopes contain enough gold to constitute a potentially-mineable resource. Within ultramafic rocks, serpentinite is altered to talc, talc-breunerite-quartz and breunerite-quartz-fuchsite assemblages with increasing intensity (Dussel, 1986).

8.3 Vein Systems

Geometry

Vein systems extend outward from the ECFZ and are up to five kilometres long. The length of the systems is a function of exposure and may be controlled by the BCFZ and the BLFZ, which occur within two to three kilometres of the ECFZ. The longest system, Wings Canyon, occurs in a relatively flat, and extensive, but thin exposure of basalt of the upper subunit of the lower thrust sheet that lies just on top of chert of the middle subunit and beneath a cap of TMS.

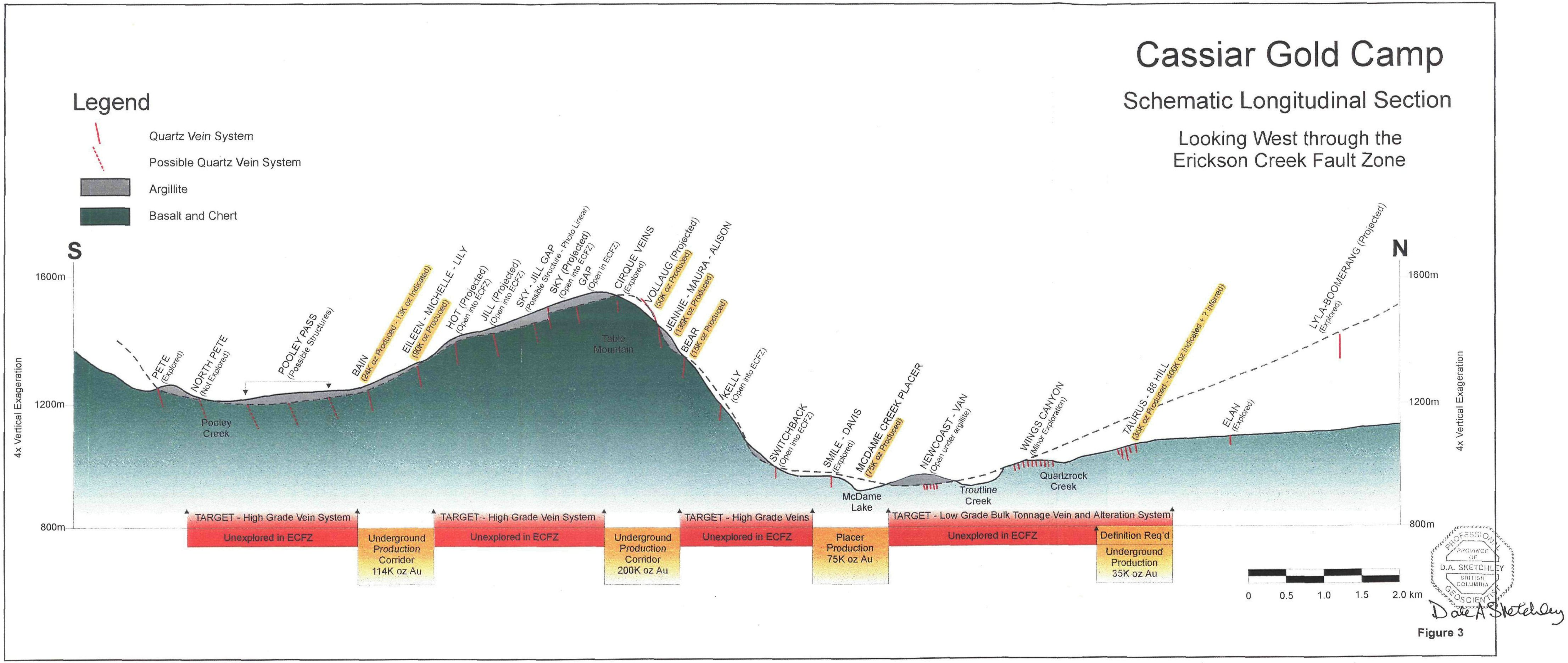
The known extent of vein systems south of Wings Canyon, is limited because of a thick cap of TMS to the east and a deeper erosional level to the west. North of Wings Canyon, the systems progressively extend further west from the ECFZ to the BLFZ. This may be due to the presence of TMS close to chert, which underlies host basalt. The northern systems do not extend further east. Reasons for this are not known.

Along the ECFZ, there is a crude periodicity of vein systems. North of McDame Lake where wider systems are present, they are spaced about 1,500 metres apart. South of McDame Lake where narrower systems are present, they are spaced about 400 to 600 metres apart. This apparent periodicity could be used to guide exploration where gaps exist along the ECFZ.

Names and Locations

The following is a list of known vein systems in the camp from north to south. Vein or area names for each system and mines are tabulated. These systems are shown on Figure 3, a schematic longitudinal section of the Cassiar Gold Camp, and include gaps along the ECFZ with high exploration potential.

