Mineralisation on the West Coast Range (2 COPIES)

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WEST COAST RANGE

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To: Mr. G.P. Hudspeth

Mineralisation on the West Coast Range

1. Mackintosh Shear - Farrell Mining Field

This mineral zone is characterised by galena with some zinc and a little copper and by granite rather than quartz porphyries. The deposits lie within a few hundred feet of the boundary of the bedded rocks with the massive pyroclastics of Cottle and Hall (1953). The ore zones lie in the bedded series, notably the tuffs (greywackes?). Although the mineralised zones spread over two miles (north to south) most of the ore has been won from two mines, the New North Mount Farrell and the North Mount Farrell. Ore grade averages 11% Pb., 1½% Zn.; the silver to lead ratio is 1:1. The zone is characterised by unsericitised felspar porphyries.

2. Red Hills - Lake Dora Field

The sulphides are, with but few exceptions, of copper and iron: pyrite is abundant. Quartz/felspar porphyries are associated with these deposits and these are usually heavily altered.

(a) Red Hills

"The mode of occurrence of this deposit is clearly stratiform (i.e. concordant) and it is almost certainly a chlorite/pyrite replacement of an argillaceous rock." The sulphides, according to Blake (1939), contain less than 0.5% copper. The usual copper mineral is chalcopyrite. The deposit lies at or near the Red Hills shear, which is thought to be a branch fault of the Dora Shear.

(b) Lake Dora

Very similar to the Red Hills occurrence and once again probably a replacement of an argillite/tuff and consists almost exclusively of massive chlorite and pyrite. There is some evidence to suggest that one of the N.E. faults of the Lake Margaret system has controlled the deposition of the sulphides and the formation of the quartz porphyry. In this area there is a strong suggestion that the deposits are "bedded".

Judging from Bradley's maps (1956, p.119), the horizon replaced in the Dundas Group would be one high up in the sequence and practically immediately below the Jukes Breccia in this area.

(c) Tyndall Copper

These are thin pyritic disseminations associated with the Tyndall Fault which brings Owen Conglomerate against the Dundas Group, on the west side of the Range. They appear to be associated with quartz porphyries, at the base of the Owen Conglomerate. Bradley (1956) considers the original rock to have been a greywacke.

(d) Dora Shear Deposits

These prospects occur in sericite/chlorite schists, the zone is long and continuous with the shear and consists of a weak dissemination of pyrite and chalcopyrite in schists. Bradley considers the original rock to have been a greywacke.

3. Mount Huxley - South Darwin Field

(a) Prince Darwin

Hematite/magnetite/chalcopyrite body averaging 0.5 to 1% copper. It is on the Lyell Shear, and is associated with felsite.

(b) Findons and Hydes (Hal Jukes)

Blebs of chalcopryite and pyrite which follow schistosity in chlorite schists and felsite (altered greywacke conglomerate(?)).

(c) Lake Jukes

The mineralisation consists of chalcopyrite/bornite/hematite in felsite, situated on the Lyell Shear. The felsite in all probability is an altered greywacke conglomerate.

(d) East Darwin

Mineralisation consists of chalcopyrite/pyrite in sericitic schists (altered Dundas?) which are associated with a north-south fault. The sulphide occurs as lenses elongated along schistosity.

(e) Jukes Proprietary

Chalcopyrite/pyrite/magnetite mineralisation along a N.E. fault, with hematitic red felsite on the west side and green chlorite schists on the east.

Stratigraphical control is indicated in the occurrence of all these deposits at or near the same level in the geological column. They occur generally just below the base of the Owen Conglomerate, or within but near to its base. Structural control is indicated by their occurrence along lines of strong shearing.

4. Huxley-Sedgwick Field

The copper sulphide deposits of this field constitute the major known area of mineralisation on the West Coast. The deposits have a similar stratigraphical control as in the Jukes-Darwin field in that they occur just below the base of the Owen Conglomerate, or within but near its

base. Structural control is indicated by their persistent existence at the intersection of the Lyell Shear and east-west cross-cutting structures as follows:

Mines	Faults
Comstock Zone	Lyell Shear and Comstock Fault
Crown Lyell and North Lyell	Lyell Shear and North Lyell Fault
The Blow	Lyell Shear and Owen Spur Fault (?)
Copper Estates	Lyell Shear and Owen Fault
Great Lyell and Duke Lyell	Lyell Shear and South Owen Fault

The structural control of the large low grade orebodies which are in the Lyell Schist away from the schist/conglomerate contact (West Lyell and Royal Tharsis) is not so readily apparent. Obviously there is no doubt that they are, for all practical purposes, on the Lyell Shear and are placed between the North Lyell and Owen Spur Faults.

