Zoning Model of Alteration and Mineralization in the Regional Alkali-rich Porphyry: A Case Study of the Baixiangchang Pb-Zn-Ag-(Cu-Au) Polymetallic Deposit, Western Yunnan

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Abstract: The Pb-Zn-Ag-(Cu-Au) polymetallic deposit in Baixiangchang is one of the Himalayan porphyry-type Au polymetallic deposits in the Jinhshajiang-Ailaoshan alkali-rich porphyry belt in the Sanjiang Tethys metallogenic area. This deposit is adjacent to the Beiya super-large Au polymetallic deposit, the Machangqing Cu-Mo-Au deposit. The exposed stratum in the mining area is gray medium-thick layered limestone in the upper Carboniferous (C2), and its structures mainly distribute NE-trending the Liziyuan fault, which is the ore-conducting structure of the deposit. At the same time, a series of gentle anticlines, eg. The Binju Street anticline are also developed. The ore-related intrusive body is monzonite-porphyry. Many types of mineralization include porphyry-type Cu-Mo-Au mineralization, contact metamorphic-type Fe-Cu-Au mineralization, hydrothermal vein-type Pb-Zn-Ag-Fe mineralization and oxidation-type Fe-Au mineralization. The ores are mainly natural gold, chalcopyrite, pyrite, magnetite, galena, sphalerite, and secondary minerals are molybdenite, pyrrhotite, specularite, etc. The gangue minerals are mainly feldspar, calcite, quartz, biotite, grossularite, andradite, and secondary minerals are sodechlorite, kaolinite and hornblende. Ores show idiomorphic, hypidiomorphic granular textures. The major alteration types in the mining area include strong porphyry-type, contact zone-type between porphyry and surrounding rock, and hydrothermal-type alteration in the marble of the country rock. The main mineralization and alteration zones are characterized by the regular changes as follow: In porphyry body, it is shown that potassium zone occurring star-shaped and spotted Cu mineralization—beresitization zone occurring densely disseminated, fine vein Cu-Mo-Au ore bodies→kaolinite argillation zone occurring higher grade gold orebodies→propylitization zone occurring fine veined Fe-Cu-Au ore bodies, and in contact zone, skarnization occurring veined Fe-Cu-Au ore bodies, and in surrounding rock, calcitization, silicification—dalilithization occurring thermal vein-type Pb-Zn-Ag ore bodies in interlayer faults or fractures. Specially, the contents of chalcopyrite and pyrite show a negative and a positive relationship from the potassium zone to propylitization zone, pyritization and sericitization are closely related to gold mineralization, and oxidized-type Fe-Au ore bodies enriched in the surface and shallowness. Based on comparing among this deposit, the Beiya deposit and the Huangshaping W-Sn-Cu-Pb-Zn Polymetallic deposit, it is found that the features of their alteration and mineralizations a wholes is similar. Therefore, the depth in the Baixiangchang deposit has a good ore-prospecting potential. A mineralization-alteration zoning model has been established finally.

Key words: mineralized alteration zoning, porphyry deposit, Baixiangchang polymetallic deposit, western Yunnan

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