# CASSIAR GOLD DEPOSITS
# McDAME MAP-AREA

## (104P/4, 5)

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## INTRODUCTION

A study of the Cassiar gold deposits initiated in 1980 was continued during July of 1981. Additional fill-in geological mapping at scale 1:10 000 was done west of Quartzrock Creek and north of Troutline Creek, along Finlayson Creek, to the south of McDame Creek, and along the northern boundary of the 1980 map-area (see Figure 1, this report and Figure 18, Geological Fieldwork, 1980, Paper 1981-1, p. 56).

Particular attention was paid to delineating major quartz vein systems. A number of northeasterly to east-northeasterly trending fracture zones containing quartz veins are outlined on Figure 1. Within these zones, mineralized areas and individual veins of economic interest were mapped at 1:1000 scale.

Mining and exploration activity in the Cassiar gold belt was brisker during 1981 than in previous years. For the third consecutive year mining and exploration were conducted on Table Mountain by Erickson Gold Mining Corporation (Jennie vein MDI No. 104P/029). Two new mills were commissioned in August. On August 14th the United Hearne - Taurus Resources Limited's plant turned over at the Hanna gold mine (Cornucopia, Benroy, Copco) (MDI No. 104P/012), 8 kilometres east of Cassiar. On August 17th Plaza Mining Corporation started milling at their plant that adjoins the Cassiar road 3 kilometres southeast of Hanna mine. Mill feed for start-up of both new mills came from stockpiled ore. At Hanna mine (Cornucopia), ore was provided by underground development work whereas at Plaza it came from a small open pit located at the eastern extension of

SYLVESTER GROUP (MISSISSIPPIAN TO ? PERMIAN)

- 2 — GREENSTONE–CHERT ASSEMBLAGE: MASSIVE PALE TO DARK GREEN ANDESITE FLOWS, TUFF, IN PART FINE–GRAINED DYKES AND SILLS, SOME CHERT, INCLUDES PORPHYRITIC FELDSPATHIC ANDESITE FLOWS (AND ? SILLS)
- 2a — CHERT, TUFFACEOUS CHERT, INCLUDES SOME ARGILLITE; IN NORTHEAST WELL–LAYERED CHERT–PHYLLITE, TUFFACEOUS CHERT, RIBBONED CHERT, AND ARGILLITE
- 1 — ARGILLITE, SILTSTONE, CHERT, QUARTZITE, LIMESTONE, PEBBLE CONGLOMERATE, TUFF; INCLUDES NUMEROUS DIABASE AND ANDESITE SILLS
- 4 — BASALT: WIDESPREAD PILLOWS, SOME BRECCIA, TUFF, AND MINOR ARGILLITE; IN SOUTHEAST, ABUNDANT BRECCIA, TUFF, AND SMALL LIMESTONE PODS
- 3 — SILTSTONE, ARGILLITE, GREYWACKE, PEBBLE CONGLOMERATE, QUARTZ ARENITE, CALCAREOUS SILTSTONE, LIMESTONE
- VEIN SYSTEM

LEGEND TO ACCOMPANY FIGURE 1.

