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GEOLOGY AND REGIONAL SETTING OF THE CHU CHUA COPPER DEPOSIT

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6th CIM District Six Meeting, Oct. 29-31, 1981, Victoria, B.C.

GENERAL

The Chu Chua massive sulfide deposit is located on Chu Chua Mountain, 100 km north of Kamloops, on the east side of the North Thompson Valley. It was discovered in 1978 as a result of drilling a small surface gossan upslope from a strong copper stream anomaly, and is presently estimated to contain 2,000,000 tonnes grading 2% copper.

The only surface expression was a small gossan about 25 m east of the main sulfide zone and sparse outcrops of magnetite along a northerly trending gully. The deposit is marked by strong electromagnetic and magnetic anomalies and was readily detected by an airborne survey subsequent to discovery. There was very minor geochemical response over the deposit itself but a very strong copper soil anomaly occurs over transported gossan, about one km downslope, and clearly resting on glacial till.

GEOLOGY

The sulfides occur as two or more beds within a siliceous tuffite or exhalite unit, separated by beds of massive magnetite, talc and tuffite (Fig. 1). The enclosing

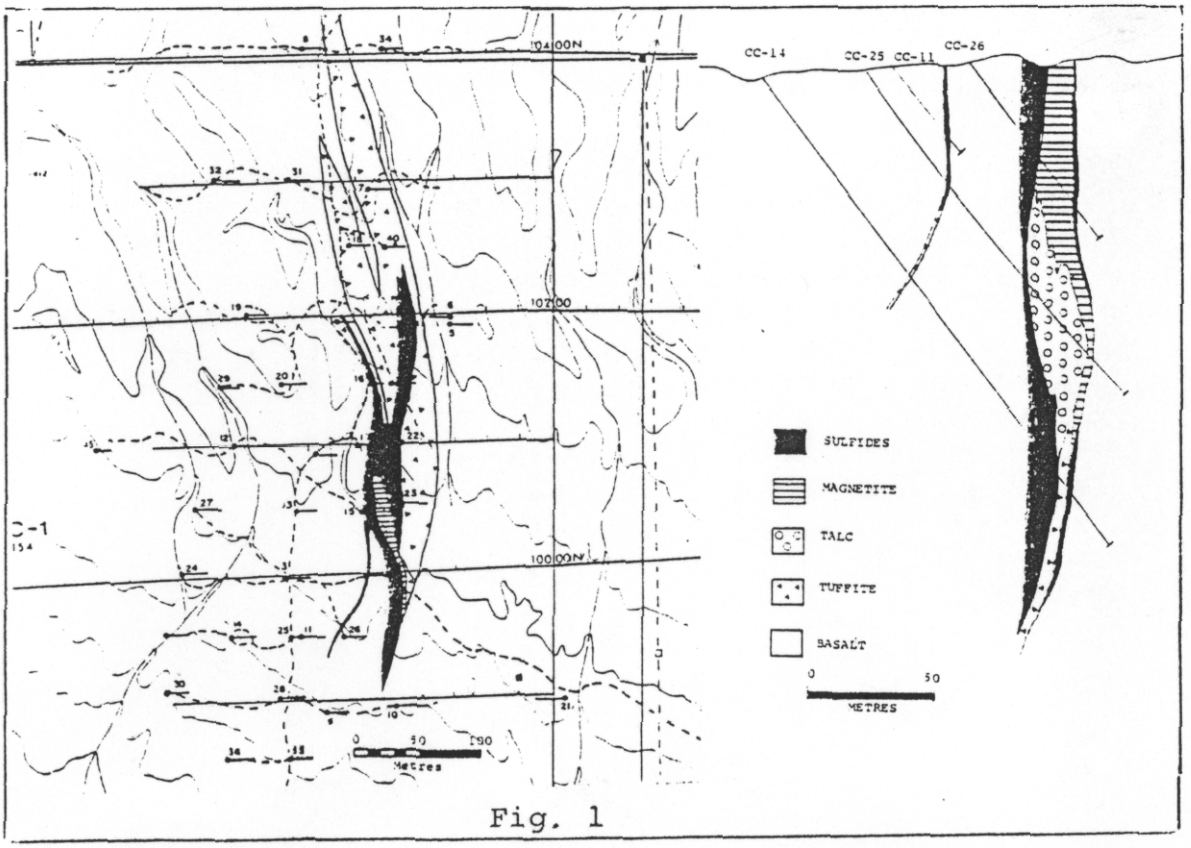


Fig. 1

basalts on either side are similar, but those on the east wall show areas of carbonatization and alteration, suggesting that tops face west. The zone dips vertically to steeply west and both sulfides and tuffite thin down dip and pinch out southward, with only a metre or so of alteration between flow units marking it. The sulfide body as a whole forms an elongate zone that plunges south at about 45°.

There is remarkably clean separation among units; the massive sulfide ore is 80% or more pyrite and chalcopyrite; the magnetite 80% or more magnetite, with no sulfides, and the talc zones are very clean and pure. Very little bedding is evident but the sulfides exhibit coarse clastic textures in some sections. Contacts with the enclosing basalts are very sharp, showing no gradations.

