DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

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OPAQUE MINERALS IN METASEDIMENTS FROM DDH BROADVIEW NO. 1 NEAR KIMBA, SOUTH AUSTRALIA

GEOLOGICAL SURVEY

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ABSTRACT

Opaque minerals from the Early Proterozoic, Mount Shannan Iron Formation in Broad View No. 1 are pyrite, pyrrhotite, magnetite and chalcopyrite.

INTRODUCTION

Broad View DDH 1 was drilled by SADME southwest of Kimba and approximately 5 km northeast of Carappee Hill. The stratigraphic targets were poorly exposed, Early Proterozoic calcsilicates and volcanics (Bosanquet Formation) and ferruginous metasediments of the Mount Shannan Iron Formation (Hutchison Group). Details of the drillhole, including geological log and interpretation, thin-section petrology and geochemistry are included in the well completion report by Rankin and Flint (1987). Additional examination on polished thin sections was undertaken on four samples from the Mount Shannan Iron Formation.

MINERAGRAPHY

Specimen 6131 RS 91, PTS C 48260, DEPTH : 409.0 m

ROCK NAME: Pyritic quartzite

Opaque minerals occur mainly in patches along thin, discordant veinlets but some grains are disseminated with a conformable orientation to the banded fabric of the host rock.

In reflected light almost the only identifiable mineral is pyrite. It occurs in irregular but elongated masses in the vein system and in elongated grains without crystal outlines when disseminated. Rare patches of recrystallisation contain a few euhedral and subhedral grains.

A few silicate grains contain wedges and plates of a sulphide which is yellower than the rest of the pyrite and on the surfaces of which bright red, yellow and green reflections are seen. This appears to be a tarnished form of pyrite rather than a different sulphide.

Very rare compound grains of pyrite and magnetite are present, as are even rarer grains of amorphous limonite.

Specimen 6131 RS 97, PTS C 48266, DEPTH : 417.8 m

ROCK NAME: Diopside + magnetite + quartz gneiss.

Reflecting minerals are distributed along sharply crenulated bands of the host rock with an approximately conformable orientation. Minor discordance is evident in places.

Broad bands in the rock consist of weakly reflecting opaque grains and masses, which are notably ferromagnetic even in thin section. The mineral is grey and isotropic and is certainly magnetite.

The magnetite is closely associated with silicate material and is conformable with the host fabric.

A more strongly reflecting phase, which is locally discordant to the silicate and magnetite fabric, is pyrrhotite. This forms coarser grains and masses than the average of the magnetite but is intergrown with relatively coarse-grained magnetite which may have been recrystallised. The pyrrhotite is interstitial to the early magnetite but occurs in complex intergrowths with recrystallised magnetite, forming compound grains in places.

A small amount of chalcopyrite is associated with the pyrrhotite as inclusions and as compound grains.

Specimen 6131 RS 118, PTS C 48287, DEPTH : 491.17m

ROCK NAME: Banded calcsilicate gneiss

Fine, disseminated, opaque minerals are conformable with fine banding in the silicate minerals of the host rock.

Magnetite is the most abundant opaque mineral and occurs as grains of poor shape, associated with silicates and varying with these in grain size. Magnetite is abundant enough to respond to a hand magnet only in one band.

Pyrrhotite is considerably less abundant than the magnetite but occurs in very similar form. There is no evidence of an association between pyrrhotite and recrystallisation of magnetite in this rock.

Chalcopyrite also occurs independently as discrete grains but also displays an association with pyrrhotite in places. The abundance of chalcopyrite is very minor.

Specimen 6131 RS 120, PTS C 48289, DEPTH : 492.1 m

ROCK NAME: Diopside + amphibole gneiss

The rock consists of irregular bands of green and colourless silicates. Reflecting minerals occur as disseminated fine grains and as a lenticular mass which is approximately conformable to the banding.

Pyrrhotite is the most abundant relecting mineral and occurs both as irregular, interstital grains of various grain sizes and as the lenticular mass seen in the hand specimen. The mass is made up of continuous bands and patches of pyrrhotite as well as of discrete grains.

A little chalcopyrite is included in the pyrrhotite.

Magnetite is not abundant in this specimen and is restricted to widely scattered grains.

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REFERENCES

Rankin, L.R. and Flint, R.B., 1987. Broad View 1 DDH well-completion report. S. Aust. Dept. Mines and Energy report 87/97 (unpublished).