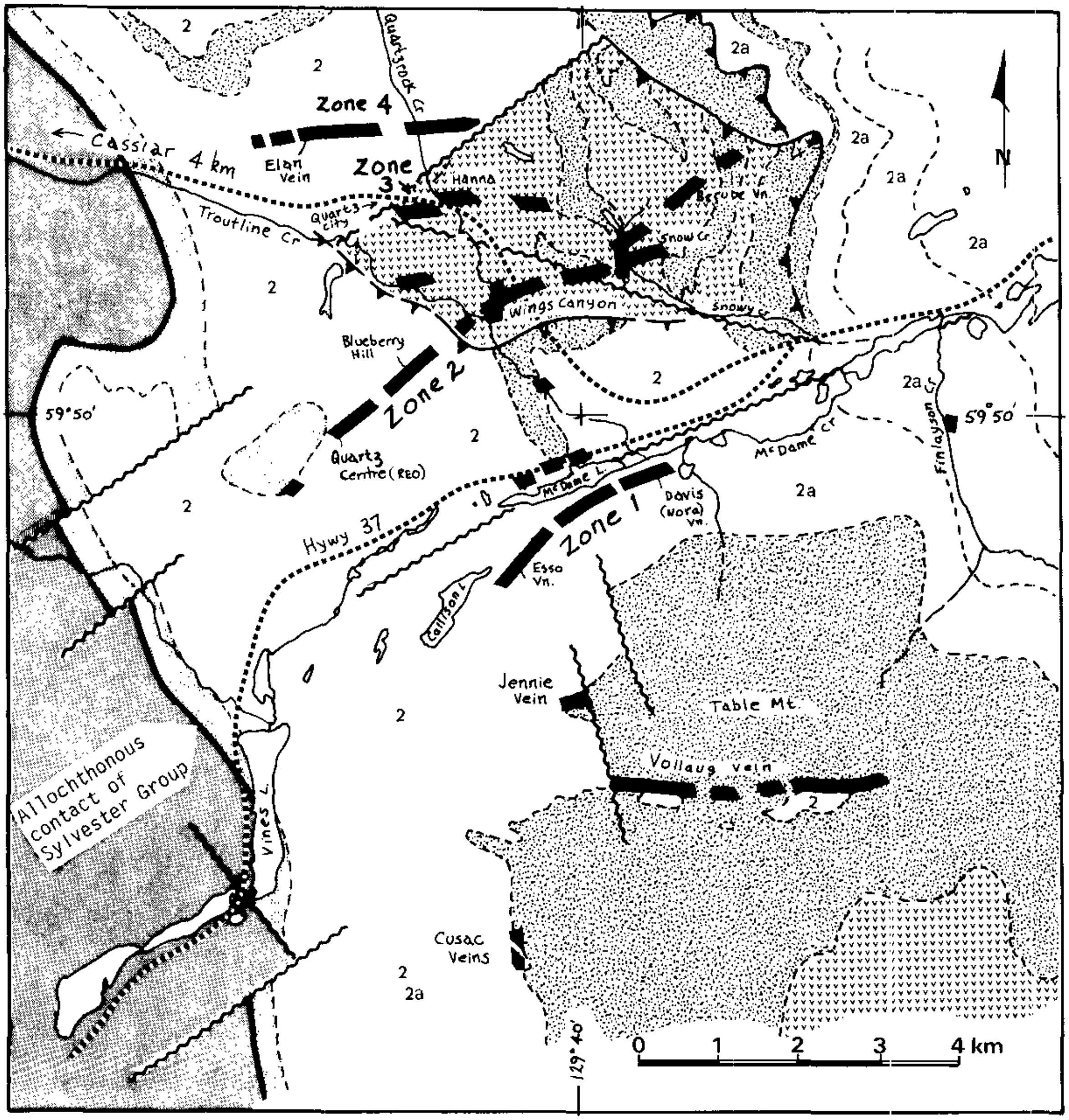


Figure 1. Geology of the McDame map-area.

also occur (Bruce Spencer, pers. comm.). These suspected thrust faults are seen in new underground workings and diamond-drill cores. If these structures are part of the same fault that is present in outcrops south and west of Snowy Creek, then a major flat fault or series of faults underlie the lower reaches of Troutline and Quartzrock Creeks.

## QUARTZ VEIN SYSTEMS

Auriferous quartz veins and placer deposits in the Cassiar region have been described in considerable detail by Mandy (1931, 1935, 1937). These the Vollaug vein (MDI No. 104P/019) on Table Mountain. All three of the operating mills in the Cassiar gold belt have rated capacity of 100 to 150 tonnes per day.

## GEOLOGY

Fill-in mapping affirmed the stratigraphic and structural interpretations presented in Geological Fieldwork 1980 (Paper 1981-1). During current mapping map units described in 1980 were extended; chert and tuffaceous chert of map unit 2A was found to underlie the northeastern part of Table Mountain along Finlayson and McDame Creeks, and greenstones, clastic rocks, and basalt of map units 2, 3, and 4 were noted to the north of the previously mapped area.