1. Lyla-Boomerang: Easterly-trending Type I silver-rich veins along north side of klippen of TMS on southeast side of Mount McDame.
    - Lyla, Boomerang
2. Elan: Easterly-trending Type I silver-rich vein system that is three kilometres long extending from Quartzrock Creek to southeast side of Mount McDame.
    - Elan, Lucky
3. Taurus-88 Hill: Broad easterly-trending Type I vein system that crosses Quartzrock Creek at the Cassiar access road.
    - Taurus, 88 Hill, Highway Zone, Taurus West, Mack, Hopeful
    - Taurus Mine, Plaza Adit, Sable Adit
4. Wings Canyon: Broad northeasterly-trending Type I vein system extending from north of Highway 37 west of McDame Lake to east of Snowy Creek.
    - Reo, Left Shoe, Blueberry Hill, Red Rock Canyon, Klondike, Snowy Creek, Rich, Berube
5. Newcoast-Van: Broad northeasterly-trending Type I vein system that includes several smaller Type II veins and extending from west end of McDame Lake to north of Highway 37 at Jade City.
    - Rocky Ridge
    - Newcoast 1 adit and Newcoast 2 adit
6. Smile-Davis: Northeasterly-trending Type I vein system extending from Callison Lake four kilometres to the northeast along the south side of McDame Creek.
    - Nora, Goldhill, Lakeview, Porcupine, Dorothy, Callison Lake
7. Switchback: Northeasterly-trending Type I vein on south side of tailings pond adjacent to klippen of TMS.
    - Esso
8. Kelly: Northeasterly-trending Type I vein southeast of 1140 portal of Erickson Mine adjacent to small exposure of listwanite.



Cassiar Gold Camp
Schematic Longitudinal Section
Looking West through the Erickson Creek Fault Zone
Legend
Quartz Vein System
Possible Quartz Vein System
Argillite
Basalt and Chert
S
N
1600m
1200m
800m
4x Vertical Exageration
PETE (Explored)
NORTH PETE (Not Explored)
POOLEY PASS (Possible Structures)
BAIN (24K oz Produced - 13K oz Indicated)
EILEEN - MICHELLE - LILY (90K oz Produced)
HOT (Projected) (Open into ECFZ)
JILL (Projected) (Open into ECFZ)
SKY - JILL GAP (Possible Structure - Photo Linear)
SKY (Projected) (Open into ECFZ)
GAP (Open in ECFZ)
CIRQUE VEINS (Explored)
VOLLAUG (Projected) (58K oz Produced)
JENNIE - MAURA - ALISON (135K oz Produced)
BEAR (15K oz Produced)
KELLY (Open into ECFZ)
SWITCHBACK (Open into ECFZ)
SMILE - DAVIS (Explored)
MCDAME CREEK PLACER (75K oz Produced)
NEWCOAST - VAN (Open under argillite)
WINGS CANYON (Minor Exploration)
TAURUS - 88 HILL (33K oz Produced - 400K oz Indicated + ? Inferred)
ELAN (Explored)
LYLA-BOOMERANG (Projected) (Explored)
Table Mountain
Pooley Creek
McDame Lake
Troutline Creek
Quartzrock Creek
TARGET - High Grade Vein System
Unexplored in ECFZ
Underground Production Corridor 114K oz Au
TARGET - High Grade Vein System
Unexplored in ECFZ
Underground Production Corridor 200K oz Au
TARGET - High Grade Veins
Unexplored in ECFZ
Placer Production 75K oz Au
TARGET - Low Grade Bulk Tonnage Vein and Alteration System
Unexplored in ECFZ
Definition Req'd
Underground Production 35K oz Au
0 0.5 1.0 1.5 2.0 km
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Dale A Sketchley
Figure 3

- 1140 level of Erickson Mine

9. Bear: Northeasterly-trending Type I veins under contact of TMS.
   - Dease, Devine, Goldie, McDame
   - 1210 and 1140 levels of Erickson Mine and Bear Open Pit
10. Jennie-Maura-Alison: Northeasterly-trending faulted segments of Type I vein under klippen of TMS that appears to trend into a Type II vein (Jennie's Revenge).
    - Caitlin, Jennie's Revenge
    - 1350, 1280 and 1210 levels of Erickson Mine
11. Vollaug: Easterly-trending Type II vein under TMS that cap Table Mountain.
    - Table Mountain Mine, Vollaug 4700 and 5700 Mine Levels, Troutline Mine, Finlayson Mine, Plaza Open Pit, numerous Vollaug Open Pits
12. Cirque: Several small northeasterly-trending Type I veins that occur on the west side of the cirque above Erickson Mine.
    - Cirque, Top
13. Gap: Diamond-drill hole intersection with gold-bearing quartz vein.
    - Gap
14. Sky: Type I vein along steeply north-dipping major east-west fault that juxtaposes black clastics up against the normal sequence of TMS - Listwanite - Basalt.
    - Sky
15. Sky-Jill Gap: A prominent northeasterly-trending photo lineament similar to those at the Eileen-Michelle-Lily and Bain system.
    - Possible vein system
16. Jill: Northeasterly-trending Type I vein adjacent to TMS.
    - Jill
17. Hot: Northeasterly and northerly-trending Type I veins adjacent to TMS.
    - Cominco, Flat
    - Hot Open Pit
18. Eileen-Michelle-Lily: Northeasterly-trending Type I vein system under TMS.
    - Eileen South, Big, Michelle High Grade, Fred, Dino, Prosser, East-West, L, Heather
    - Cusac Mine
19. Bain: Northeasterly-trending Type I veins system under and within listwanite adjacent to TMS.
    - Katherine, Bonanza, Marion, Amber
    - Bain Mine

20-21. Pooley Pass: Large gap along ECFZ with possible vein system.

