GEOLOGY OF THE GRANVILLE HARBOUR AREA

AND

MINERALIZATION IN THE GOURLAYS CREEK PROSPECT

by

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LANDSAT IMAGE OF GRANVILLE HARBOUR
AND THE AREA IMMEDIATELY TO THE
NORTH.

ABSTRACT

The dominantly (meta-)sedimentary sequence of the Granville Harbour area ranges in age from Late Proterozoic to Devonian. Five phases of deformation are recognized in these sequences; two are correlated with the Late Proterozoic Penguin Orogeny, one with the Upper Cambrian Jukesian Movement, and two with the Early to late-Middle Devonian (Tabberabberan) Orogeny. Lower greenschist facies metamorphism accompanied the Penguin Orogeny.

Faulted against the Oonah Formation and unconformably underlying the Mt Zeehan Conglomerate are 415 m of interlayered schists, phyllites, quartzites and dolomites. This sequence is a probable lithostratigraphic correlate of the Crimson Creek Formation and has been named the Duck Creek Sequence. Minor metavolcanics contained within the Duck Creek Sequence, Oonah Formation and Whyte schist are defined chemically as ocean-floor tholeiite basalts.

Within the Gourlays Creek Prospect, the Oonah Formation hosts two distinct styles of mineralization:

(i) syngenetic banded iron formation of chemical origin, and

(ii) calcic, garnet-pyroxene, metasomatic infiltration exoskarn.

The banded iron formation is a stratabound and stratiform horizon consisting of massive and banded magnetite-pyrite-(quartz) and magnetite-barite mineralization. This chemical exhalative, banded iron formation is a probable analogue of the (Recent) Red Sea metalliferous sediments and is the only recognized deposit of its type in Tasmania. Sulphur isotopes from this horizon give $\delta^{34}S$ values for pyrite in the range of -7.6 to +15.5‰ and for barite, +35.8‰. A combination of inorganic reduction of Precambrian seawater, ($\delta^{34}S$ = +20 to +25%), with isotope disequilibrium, and biogenic reduction is required to explain the range in pyrite $\delta^{34}S$ values.

Intrusion of the Devonian Heemskirk Granite was accompanied by the formation of a garnet- pyroxene skarn. The dominantly calcic mineralogy of the skarn is suggestive of a lime-rich protolith. The deposition of magnetite-pyrrhotite-chalcopyrite and pyrite occurred during retrograde skarn alteration.

Sulphur isotope studies of skarn-associated sulphides indicate a source fluid with a $\delta^{34}S$ value of +7 to +15‰. Such high values indicate an inhomogeneous source consisting of barite from the banded iron formation, primary pyrite and/or magmatic sulphur. From fluid inclusion studies, homogenization temperatures for garnet and late-stage, retrograde quartz are >500°C and 330-340°C respectively. Deposition of sulphides during retrograde skarn alteration is inferred to occur at temperatures of 350-360°C, pressures of 13-35 MPa and from a 20-21 wt% equiv. NaCl solution. Minor tin (<0.35%) mineralization is considered to be associated with retrograde skarn formation.

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