THE BOWDENS SILVER DEPOSIT - RENEWED INTEREST WITH AN IMPROVING SILVER PRICE

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Introduction

The Bowdens Silver Deposit (BSD) is located close to the NE edge of the Lachlan Fold Belt between Mudgee and Rylstone. It formed as an epithermal silver-base metal deposit within air-fall rhyolitic breccias, ash falls and crystal tuffs. The silver mineralisation is associated with sphalerite and galena as disseminations and as silicic fracture fill. High-grade silver mineralisation also occurs in fracture zones and as sulphide veinlets.

The BSD was discovered by CRAE during regional stream sediment sampling in 1988. By 1992 CRAE had defined an Inferred Resource of 6.2Mt of 85g/t Ag, 0.52% Zn and 0.28% Pb for the 'Bowdens Gift' which is the Main Zone South portion of the deposit. In 1994 GSM Exploration Pty Ltd purchased the project and in 1997 GSME was purchased by Silver Standard Resources Inc of Vancouver. Since 1994 drilling has shown the mineralised sequence continues down dip towards the north and west of Main Zone South and remains open at depth and to the west. During 2004 Measured and Indicated Resources were estimated to total 47.6Mt of 52g/t Ag, 0.41% Zn and 0.30% Pb with an additional Inferred Resource of 13.4Mt of 41g/t Ag, 0.32% Zn and 0.21% Pb for a combined total of 97 million ounces of contained silver. These calculations were based on 402 drill holes, a total of 43,644 drill metres, an average drill hole spacing of approximately 30m and a 40g/t Ag cut-off.

Pre-feasibility scoping studies which include metallurgical testwork and mine planning and environmental studies including flora, fauna, archaeology, meteorology, noise control and ground water surveys were completed during 2004 and these are currently being updated by Lycopodium Engineering to incorporate 2005-6 metallurgical testwork undertaken by G&T Metallurgical Laboratories, Canada.

Geology

Mineralisation at BSD occurs within a sequence of rhyolite pyroclastics of the Early Permian Rylstone Volcanics which unconformably overlie fine grained Ordovician meta-sediments and which are overlain by conglomerates, sandstones and coal measures of the Shoalhaven Group (Permian) part of the western edge of the Sydney Basin.

Four distinct, relatively flat lying units are recognised in the pyroclastic sequence. Underlying fine-grained crystal to crystal lithic tuffs are overlain by an ignimbrite flow sequence, which in turn is covered by coarse lapilli tuff and tuff breccia. Thin lenses (generally several metres thick) of vitric tuff occur in the upper part of the pyroclastic sequence. Underlying Ordovician meta-sediments consist of alternating lenses of siltstone and sandstone.

The Main Zone South and Main Zone North parts of the mineralisation are bounded to the east by a N to NNW trending structure, whereas mineralisation at the Bundarra North and Bundarra South Zones are aligned along a parallel structure in the western part of the prospect area. The pyroclastic sequence has been down faulted within a graben-like feature associated with these faults and a set of ESE cross cutting faults commonly form the boundaries to higher grade zones of mineralisation.

Mineralised host rocks include air-fall tuff breccia, ignimbrite and crystal tuff. Mineralisation also extends into Ordovician sediments (for example CRAE drilling intersected 2.2m of 14.4% Zn, 196g/t Ag, 1.4g/t Au and 4.4% Pb from 204.8m in DD89BG39) although most drill testing has been relatively shallow <120m and in many portions of the mineralised system exploration has not determined the depth extent of the mineralisation. Ignimbrite, and some tuff lithologies are welded and show crackle, mosaic and rotational breccia-style textures which can host mineralization within the both breccia clasts and siliceous breccia matrix. Crystal tuff rocktypes show less secondary brecciation and mineralisation in these is commonly finely disseminated within the altered matrix. Later stage mineralisation occurs as crustiform veins up to 10cm wide, often associated with fault zones, and usually containing quartz-carbonate-sulphide assemblages. Areas of more marked silicification and fracturing within welded tuffs may represent prominent pathways for circulating mineralising fluids.

Mineralisation occurs as lensoid zones, stacked within a 20-80m thick package which dips northwards at less than 30 degrees from outcrop at Main Zone South and Bundarra South to depths of over 200m in the northern parts of Main Zone North and Bundarra North. Drilling has shown that the BSD extends more than 600m east-west and 700m north-south. Faults bound the east and north margins of the mineralisation but mineralisation remains open to the west.

Silver Minerals

Silver minerals include tennantite, silver sulphosalts (pearceite-polybasite > pyrargyrite – proustite), silver sulphide (argentite, acanthite) and native silver. Microprobe analyses have identified stephanite / argyrodite, plagionite and cerargyrite. The silver content of the galena has not been determined. The sequence of deposition of the dominant silver phases occurs as: (?Ag-galena) → Ag-tennantite / freibergite → native Ag → argentite / acanthite → pyrargyrite-proustite → pearceite – polybasite.

Geophysics

Magnetic and IP surveys as well as some down-hole electrical logging has been undertaken. This has shown that the contrast between host and mineralised rock is subtle and many geophysical techniques would be of limited help in exploration.