20. North Pete: Several small quartz stringers along north side of major listwanite body.
    - North Pete
24. Pete: Easterly-trending Type I vein along south side of major listwanite body.
    - Pete, Cabin

Significant veins or vein systems that occur outside of the main camp area are tabulated as follows.

1. Jade: Northerly-trending vein on south slope of Table Mountain within TMS along photo lineament of BCFZ.

2. Christine: Northerly-trending Type I vein in Finlayson Creek on east side of Table Mountain along contact of TMS.

3. Meg: Northeasterly-trending Type I vein in basalt on northeast flank of Table Mountain.

4. Huntergroup: Easterly to northeasterly-trending Type I and II veins on the east side of Huntergroup Massif along contact of TMS.
   - Hunter, Hunter South, Theresa, Cassy

8.4 Deposit Model

Nelson (1990), Nelson and Bradford (1989, 1993) and Panteleyev et al. (1997) discussed formation of the mesothermal gold-quartz vein deposits of the Cassiar Gold Camp. Although the system has characteristics that resemble classic mesothermal lode gold deposits, major structures within and bounding the Sylvester Allochthon are flat in contrast to regional breaks associated with major camps. Northerly-trending structures that control the distribution of veins, ECFZ, BCFZ and BLFZ, although significant, are not major crustal breaks. Similarly, east-northeasterly structures that host and are associated with the veins are minor without significant offsets. Suggestions that these structures developed in an extensional environment related to dextral movement on major northwesterly-trending regional faults are not compatible with vein system geometry. The geometric pattern of these structures is that of a box-shaped array, not the expected en echelon pattern. In addition, the veins are considered to have formed at about 130 Ma (Panteleyev 1982; Sketchley 1986; Sketchley et *al.* 1986) when the regional strain pattern was compressive, not extensional. This age, which was recently confirmed by Panteleyev (personal communication 1998), postdates emplacement of the Cassiar Batholith, which might have contributed to development of the host fractures.

An alternative proposal for development of the camp by Nelson (1990) and Nelson and Bradford (1989, 1993) is that of an intrusion driven hydrothermal system. Evidence for a cryptic intrusion beneath the camp comes from the 130 Ma date of formation, granite clasts that occur in a number of post-mineralization lamprophyre dykes and the spatial disposition of the actinolite-epidote isograd. The granite clasts occur in dykes from the Table Mountain area to north of Snowy Creek and contrast with dykes north of the camp that contain clasts of subjacent miogeoclinal units, but not granite (Read and Psutka 1983; Sketchley 1986; Nelson 1990; Nelson and Bradford 1989, 1993). The isograd generally follows the eastern edge of the Cassiar batholith; however, it swings east around the camp in an anomalously-wide arc. Based on textural and age relationships, actinolite that formed within the isograd is not related to the Cassiar Batholith.

The ECFZ, which has late dextral movement (Ey 1986, 1987), may have developed as a cross fault in response to dextral motion on major northwesterly-trending regional faults. The orientation of the ECFZ at 000^0 is compatible with development of dextral synthetic Riedel fractures between regional faults striking 165^0. The MCFZ, BLFZ, ECFZ and BCFZ appear to be arranged en echelon in a northwesterly-trending array, supporting this hypothesis. Northerly-trending structures that control the Christine and Hunter Veins may be manifestations of this array. The structural regime at this time (130 Ma) was compressive and hence would not facilitate development of northerly-trending dilatent structures that could host veins, although they do occur.

Dextral motion on the ECFZ may have caused minor sinistral movement along pre-existing east-northeasterly-trending fractures. Tension gashes within a duplex fault system striking 000^0 would be expected to develop at 045^0, and antithetic Riedel fractures with sinistral movement at 075^0. Vein systems in the camp strike from 060^0 to 105^0, have sinistral movement and are parallel to subparallel to regional fractures and joints. The box-shaped array of veins are analogous to antithetic Riedel fractures occurring along and controlled by anastomosing faults of the ECFZ, which is an antecedent structure. Movement along undulating fractures hosting the veins would adequately account for the dilation needed in development of Type I veins and is compatible with the geometry of tension gash veins that formed along vein margins.

The development of Type II veins along Table Mountain is related to shearing with a southerly vergence of the middle thrust sheet, i.e. tops to south movement (Ey 1987). Doming from emplacement of a buried intrusion would account for this movement, create dilatant zones for Type I veins and explain the sigmoidal shape of some structures. Further evidence is provided by vein dips throughout the camp, which suggest uplifting. In the southern part of the camp, veins tend to dip steeply north, whereas in the northern part of the camp at the Taurus Mine veins tend to dip steeply south (Broughton and Masson 1996). Doming could be related to southerly-directed thrusting along the reverse fault that bounds the Sky vein on the southern side of Table Mountain. This movement may have caused development of the Table Mount Anticline and an anomalous thickening of structural imbrication in that area (Ball 1985). This area occupies the centre of the camp and was the most productive.

