The Mineralization of the Beiya Skarn Gold Deposit in Yunnan, Southwest China

HE Wenyan, YU Xuehui, DONG Guochen and HUANG Xiongfei

State Key Laboratory of Geological Processes and Mineral Resources, School of Earth Sciences and Resources, China University of Geoscience, Beijing 10083, China

With the collision of Indo-Asian continent since the Palaeocene, the Ailaoshan-Red River (ASRR) shear zone formed in SE Tibet and west Yunnan, as a consequence of tectonic escape (Tapponnier et al., 1990; Leloup et al., 1995; Chung et al., 1997; Yin and Harrison, 2000; Mo et al., 2006). More than 300 km of Tertiary left-lateral strike-slip movement has occurred along the ASRR shear zone (Tapponnier et al., 1990; Leloup et al., 1995). Strike-slip motion caused lithospheric-scale extension and emplacement of numerous alkali-rich igneous rocks along the Jinshajing suture where formed a 2000 km-long and generally 50-80km-wide alkali-rich magmatic belt crossing the Qiangtang Terrane and the western Yangtze carton (Chung et al., 1997). A number of mineral deposits are associated with this alkaline igneous rocks belt, which makes it one of the most important metallogenic belts in China. The Beiya skarn gold and polymetallic deposit in western Yunnan province is located in the middle of this belt. It is one of the largest gold deposits found in China.

To date, 5 mineralized zones have been defined in the Beiya area with the totally resource estimated over 250 tonnes gold, 3000 tonnes silver, 30 million tonnes of iron ores, 0.3 million tonnes of copper and 1.5 million tonnes of lead and zinc. Skarn alteration and mineralization are related to the shoshonitic quartz syenite porphyries that were emplaced into the carbonates of the Triassic Beiya Formation. The mineralization at Beiya is dominantly the disseminated sulfides in skarn and closely related to the distribution and style of calc-silicate alteration, with significant variation of mineralogy and metal concentrations. Mineralization is spatially associated with the skarn contact zone between the quartz syenite porphyry and Beiya Formation carbonates. The main orebodies occur along the contact zone of quartz syenite porphyry, less along the fracture zones within the porphyries and the adjacent limestones. The ore metals are zoned along the Wandongshan porphyry, and from inside porphyry intrusion (endoskarn), contact zone (exoskarn), outside zone to long-distance, the metals vary from Cu-Au, to Au-Cu-Fe, to Au- Fe, to Au-Fe-Pb to Pb-Ag respectively. The lead-gold-polymetallic zones at adjacent Xiyi (Beiya north) occur within interlayer fracture or breccia zones in the limestones of the lower part of the Upper Triassic Beiya Formation and along an interlayer detachment surface between the Beiya Formation and the Lower Triassic sandstone (T₃Q). The mineralized lenses are stratabound, with the thickness increasing toward the axis zone of the Beiya syncline (to the south). Mineralization is thought to be spatially and genetically associated with alkaline porphyries.

The ore minerals are dominantly sulfides, which have been oxidized at the shallow levels. The oxidized zone is generally 130 to 360 m deep, dominated by limonite, rarely magnetite, malachite and free gold. The sulfide ore zone is dominated by pyrite, chalcopyrite, magnetite, and free gold.

Sulfide and oxide minerals have overprinted the garnet-rich calcic skarn. The mineralization appears to be hosted primarily within intercalated limestone and quartz syenite porphyry. The most abundant ore minerals are magnetite, pyrite and chalcopyrite. Early-formed magnetite is cut by pyrite. Pyrite, which is the most abundant sulfide, has anhedral crystals disseminated in the fine-grained skarn and occurs as massive aggregates replacing garnet. Interfingerling of the phase is common. Chalcopyrite replaced magnetite and pyrite. Gold occurs as native gold or electrum in the interstices of previously formed crystals such as pyrite and chalcopyrite, and also occurs with garnet and pyroxene. From electron probe microanalyses, the gold is composed of about 88 wt% Au and 12 wt % Ag. The native gold is this study has high Au/Ag ratios averaging 15.7.

Key words: Mineralization, Skarn, Beiya deposit

References