During 2005 a VTEM (time domain) helicopter EM survey was flown by Geotech Ltd over Bowdens and the area covered by Sydney Basin sediments to the north of the deposit. Ken Witherly of Condor Consulting prepared a series of composite profiles showing the EM channels, the EM Flow Conductivity Depth Section (CDS), the TMI and AdTau (time constant) profiles as well as geological sections through the BSD and showed that the mineralisation can be defined in the EM Flow sections where a well defined flat-lying zone of moderate conductivity can be seen in most sections through the deposit.

Alteration

The hydrothermal history of the BSD shows an early stage of fluidized brecciation where pyroclastic fragments were transported, milled and sealed in a quartz-illitic clay-pyrite altered matrix. This breccia event was followed by wallrock replacement and cavity, fracture and breccia filling characterised by an often repeating sequence of quartz → sulphides → carbonate → clay, typical of South-West Pacific carbonate-base metal-gold systems (Corbett and Leach, 1998).

Quartz replacement and deposition occurred during all hydrothermal events. Fine grained early stage quartz is intergrown with illitic clay + pyrite and later quartz is generally coarser grained, clear and contains intergrowths of illitic clay, pyrite, arsenopyrite and/or sphalerite. Adularia replaces primary feldspar, rims fractures and cavities, and is replaced by illitic clays or sericite.

Sulphide content tends to increase during later quartz events and continues into carbonate-dominated alteration. Sulphide minerals are usually deposited as open space fill although they occur as replacements of mafic crystal fragments, feldspar fragments and vitric tuff clasts. Quartz in open spaces is overgrown by sulphide minerals that exhibit an overall depositional sequence of pyrite → arsenopyrite → sphalerite → galena → tennantite (±chalcopyrite) → silver minerals, although there is considerable overlap in this sequence. Sphalerite is the most abundant sulphide. Sphalerite shows general compositional change from Fe-rich cores to Fe-depleted rims, suggesting a general cooling during mineralization. This zoning is generally erratic and repetitive and suggests multiple fluctuations of temperature. Very rare chalcopyrite and other copper sulphides show that the hydrothermal fluids at this level in the system were depleted in copper.

Carbonate is intergrown with, and commonly overgrows quartz and sulphide minerals. Early carbonate phases are manganiferous compared with later carbonate which is iron-rich and finer grained and often forms fine grained colloform bands. Wall rock replacement is dominated by clay minerals which are also prominent as fracture and breccia fill with quartz, sulphide and carbonate minerals. Clay minerals line open spaces and form overgrowths on igneous minerals. Kaolinite occurs as overgrows, partially replaces illitic clay and locally contains marcasite and trace galena and silver minerals.

Silver mineralization occurred at the same time as carbonate alteration and continued into the clay-rich alteration events.

Distribution in Alteration and Mineralisation

An X-ray diffraction (XRD) study of the illitic clay minerals has been undertaken by Terry Leach. This work shows that illite and well-crystalline sericite form a relatively high temperature, N-S trending zone that coincides with a major fault in the western part of the BSD and widens in the south. Clay minerals grade into interlayered smectite – illite (with high smectite content) close to the western margin of the deposit and this indicates rapidly cooling alteration towards the west. Along the east of the BSD broad zones of interlayered illite-smectite, with a progressive increase in smectite content is interpreted as cooling conditions and possibly indicate an outflow zone.

Fe-rich carbonate minerals (siderite, mangano-siderite) dominate in the eastern portion of the prospect area, whereas manganese ± magnesium (rhodochroiste, kutnahorite, ankerite) are the main carbonate minerals identified in samples from the west of the deposit.

Arsenopyrite is common in the south and west of the deposit and marcasite is abundant and associated with Fe-carbonate in the north and east. Using colour index in thin section Terry Leach has shown that Fe-content of the sphalerite follows the distribution of illitic clays and is indirectly related to the temperature of mineralization. Fe-poor sphalerite is indicative of cool conditions and is typical of the north east and shallower levels of the BSD. Fe-rich sphalerite is restricted to the west. Galena is more abundant than sphalerite as the main base metal sulphide at shallower levels, especially in the northeast portion of the deposit. Silver minerals are mainly observed in samples from the north and east where tennantite (Cu-rich silver sulphosalt) occurs at deeper levels and Sb-As-Ag ore minerals (pearceite, pyrargyrite, argentite / acanthite, native silver) are more common at shallow levels.

Depositional Model

The distribution of the mineralisation and alteration indicates that quartz (+- adularia) – illite/sericite –pyrite – arsenopyrite assemblages formed on the northernmost margin of a hydrothermal system where high temperature fluids from south of the BSD flowed northwards along a major structure close to the western side of the deposit and towards the northeast along open structures or fracturing.

Cooler steam heated geothermal waters with a low pH flowed into the volcanic tuff sequence in the north and east with characteristic alteration of siderite – smectite-rich illite clays – Fe-carbonate - marcasite ± kaolinite.

When these two fluid types mixed, iron and base metal suphides were deposited, sulphur activity and pH of the mineralised fluid decreased and silver minerals were deposited. Clay minerals associated with the ore indicate that temperatures of silver – base metal mineralization were less than 150-200ºC.