The architecture of the hydrothermal system that formed gold-bearing quartz veins appears to have been controlled by the ECFZ and possibly the adjacent BLFZ and BCFZ. The ECFZ, which is an antecedent structure, is probably related to emplacement of a buried intrusion responsible for the system. The two different structural regimes presented to explain vein development would have been operative at the same time, further linking the ECFZ to a buried intrusion.

Veins are not prevalent lower in the lithostratigraphic package, possibly because chert is more prevalent and because of its brittle nature, it would effectively shatter, making it more amenable to development of broad zones of silicification. Vein systems in the northern portion of the camp are empirically associated with anticlinal structures in the chert (Broughton and Masson 1996), which suggests a focusing of fluids. Vein systems above chert tend to be widespread with narrower veins, which may reflect shattering in the brittle underlying rocks as fractures coalesced and developed better in overlying mafic volcanic rocks. Higher gold contents in altered wall rocks above chert may reflect precipitation of gold by flooding as fluids moved upward and out of chert into a new physiochemical environment. Higher up in the systems, fluid flow would have coalesced more into single stage barren to low-grade veins and then up into composite higher-grade veins under incompetent carbonaceous black clastics. These rocks effectively capped the hydrothermal system, damming fluids, and because of their carbonaceous nature may have facilitated precipitation of gold.

8.5 Mineralization Controls

Mineralization controls are features that characterize productive structures throughout the camp. They are useful in guiding exploration for extensions to known vein systems and in anomalous gaps between productive areas. Important mineralization controls are listed as follows.

1. Proximity to antecedent northerly-trending structures. Prominent northerly-trending structures in order of importance are ECFZ, BCFZ and BLFZ. Less prominent structures include faults along the Christine and Huntergroup veins. Productive veins occur within the ECFZ duplex and generally within one kilometre of the bounding faults.
2. Northeasterly-trending fracture zones. Dominant fracture systems may be related to faults that offset allochthon margins. Several vein systems that extend under TMS are marked by prominent photo lineaments.
3. An apparent periodicity between vein systems. In the northern portion of the camp, this is about 1,500 m; in the southern portion about 400 to 600 m.
4. A cap of incompetent carbonaceous rocks such as TMS.
5. Rolls in the lower contact of the TMS. Productive sections of the Vollaug Vein are adjacent to a roll that defines the Table Mountain Anticline.
6. An apparent thickening of listwanite. Prominent listwanite bodies occur adjacent to the Pete Vein, the Bain Vein, the Eileen-Michelle-Lily Vein and the Jennie-Maura-Alison Vein systems. Listwanite isopachs along the Vollaug vein suggest productive zones are spatially related to thicker sections of listwanite.
7. An apparent periodicity of ore shoots along veins. Along the Eileen-Michelle-Lily Vein system, the ore shoots are about 80 to 130 m long with barren gaps of 65 to 110 m (Downie 1997).
8. Rake of veins. The Eileen-Michelle-Lily Vein system appears to rake to the east. This may be related to a sinistral movement along shears hosting veins coupled with a southerly vergence of the middle thrust sheet, i.e. north side of the structures move upward and to the west. This hypothesis suggests exploration should be initiated on the western side of the controlling northerly-trending structures under caps of TMS.

9.0 PRODUCTION

The Cassiar Gold Camp is one of British Columbia's major placer districts with recorded production of about 74,500 oz of gold (2,317 kg) between 1874 and 1895 (Holland 1950). Minor placer production still continues today. The first hardrock production was in 1934 when one ton of rock containing four ounces was shipped out. In 1939, 114 oz (3.5 kg) of gold was recovered from 130 tons taken from the Jennie Vein. During the 1940's, 1950's and 1960's, a maximum of 100 tons of ore was mined from the main deposits in the camp (Diakow and Panteleyev 1981). The largest producer in the camp, the Erickson Mine, was in operation from 1979 until 1988. Approximately 150,000 oz (4,666 kg) of gold were produced from the Jennie-Maura-Alison and Bear Vein systems (Glover 1998). The Taurus Mine operated between 1981 and 1988 and produced 35,000 oz (1,089 kg) of gold (Trenaman 1997). A small amount of this production came from the Plaza adit and open cuts on 88 Hill. The Vollaug Vein was mined from various open pits and underground workings between 1980 and 1997. Approximately 50,000 oz (1,555 kg) of gold were produced from this structure (Glover 1998). Mining commenced on the Eileen-Michelle-Lily Vein system in 1986 and continued until 1997 with about 90,000 oz (2,799 kg) of gold produced (Glover 1998). Production from the Bain Vein system spanned the period from 1993 to 1995 and totalled 24,000 oz (746 kg) of gold (Glover 1998). Recorded production from the camp totals about 423,500 oz (13,172 kg) of gold.

Silver production from various deposits in the camp generally amounts to 75% of gold production. A summary of gold production from major vein systems in the camp is given in Table 1.

Table 1. Cassiar Gold Camp Production

Vein System or Area	Tons (x 1,000)*	Head Grade* (oz/ton)	Ounces (x 1,000)*
Jennie-Maura-Alison & Bear	300	0.50	150
Eileen-Michelle-Lily	150	0.60	90
Bain	60	0.40	24
Vollaug	170	0.30	50
Taurus	318	0.12	35
McDame Creek Placer	N/A	N/A	74.5
Total	N/A	N/A	423.5

* Approximate values obtained from internal company technical reports.