REGIONAL GEOLOGY

Chu Chua is within a belt of rocks that reaches from Sicamous to north of Clearwater, a distance of more than 150 km. These rocks are presently not well dated and have been assigned ages ranging from Devonian to Triassic, but must be older than the Upper Cretaceous batholiths that intrude them.

Numerous sulfide deposits are known within this belt; small Pb Zn Ag deposits on the Adams Plateau; Pb Zn Ag Ba deposits near Skwaam Bay; the Chu Chua Cu deposit; sulfide deposits on Foghorn Mountain and small Cu Pb Zn Ag deposits on McLennan Mountain. Two large tonnage, low grade, copper deposits are also known; one at the head of Harper Creek, the other between the Barriere Lakes.

A regional map (Fig. 2) has been compiled from Federal and Provincial geological mapping and from data collected by the author since 1966 while working on various prospects in the area. The rocks were recognized in the late 1960's as being very similar to those in massive sulfide camps in Eastern Canada and appear to be part of a caldera sequence. The formation names used are in conformity with those used by Jones in the Vernon Sheet and by Campbell and Tipper in the Bonaparte and Barriere sheets, though not necessarily in the same order.

The lowest unit it the Sicamous Formation, composed of black lim estone, shaly limestone and cherty shale. It can be extremely carbonaceous and becomes more shaly westward. It is dated anywhere from Devonian to Triassic, with good Mississippian fossils reported by Campbell from

south of Barriere River. It extends continuously from Sicamous to Barriere, up to the Lewis Creek fault, and reappears in the cores of anticlines in the Barriere River-Birk Creek area, the North Thompson valley east of Clearwater, and west of Grizzly mountain. It includes a basic volcanic unit, the Tsalkom, and ultrabasic rocks, near Adams Lake.