The presence of at least one major, westward dipping thrust fault was confirmed by mapping ridges north of Snowy (Snow) Creek and east of Quartzrock Creek. Other flat-lying to locally eastward dipping faults reports provide a historical record of exploration as well as sound descriptive and assay data.

Few new veins, with possible exceptions of the Cusac, Esso, and Berube vein systems, have been found as a result of recent work. However, much information has been gained from new exposures of known veins. A geologic map (Figure 1) shows the locations and current names of the main quartz vein systems.

In this study veins were divided into two fundamental types. Type 1 veins are hosted by 'greenstone' and Type 2 veins occur at bedding contacts between greenstone and argillite.

## TYPE 1 VEINS

The host rocks for Type 1 veins are mainly metamorphosed andesitic flows or tuffs, pillowed basaltic flows, and rarely diabasic dykes, sills, or flows. These rocks are now greenstones as a result of greenschist metamorphism or propylitic alteration. Type 1 quartz veins consist of fine to coarse granular milky white quartz with small amounts of erratically distributed ferroan carbonate and rare vugs with clear, terminated quartz crystals. The veins occupy sets of steeply dipping, generally northeast to east-northeasterly trending, subparallel fractures or en echelon gashes. Type 1 veins are generally short and narrow. Even those in the larger shear zones tend to pinch and swell along strike. Many veins are arcuate or cymoid (sigmoidal) and terminate either by pinching out, by splaying into 'horsetails,' or locally by forming bulbous quartz 'knots' that are generally less than 1 metre in diameter. Where a vein terminates in quartz 'knots,' it is common to see another quartz vein developed in the hangingwall of the first vein. These hangingwall veins are wispy and thin near the quartz 'knots' but increase in thickness along strike. A typical Type 1 quartz vein would be up to 1 metre wide and as much as 60 metres in length; rare veins are up to 5 metres wide and persist for hundreds of metres (for example, the Elan vein system). En echelon veins and ladder veins which commonly show preference for certain beds are generally short, rarely more than 10 metres in length.

Type 1 veins have characteristic bleached wallrock alteration envelopes. The alteration envelopes are commonly 5 to 10 times as wide as the quartz veins that they surround and mostly have sharp, knife-edged margins. In some cases alteration zones up to 100 metres wide surround small discontinuous quartz veinlets, such as in the Hanna mine (Cornucopia)-Quartzrock Creek area.

The alteration zones serve as excellent exploration guides because they give rise to distinctive orange-brown soils over buried vein systems. The bleached altered greenstone consists of albite, carbonate, clay minerals, pyrite crystals and rare chlorite and epidote. The quartz veins in the most highly altered zones contain sericite and tourmaline in addition to ankeritic carbonate.

Type 1 veins occur in four main zones as shown on Figure 1. From south to north these include:

Zone 1: Callison - McDame Lakes system (MDI No. 104P/017, 018): The vein system includes the Esso, Gold Hill, and Davis (Nora) veins in a zone that trends at 055 degrees for at least 2 500 metres. Most veins have a short strike length and are controlled by 040 to 050 degrees trending joint sets. The recently discovered Esso vein is one of the few veins that follows shear joints; it trends 020 degrees. The Davis (Nora) vein strikes at 070 to 085 degrees, the most common trend of the larger veins in the McDame map-area.

Zone 2: Quartz Centre - Wings Canyon - Snowy Creek System (MDI No. 104P/013, 014, 015): This is the most persistent of the vein systems. It gives rise to a mineralized belt approximately 5 kilometres long and 150 metres wide. This system includes the Reo, Blueberry Hill, Wings Canyon (Red Rock), and Snowy Creek veins including the Rich vein, Snow Creek, and Berube veins. The Reo veins are unusual in this district in that two ages of quartz are evident. Older veins are massive and trend 090 to 115 degrees; younger veins trend at 045 degrees and truncate the older veins.