10.0 RESERVES

Current reserves for the property are 73,250 tons of 0.375 oz/ton of gold for a total of 27,456 ounces (854 kg) of gold in all categories (Glover 1998).

+ Tailings: 700,879 tonnes @ 1.25 g/t Au

11.0 EXPLORATION TARGETS

11.1 Camp Overview

Several types of exploration targets exist in the Cassiar Gold Camp. High-grade quartz vein systems that historically produced most of the gold. These are discussed in order of priority under Target Areas 1 to 5 (Figure 4). Recent work by Cypress Canada Inc. (Broughton and Masson 1996) explored widespread lower-grade vein and alteration systems for mineable bulk tonnage resources. These are discussed in order of priority under Target Areas A to C (Figure 4). Within the northern portion of the camp in Target Area C, gold-bearing pyritic replacement mineralization occurs and is discussed separately. Several areas that contain gold-bearing veins outside the main productive camp corridor and several occurrences of volcanogenic massive sulphides that occur along the western margin of the allochthon are also discussed separately.

11.2 Target Areas

11.2.1 Target Areas - High-Grade Quartz Vein Systems

Area 1

Area 1 comprises a large gap along the ECFZ between the Cusac Mine and the Erickson Mine. Five locations within this area are marked on Figures 3 and 4. Locations in order of priority for follow-up are: Gap, Sky–Jill Gap, Jill Vein Extension, Hot Vein Extension and Sky Vein Extension.

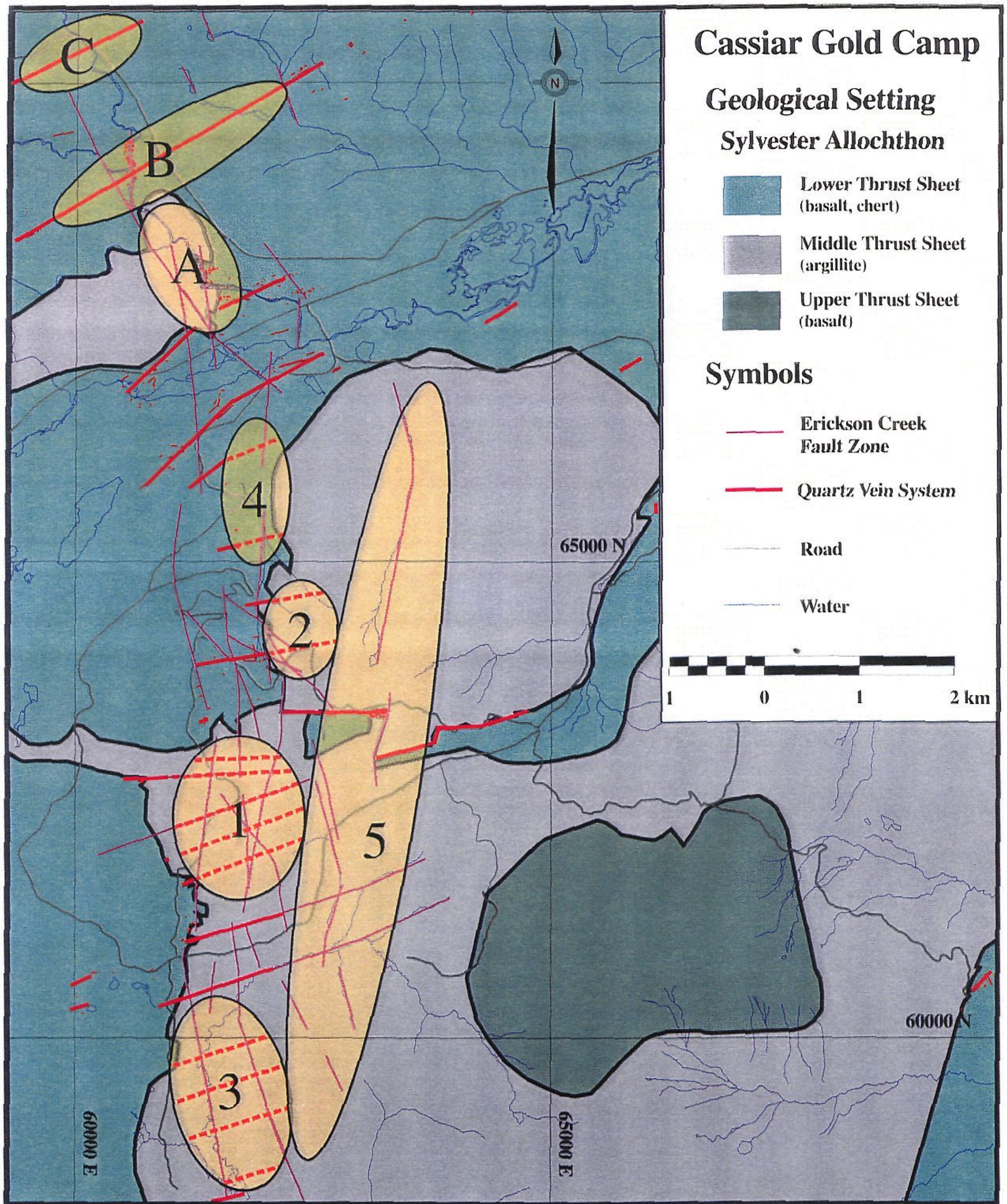
The Gap contains a previous intersection of 0.355 oz per ton of gold over 0.8 m. The intersection is below a thin layer of TMS within basalt of the lower thrust sheet. The location is immediately south of and below the crest of Table Mountain, which offers a significant advantage for development.

