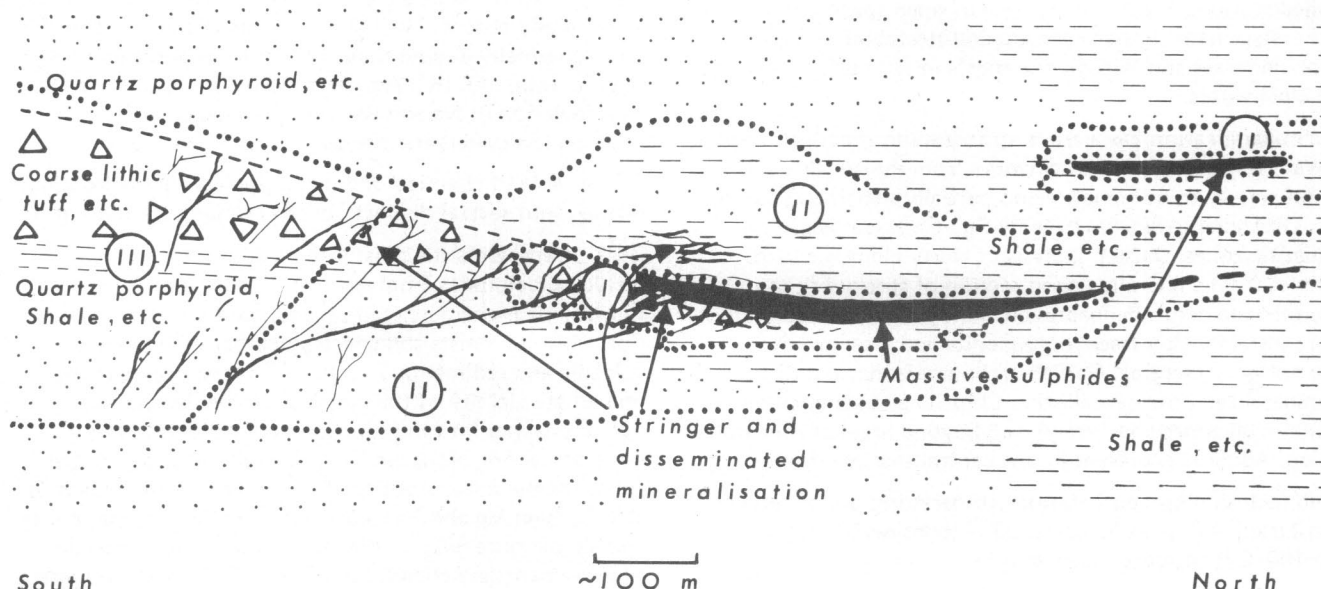


## CENTRAL VOLCANIC PILE

## SEDIMENTARY BASIN



South

~100 m

North

FIGURE 1

Schematic section showing zones of alteration around the Woodlawn ore body prior to folding. The features of the zones are explained in the text.

offers a feasible means of "tapping" the metalliferous solution and enabling rapid ascent of the resultant mixed solution which carried adequate metals to form the mineralization at and near the submarine surface.

The Woodlawn deposit appears to be similar to the much younger Kuroko deposits of Japan, in terms of ore mineralogy, host rocks and alteration zones.

### COLO CREEK — A BARITE ZINC-RICH SETTING IN THE HILL END TROUGH

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The Colo Creek setting, some 66 km south of Bathurst, is situated on the very western margin of the Hill End Trough. Zinc-rich sulphides have been deposited rapidly, in a high energy depositional environment close to a zone of active submarine acid volcanism.

Host lithologies belong to the Colo Creek Formation, considered to be of Middle to Late Silurian age. Two major cycles of deposition are recognized: a lower cycle, character-

ized by predominantly pyroclastic-rich rocks and volcanic slurries, and an upper cycle, comprising graded, bedded, tuffaceous sediments.

Mineralization is found in both cycles. The principal sulphide is sphalerite, the iron content of which exhibits both a vertical and lateral gradient. Barite is ubiquitous in the pyroclastic-rich facies. In the overlying sedimentary series, stratiform barite occurs at the top of the mineralized sequence. Sphalerite, galena and pyrite show a sympathetic grain size relationship with the host sediment.

The depositional environment is considered to be part of a volcanic rift complex.

### THE MINERALIZATION OF THE KANGIARA MINE, NEW SOUTH WALES

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The Kangiara deposit is located 32 km north-west of Yass in the Cowra-Yass Synclinal Zone of the Lachlan Fold Belt. The mine occurs within the Middle to Upper Silurian Hawkins Volcanics of the Douro Group.

The ore minerals comprise pyrite, sphalerite, galena and

chalcopyrite with minor amounts of marcasite, tetrahedrite, bismuthinite, bismuth, silver, electrum, chalcocite, covellite and digenite.

On the basis of the mineralogy and textural features of ore samples it is inferred that the deposit is of Kuroko-type.