Zone 3: Quartz City - Upper Snowy Creek System (MDI No. 104P/011, 012): This belt is marked by a wide alteration zone with a large number of small quartz veins. The larger veins include the Quartzrock Creek (Mack, Mac) veins, and the Hanna mine (Cornucopia) vein system.

Zone 4: Elan vein system: A number of large quartz lenses up to 8 metres wide occupy a shear zone that trends east-westerly over a strike length of 3 kilometres.

## TYPE 2 VEINS

This second type of quartz vein occurs at bedding contacts of greenstone and argillite. Invariably greenstone is in the footwall and argillite in the hangingwall. Most Type 2 veins occupy the bedding plane contact; locally the veins are entirely in greenstone or splay into strands, some of which pass in and out of greenstone. Where the quartz veins pass into argillite, they become ribboned with abundant graphitic lamellae and commonly pinch or feather out. In some workings, the quartz veins are split by basic dykes about 1 metre wide. Within the veins the dykes are pervasively bleached and carbonate altered and become 'felsite.'

Movement took place along many of the bedding plane contacts before and after emplacement of Type 2 veins. For example, on Table Mountain blocks of dyke rock and dismembered limestone beds are contained in contorted argillites that overlie the plane of decollement. Mandy (1937) considered this setting to be a major thrust fault in which the Vollaug vein was developed.

The Vollaug vein, a graphitic, ribboned quartz vein, is a good example of a Type 2 vein. It is an east-westerly trending, gently northward dipping, vein up to 2 metres in width that has been traced nearly 2 kilometres as a semi-continuous structure. The east-northeast-trending, more steeply Jennie vein is another example. The Cusac veins occur at the same major greenstone-argillite contact but consist of a number of small quartz veins that are confined mainly to steep fractures in the footwall greenstone. Other Type 2 veins are found individually or in groups along the contact of map units 2 and 3 on Troutline Creek, or near map unit 2A and 3 contacts with unit 4 in the Snowy Creek area.

Alteration in the footwall greenstones associated with Type 2 veins is similar to that in Type 1 veins, though less intense. In hangingwall argillites, there is little alteration evident other than a thin zone of carbonate veining and a slight increase in pyrite content.

## MINERALOGY

Both vein types contain free gold, small amounts of pyrite, tetrahedrite, chalcopyrite, and arsenopyrite, and traces of sphalerite and galena. Covellite, azurite, and malachite occur in weathered zones. In some veins, for example the Reo, Elan, and West Hope (Hopeful), tetrahedrite is the main ore mineral. Tetrahedrite is erratic in its distribution but locally can be so abundant that it produces spectacular silver grades. Gold in Type 1 veins is associated with pyrite, ankeritic carbonate, and arsenopyrite. In weathered specimens free gold occurs as grains in cellular boxworks or plates cavity walls. In Type 2 veins, gold accompanies tetrahedrite or occurs with graphite. The average gold/silver ratio in Type 2 veins is 1:1.

## QUARTZ-CARBONATE-MARIPOSITE ROCK (LISTWANITE)

Numerous bodies of listwanite that vary from a few metres to 700 metres in length have been noted. They appear to be endemic to the gold-bearing region but have no direct spatial relationship to auriferous quartz veins. Listwanites are metasomatized zones formed along faults and bedding contacts. Boundaries are sharp or gradational. These peculiar rocks are derived mainly from basic flows but also from tuffs and tuffaceous sediments. Locally they accompany serpentine bodies. In the area mapped these small serpentine bodies constitute lenses that also appear to be derived from the basic volcanic wallrocks.

The relationship of quartz veins, listwanite bodies, and rare serpentine lenses appears to be largely a structural one - they occupy the same fracture zones.

## AGE OF GOLD MINERALIZATION

Hydrothermal white mica from a tourmaline-bearing auriferous vein from Snowy Creek yielded a potassium-argon age date of 131±5 Ma. In view of the 73-Ma Late Cretaceous dates reported for the closest granitic intrusions west of the Cassiar gold belt (Panteleyev, 1980), the gold mineralization appears to be related to structure-metamorphic events that pre-date and are independent of major granitic emplacement.

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