The Sky–Jill Gap coincides with a prominent photo lineament similar to those over the Eileen–Michelle–Lily and Bain Vein systems. Listwanite crops out 500 m west of the western bounding fault of the ECFZ along the trend of the photo lineament. Topographic expressions around and west of the listwanite occurrence are similar to those west of the Eileen-Michelle-Lily and Bain Vein systems.

The Jill Vein Extension is a projection along a northeasterly trend from the Jill Vein, which crops out 500 m west of the projection of the western bounding fault of the ECFZ.

The Hot Vein Extension is a projection along a northeasterly trend from the Hot Vein, which outcrops along the western bounding fault of the ECFZ. A small open pit exists on this vein.

The Sky Vein Extension is a projection along the fault that bounds the Sky Vein, which outcrops 800 m west of the western bounding fault of the ECFZ. This vein was explored extensively in the 1980's. Potential exists for ore shoots east of the explored area adjacent to listwanite.



Target Areas

1 High Grade Vein System

A Low Grade Bulk Tonnage Vein and Alteration System

Figure 4

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Area 2

Area 2 comprises extensions east of the Erickson Mine. Two locations within this area are marked on Figures 3 and 4: Bear extension and Jennie-Maura-Alison Extension. Bear Extension should be followed up first.

The Bear Vein Extension is a projection of this vein to the east of the ECFZ. Minor exploration has been done along this structure, which was being mined at surface east of the ECFZ at the time of this field review. Because productive veins occur within one kilometre of the bounding faults of the ECFZ, the geometry of the known Bear Vein extension should be examined for strike potential.

The Jennie-Maura-Alison Vein Extension is a projection of this vein system to the east of the ECFZ. Much exploration was done along the eastern margin of the ECFZ by previous operators, but was not successful in locating vein extensions. The geometry of the Maura East Fault should be examined to see if the Bear Vein is the eastern extension of the system that has been faulted to the north along this structure. If this relationship is established, then the significance of this area is downgraded. If this relationship is not established, the geometry of existing drill holes should be examined to check for gaps along the lower contact of TMS. Gaps should be investigated with near horizontal to shallowly south-dipping drill holes. This configuration is required because previous steeper drilling failed to intersect the eastern extension of the Bear Vein; however, later flat drilling did intersect it.

Area 3

Area 3 comprises a large gap between the Bain and Pete Veins. Four locations within this area are marked on Figures 3 and 4. North Pete should be followed up first, followed by the three locations in Pooley Pass.

North Pete is an area on the north side of a major listwanite body with several stringer veins. No exploration has been done in this area.

Pooley Pass contains three areas that are based on a vein system periodicity of 400 m to 600 m. The area is low lying, swampy with little to guide exploration. The northern portion is along a large body of serpentinite encountered at depth in drill holes.

Area 4

Area 4 comprises a gap in the ECFZ that contains projected extensions of the Switchback and Kelly Veins. Locations in order of priority for follow-up are as follows: Switchback Vein; and then Kelly Vein.

The Switchback Vein occurs on the northeast side of klippen of TMS and underlying listwanite. Although most samples returned insignificant values, two samples did return 0.122 oz/ton and 0.260 oz/ton of gold each over one metre. The eastern extension of this area, which is in the

ECFZ, is low-lying and on the south side of the tailings pond. No exploration has been conducted in this area.

The Kelly Vein occurs adjacent to a small exposure of listwanite. The vein crops out in trenches, was explored by drilling and intersected in the 1140 drift of the Erickson Mine. One sample returned 0.280 oz/ton over one metre. The eastern extension of this area, which is in the ECFZ, is low lying within Erickson Creek. No exploration has been conducted in this area.

Area 5

Area 5 comprises the southern portion of the BCFZ where it cuts TMS. The northerly-trending Jade Vein crops out on the south slope of Table Mountain within TMS, indicating the presence of a hydrothermal system along this structure away from known productive veins.

11.2.2 Target Areas - Low-Grade Bulk Tonnage Quartz Vein and Alteration Systems

Area A

Area A comprises the Newcoast-Van Vein system. The area is underlain by a thin cap of TMS with veins in the underlying basalt. Extensive exploration was conducted around the margins of this cap for narrow high-grade veins; however, little work was done within the area underlain by the cap. Widely-spaced drilling in 1995 returned intersections of 3.696 oz/ton of gold over 0.1 m and 1.679 oz/ton of gold over 0.2 m, which indicates the presence of a gold-bearing vein system. The area presents an opportunity to explore for a low-grade bulk tonnage vein and alteration system immediately beneath TMS.