## A PROBABLE MISSISSIPPI VALLEY-TYPE LEAD-ZINC DEPOSIT AT COOLEMAN PLAINS, SOUTHERN NEW SOUTH WALES

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The Mount Black lead-zinc deposit at Coolman Plains, southern New South Wales, occurs in the uppermost part of the moderately folded, weakly metamorphosed, Upper Silurian Coolman Limestone. A joint controlled collapse-breccia zone interpreted as a palaeokarst structure has been partly replaced by quartz, sphalerite with a low to moderate Fe content, Ag-poor galena, and a little chalcopyrite, pyrite, marcasite, tetrahedrite, arsenopyrite and mackinawite. These minerals show evidence of having encrusted and replaced limestone fragments in the breccia. Oxidic Zn, Pb, Cu and Fe minerals have formed by the near-surface oxidation of the sulphides.

Field, petrographic and fluid inclusion data suggest that the quartz and sulphides precipitated from saline solutions (possibly diagenetically expelled connate brines) in cavities, probably at low temperature at shallow depth. Many features of the Mount Black deposit are similar to typical Mississippi Valley-type lead-zinc occurrences.

## COPPER MINERALISATION AT THE BASIN CREEK NO. 1 PROSPECT, TUMUT, NEW SOUTH WALES

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The Basin Creek No. 1 prospect is located in the Snubba Range 14 km south of Tumut. The host rocks are phyllites and intermediate metavolcanics of the (?) Middle Silurian Blowering Beds. Locally, these are about 1000 m thick and form a thin slice, striking 340°M and with near vertical dips, sandwiched between sediments of the (?) Lower-Middle Silurian Bumbowlee Creek Beds on both the east and west. The western boundary is a fault contact, but in the east the Blowering Beds lie conformably on the Bumbowlee Creek Beds. Regionally, these rocks form part of the western limb of a major south-south-east trending anticline that plunges steeply to the south.

At Basin Creek, the Blowering Beds are tightly folded into two major south plunging drag folds with numerous superimposed parasitic folds. The rocks are highly deformed with strong cleavage and foliation developed parallel to the fold axial planes. Two fault directions are recognized. The earlier, which includes the major fault along the western boundary of the Blowering Beds, trends at 350°M. The later one, which includes several minor faults and shear zones, trends between 250° and 280°M.

Detailed stratigraphic correlation is not possible due to the highly lenticular nature of the lithological units. Broadly, however, the Blowering Beds at Basin Creek can be divided into two essentially similar sedimentary sequences above and below a volcanic unit.

The sedimentary sequences, each about 200 m thick, consist of grey to green phyllites, tuffs and greywacke (in part conglomeratic). Locally, a red to chocolate coloured phyllite is also present at the base of the lower sequence. The volcanic unit is a massive fine-grained rock consisting of microscopically fine albite laths in a dark chloritic matrix (?meta-andesite). Irregular veinlets of epidote/chlorite/quartz are common, and, in places, these minerals also infill well-rounded vesicles. Locally the rock is brecciated and/or intensely sheared. Several intercalations of chloritic phyllite occur within the sequence, the whole thickness of the unit being about 60 m.

The mineralisation consists predominantly of chalcopyrite, either disseminated in fine quartz/sulphide veinlets or concentrated in massive sulphide shoots. Abundant fine-grained magnetite and specular hematite are commonly present and microscopic evidence suggests that much of the magnetite has formed from the hematite. Bornite and sphalerite occur in minor amounts together with minor pyrite and traces of galena. The deposit is zoned with sphalerite, pyrite and galena occurring mostly in low-grade disseminated mineralisation to the south of the copper-rich shoots. Some of the pyrite exhibits a framboidal texture. Bornite is restricted to a small lens within one of the massive chalcopyrite shoots. It occurs massive and also as disseminations interstitial to massive chalcopyrite.

Electron microprobe analyses indicate that there is little variation in the composition of the chalcopyrite. The Cu/Fe ratio averages  $0.95 \pm 0.02$  and the metal/sulphur ratio falls in the range 0.94 to 1.03, with a suggestion that the more sulphur rich grains are associated with bornite. Sphalerite has very low iron content in the range 0.2 to 1.4 wt%, the higher values occurring towards the south, and contains about 0.3 to 0.5 wt% cadmium.

Preliminary analyses of  $^{34}\text{S}/^{32}\text{S}$  isotopic ratios (mostly for the chalcopyrite) indicate values that range from -0.4 to +4.0, but are generally close to zero.

A 3-D geological model based on mapping and drill-hole data shows that the mineralization is closely associated with the volcanic unit and immediately overlying phyllite. Two main chalcopyrite-rich shoots occur, both structurally controlled mainly by axial shearing. One, in the north, is clearly localised at the intersection of two shears. The other, to the south, includes the copper-rich bornite lens and is essentially conformable with phyllite intercalations within and close to the top of the volcanic unit. Further south the mineralisation consists of lenses of sparsely disseminated