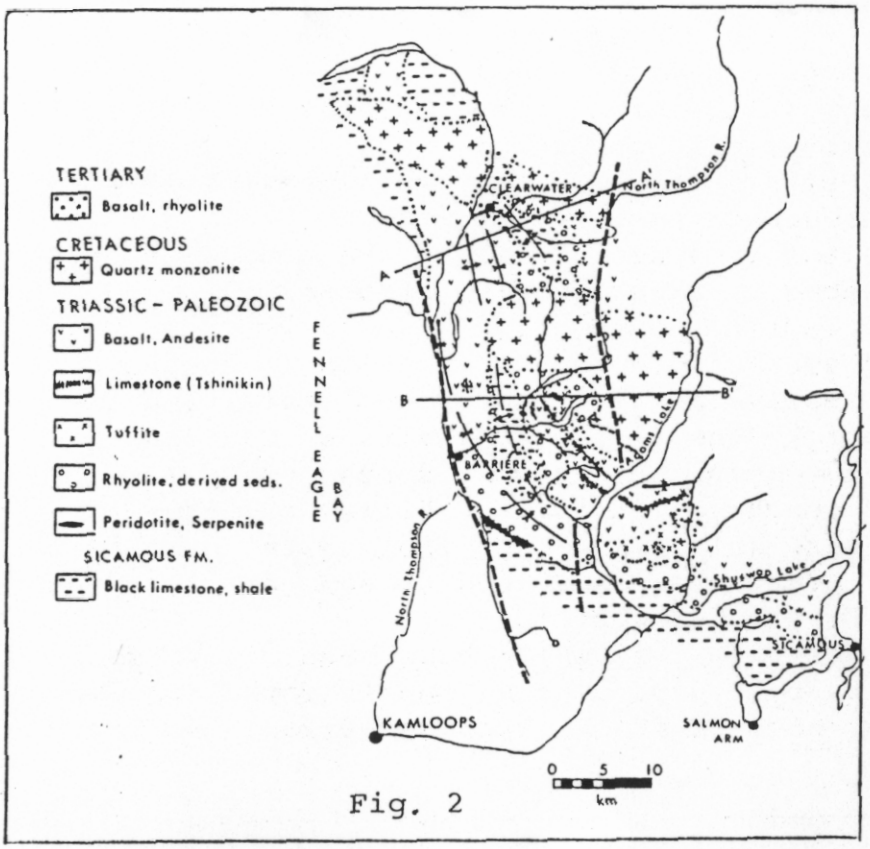


Fig. 2

The Sicamous formation is conforably overlain by the Eagle Bay formation, and at Scotch Creek, where the contact has been drilled, the two appear interbedded.

The Eagle Bay formation is a felsic volcanic unit, consisting essentially of rhyolite ignimbrites or ash flows and their sedimentary derivatives. It is typically pink weathering, somewhat coarse textured and commonly contains quartz eyes. It was probably poorly welded and absorbed deformation to form laminated rocks and, in extreme cases, quartz-mica schists. In some areas it remains quite massive, with quartz eyes up to pea size.

The Eagle Bay rocks tend to be uniformly resistive electricaly and show up on Dighem resistivity mapping as low relief areas, and can be readily mapped out in this manner. On the Adams Plateau they are at least 2000 m thick, but thin rapidly to the east and west, dissappearing in the western parts of the belt.

The Eagle Bay formation is overlain by siliceous chemical sediments or exhalites, called tuffites. On the Adams plateau they are at least 1000 m thick and contain thin limestone beds a few metres thick. Elsewhere they form persistant beds a few metres to a 100 metres thick.

The tuffites are commonly well bedded but at Chu Chua and Foghorn mountains, where they are mineralized, they are very poorly bedded and resemble clastic breccias. They show

considerable variation, changing rapidly both across and along formation from black, graphitic, to white, but are nearly always extremely siliceous. They may form spectacular, chaotic breccias, with sharp fragments, either black or grey, in a matrix of the opposite material. Angular sulfide fragments are occassionaly seen.

The tuffites are hot spring or sinter deposits, formed both subaerially and subaqueously, that build up into unstable piles or towers that collapse into breccia beds on each successive seismic rattle.

The tuffites are normally good conductors that are easily traced by airborne electromagnetic surveys and form excellent horizon markers.

The overlying Fennell formation is composed of pillowed and massive basalts and several tuffite units up to 100 m thick. The pillowed basalts at Chu Chua are pale grey green, completely saussuritized, very fine grained, breaking with conchoidal fracture. Pillow structures and textures are very well preserved. The massive basalts are darker green, coarser grained, and in some areas, such at Clearwater, are almost gabbroic.

White limestones which have been called Tshinikin occur in the eastern part of the Fennell formation. They are present at several stratigraphic horizons and may be reefs.