Area B

Area B comprises the Wings Canyon vein system. Little exploration work has been conducted in this area, which coincides with a chargeability high that extends from the Reo showing to Snowy Creek. A window of chert that underlies the basalt, which hosts the veins, occurs between Quartzrock Creek and Snowy Creek. This structural situation is similar to that at the Taurus Mine and 88 Hill, which overlie chert highs at depth. Exploration drilling is required to outline areas for detailed follow-up.

Area C

Area A comprises the Taurus - 88 Hill Vein system. Cyprus Canada Inc. and International Taurus Resources Inc. explored this area for low-grade bulk tonnage vein and alteration systems during 1995 and 1996 (Broughton and Masson 1996; Trenaman 1997). Work by Cyprus in 1995 defined an inferred, undiluted mineral inventory of 41.8 million tons grading 0.0415 oz/ton totalling about 1.735 million ounces of gold, which is about 38 million tonnes grading 1.42 g/t (Trenaman 1997) and totalling about 53,960 kg of gold. Further work by Taurus in 1996 defined a drill indicated resource of 15.07 million tons grading 0.0272 oz/ton totalling about 410,000 ounces of gold, which is about 13.7 million tonnes grading 0.93 g/t (Trenaman 1997) and totalling about 12,752 kg of gold with some 25 million tonnes (27.5 million tons) of inferred mineralization.

A synthesis of all geological information should be completed to increase the understanding of this portion of the camp. Definition drilling is required in all areas of previous work to outline a mineable resource.

11.2.3 Target Areas - Gold-Bearing Pyritic Replacement Zones

Pyritic replacement zones (Gunning 1988; Broughton and Masson 1996) occur in the Taurus Mine and West Taurus areas of the Taurus - 88 Hill Vein system (Area A). More work is required to define the distribution and geometry of these zones.

11.2.4 Target Areas - Outlying Gold-Bearing Quartz Vein Systems

Boomerang -Lyla Fault Zone

The Boomerang and Lyla veins occur adjacent to a klippen of TMS in the northwestern portion of the camp. The area is bounded to the west by the north-northwesterly-trending BLFZ, which extends to at least west of McDame Lake and possibly further southeastward toward the Cusac Mine. This structure may have additional veins occurring along it and warrants further exploration. Interestingly, gold-in-soil geochemical anomalies (Broughton and Masson 1996) occur along the approximate trace of the fault north of the Cassiar access Highway and immediately northwest of the Reo showing. Cypress drilled both of these areas and intersected veins with low, but anomalous gold values.

Finlayson Creek

The Christine Vein is a northerly-trending vein that occurs in Finlayson Creek on the east side of Table Mountain along the contact with TMS. The northerly-trending structure that controls the vein may be a southeasterly continuation of the apparent northwesterly-trending array of en echelon faults that includes MCFZ, BLFZ, ECFZ and BCFZ. The upper portion of Finlayson Creek, where the Christine Vein occurs, trends northerly similar to the fault orientations. Little exploration has been done in this area along strike.

Huntergroup Veins

The Huntergroup Vein system comprises a group of veins on the east side of Huntergroup Massif that occur along the contact of TMS and are associated with a northerly-trending structure. This structure may be a southeasterly continuation of the apparent northwesterly-trending array of en echelon faults that includes MCFZ, BLFZ, ECFZ and BCFZ. Little exploration has been done in this area along strike.

Eastern Table Mountain

On the eastern slope of Table Mountain, a frontal ramp places the older upper subunit of the lower thrust sheet over younger TMS of the middle thrust sheet. This structure is interpreted by Harms et *al.* (1989) to join up with a steeply north-dipping, easterly-trending fault along the south side of Table Mountain. The Sky Vein occurs along this fault. The frontal ramp should be examined for veins as it has been interpreted to be a similar structural environment.

11.2.5 Target Areas - Volcanogenic Massive Sulphides

The lower subunit of the lower thrust sheet along the western margin of the camp hosts three known massive sulphide occurrences: Lang Creek (MINFILE 104P 008); DDH T95-14 (Broughton and Masson 1996); and Cassiar Pit (Nelson and Bradford 1989, 1993). In addition, there is a silica-pyrite replacement body on Mt. McDame (Nelson and Bradford 1989, 1993). These occurrences may be correlatable. They have not been adequately explored and may be indicative of other significant occurrences.

12.0 EXPLORATION METHODOLOGY

Exploration within the Cassiar Gold Camp is at a mature level. Soil geochemical and ground geophysical surveys have been done in most areas. Most exploration is done by diamond drilling to define vein targets. Diamond drilling works well for target areas that are reasonably well defined; however, exploration for deeper targets under a thicker cap of TMS is difficult and costly. A less expensive technique is required to define deeper target areas prior to conventional diamond drilling. These targets are structures along the contacts and discontinuities associated with them.

Two techniques can be used: seismic and widely spaced percussion drilling. Seismic surveys are unproven in the area because velocity contrasts along the contact are unknown; however, it is relatively inexpensive to test. A four kilometre test survey would cost approximately $40,000 (M. Glover, Personal Communication, 1998). In addition, drilling would still have to be done to test results. Because drilling would be conducted through thick sections of TMS, for which core is not required, percussion drilling could be used to define contacts and rock types. This information could be used to develop isopach and structural contour maps of the contacts and to look for rolls and thickening of listwanites. These targets would be further explored by diamond drilling. Percussion drilling has the advantage over seismic surveys in that a better appreciation of geological relationships is obtained and samples can be analyzed. For these reasons, percussion drilling is favoured.