The existence of these major east-west faults allowed the mineralising etc. solutions to reach a higher stratigraphical position than elsewhere in the Range. This can be seen in the occurrence of the North Lyell and Blow orebodies in the Middle Owen and the Blocks native copper deposits in the Gordon Limestone.

Consequently, the major structural control in the localisation of the large copper orebodies is the intersection of the Lyell Shear and an east-west fault. The only known localities where this control occurs north of the harbour, and outside the present mining leases of the Mount Lyell Mining & Railway Co. Ltd. is at:

(a) Duke Lyell - at the intersection of the Lyell Shear and the South Owen fault;

(b) <u>One mile north of the East Queen River</u> - at the intersection of the Tyndall Shear and the Sedgwick Fault (north of Comstock Creek).

5. <u>South of Macquarie Harbour</u>

At present, the only known sulphide occurrence which can be compared with those north of the Harbour, is Penders Prospect, between Lewis River and Low Rocky Point. The mineralisation consists of chalcopyrite/pyrite in chloritic schists and it can be correlated with the similar deposits of the Huxley-Darwin Field.

The mineralised zone of the upper Lewis River consists of goethite/pyrite/quartz and is not comparable with the Darwin or Jukes type of mineralisation.

6. <u>General Summary</u>

Three types of sulphide bodies are apparent:

A. The hematite/magnetite/pyrite bodies (Darwin type);

B. The chalcopyrite/pyrite bodies (Jukes type) - includes the Red Hills-Lake Dora and the Huxley-Darwin Fields;

C. The bornite/chalcopyrite/pyrite bodies (Lyell type).

The Lyell type is localised by faults which displace Crotty Sandstone (Lower Silurian) and consequently must have been introduced into their present position during the known mineralising epoch of the Lower Devonian (Tabberabberan). The Darwin type is associated with the Darwin Granite and Hills (1914, p.109) referred to them as "contact metamorphic deposits" and had no hesitation in ascribing them to the Cambrian period (including the associated copper/iron sulphides). The presence of hematite and megnetite particles in the greywacke conglomerates of the Lower Owen Conglomerate entirely supports this contention of Hills. The position of the Jukes type is not so clear; they differ from the Lyell type in that they are:

(a) Considerably smaller in size and are irregular, discontinuous bodies;

(b) They are localised on the Lyell Shear but not by east-west cross-faults;

(c) They are spatially associated with the felsite, and the magnetite/hematite mineralisation of the Darwin type (i.e. Jukes Pty.);

(d) There is a general absence of bornite from these deposits, except at the Lake Jukes Prospect.

They are known to occur at or near the base of the Owen Conglomerate and there is little doubt that they occur in altered greywacke conglomerates (i.e. Lake Jukes). However, these conglomerates could obviously either belong to the Upper Dundas or Lower Owen, a vital point as far as their time of emplacement is concerned.

There is no direct evidence as to which period these Jukes type deposits belong to, a situation of which Hills (1914) was well aware (pp. 72, 92, 93, 94 and 105). Covering all possibilities they could either belong to:

(a) Upper Cambrian Period (Stichtan Orogeny)

(b) Lower Devonian Period (Tabberabberan Orogeny)

(c) Both of these periods.

Considering all the evidence, I am in favour of assuming that the copper sulphide deposits of the Jukes type were introduced in the Upper Cambrian Period during the Stichtan Orogeny; in the Lower Devonian Period they would have been metamorphosed by the Tabberabberan Orogeny with a possible redistribution of their values and position.

It is interesting to note the chemical differences between these two mineralising epochs, that of the Stichtan had a great deficiency of sulphur with an overwhelming abundance of iron (expressed in chalcopyrite, pyrite, hematite and magnetite) and it forms a contrast with that of the Tabberabberan Orogeny with its sufficiency of sulphur, considerably more copper and a correspondingly lower iron content (expressed in bornite/chalcopyrite/pyrite).

Geologist-in-Charge

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