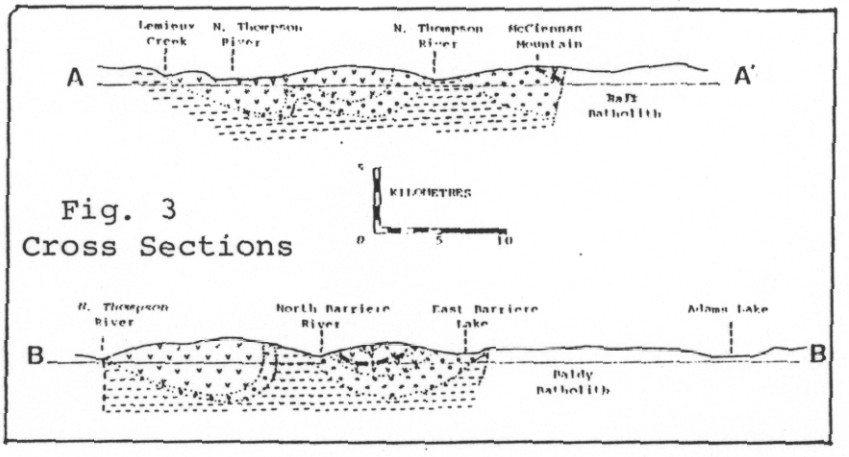
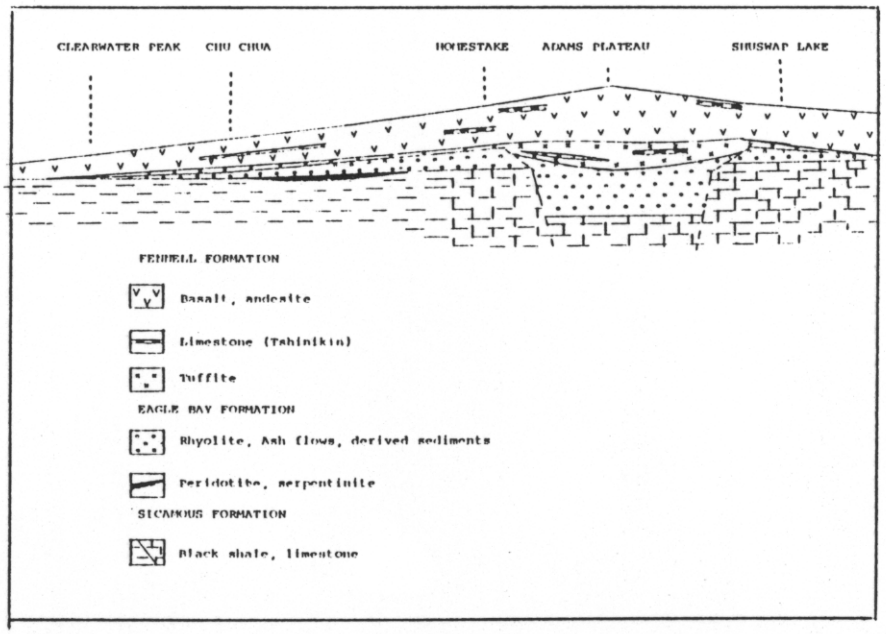


Fig. 3
Cross Sections

To summarize, the rocks in the area can be conveniently divided into three units: the Sicamous Black limestones and shales, the essentially felsic Eagle Bay volcanics and the overlying Fennell basalts. These are folded into a series of northwesterly trending anticlines and synclines, intruded by a series of westerly trending Upper Cretaceous batholiths, and finally covered by Tertiary volcanics, of which only remnants remain. (Fig. 3).

MODEL

The author believes the volcanics are a caldera sequence centered on the Adams Plateau, with the thick rhyolites and tuffites there representing intracaldera facies. On this model the Chu Chua deposit would be well outside the caldera, the Homestake deposits near its rim, and the Adams Plateau deposits within it. In the western part of the area, the Fennell basalts rest directly on the Sicamous sediments.



The entire sequence has been folded, probably twice, intruded by Cretaceous batholiths and at least partly covered by Tertiary volcanics.

Ref:

Oct. 20th, 1981

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