13.0 WORK PROGRAMME

Exploration work should consist of office preparation and fieldwork. The office component would consist of the following:

1. Synthesizing data from the Taurus-88 Hill area to define targets for definition drilling of low-grade bulk tonnage targets;
2. Updating Gemcom database;
3. Interpretation of Maura East fault to assess possibility of Bear Vein offset;
4. Assessment of previous diamond-drill hole coverage under TMS cap east of ECFZ adjacent to the Erickson Mine;
5. Interpretation of data for pyritic replacement mineralization from the Taurus-88 Hill area to understand the nature of the mineralization;
6. Conducting a detailed stereo photo lineament study from low-level airphotos; and
7. Researching background data for volcanogenic massive sulphide (VMS) deposits.

Field work would consist of three components: i) exploration for high-grade underground vein systems; ii) definition and exploration for low-grade bulk tonnage vein and alteration systems; and iii) exploration of outlying areas for vein systems and VMS targets.

The first component of fieldwork for high-grade underground vein systems would consist of:

1. Seismic orientation study across Sky-Jill Gap;
2. Fences of percussion drilling across the Sky-Jill Gap, Pooley Pass; along BCFZ south and north of the Vollaug Vein;
3. Comparison of results from seismic and percussion drilling to assess usefulness of seismic technique;
4. Development of isopach maps to refine targets; and
5. Diamond drilling of targets in Sky-Jill Gap, Pooley Pass, east of Erickson Mine, east of Switchback and Kelly Veins, and along BCFZ.

The second component of fieldwork for low-grade bulk tonnage vein and alteration systems would consist of:

1. Definition diamond drilling of targets in Taurus-88 Hill in preparation for small scale open pit mining;
2. Exploration diamond drilling of targets in the Taurus-88 Hill, Wings Canyon and Newcoast-Van areas to develop additional tonnage to increase the scale of open pit mining.

The third component of fieldwork for outlying vein systems and VMS targets would consist of:

1. Ground geophysical, soil geochemical and lithogeochemical surveys; and
2. Geological mapping.

A two phase exploration program is proposed: phase I, with a budget of about $1.2 million, to explore high priority targets, would be completed first; and phase II, with a budget of about $1 million, to explore lower priority targets, would depend on the results of phase I.

Phase I

1.	Office and minesite studies	$ 60,000
2.	Seismic orientation study of target 1	$ 40,000
3.	Percussion drilling of underground targets 1 and 2	$ 400,000
4.	Diamond drilling of underground targets 1 and 2	$ 400,000
5.	Diamond drilling of open pit targets C and B	$ 400,000
		$1,300,000

Phase II

1.	Percussion drilling of underground targets 3 and 5	$ 400,000
2.	Diamond drilling of underground targets 3, 4 and 5	$ 400,000
3.	Diamond drilling of open pit target A	$ 200,000
		$1,000,000

14.0 CONCLUSIONS

The author concludes that the Cassiar Gold Camp has a potential in eight identified target areas for discovering new high-grade gold vein systems similar to the ones already mined, and for bulk tonnage gold vein and alteration systems. In addition, the unexplored areas adjacent to Beaton Creek, Boomerang-Lyla Fault Zones, similar structures along Finlayson Creek, eastern side of Table Mountain and Huntergroup Massif, have a potential for discoveries of high-grade vein systems. A potential also exists for finding volcanogenic massive sulphide deposits along an unexplored stratigraphic unit with several known massive sulphide occurrences. A two-phase exploration programme with a total budget of $2.3 million is recommended.

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16.0 STATEMENT OF QUALIFICATIONS

I, Dale A. Sketchley, hereby certify that:

1. I am an independent consulting geologist with residence and office at 15068 Spenser Court, Surrey, B.C., Canada, V3S 5Z8.
2. I graduated from The University of British Columbia in 1975 with a Bachelor of Science in Geology - Geophysics and in 1986 with a Master of Science in Geology.
3. I am a registered Professional Geoscientist with The Association of Professional Engineers and Geoscientists of the Province of British Columbia.
4. I am registered as a Fellow of the Geological Association of Canada and a member of the Canadian Institute of Mining, Metallurgy and Petroleum.
5. I have practised my profession for 23 years.
6. The Technical Report dated October 5, 1998 and titled "Geological Evaluation of the Cassiar Gold Camp, British Columbia" is based on a site visit from September 8^{th} to 17^{th}, 1998 and on a technical evaluation of data from the Cusac Gold Mines Ltd. files.
7. This report was prepared for Cusac Gold Mines Ltd.
8. Other than my capacity as an independent Consulting geologist to Cusac Gold Mines Ltd., I have not received and do not expect to receive an interest, direct or indirect, in the Properties described in this report nor in Cusac Gold Mines Ltd.
9. I hereby give permission to Cusac Gold Mines Ltd. to use this report in its complete and unedited form. Written permission must be obtained from me before publication of any excerpt or summary from this report.

Dated at Surrey, British Columbia
This 5^{th} day of October, 1998.

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PROVINCE OF
D.A. SKETCHLEY
BRITISH COLUMBIA
GEOSCIENTIST

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