1 Geological Setting

Baiyinbaolidao and Bayanhar (Bai-Ba) gold deposits are situated on the northwest of Xilinhot massif, which belongs to the Precambrian massif surrounded by Paleozoic orogenic belt in the northern margin of the North China craton, and on the south of the Erenhot-Hegenshan deep fault, that is, the suture zone of North China Craton and Siberian plate. This area is one of the most important iron and gold producing area in south-central Inner Mongolia (Nie et al., 2007).

Three lithostratigraphic-tectonic units were recognized in the region. (1) the Precambrian massif, which comprises two groups, is the favorable source bed for gold mineralization (2) the upper Palaeozoic volcano-sedimentary formation, which is characterized by poor continuity and complex rock types, is mainly constitute of Devonian, Carboniferous and Permian volcano-sedimentary groups and is distributed in the north, east, and northeast of the mining area. (3) the Mesozoic to Cenozoic volcano-sedimentary formation mainly consists of Jurassic to Cretacic volcano-sedimentary rocks and Tertiary to Quaternary sediments (Nie et al., 2007).

Faults are wide-spread in this area and are affected by multiple subduction and collision of the North China Craton, the Paleo-Mongolian ocean and the Siberian plate. Among them, the ductile-shear zones which are related to nappe tectonics have a close time-space relationship with the gold deposits. Up to now, Bai-Ba area has found four large ductile shear zones. (Yuan et al., 2009; Nie et al., 2007)

Multiply magmatic activities provide sufficient source and hydrotherm for gold mineralization. According to the distribution of gold deposits in the China-Mongolia-border metallocenic belt, the deposits are all connected with the middle-late Variscan intrusions. Particularly, the late Caledonian Baolidao suite and the late Hercynian Halatu plutons have close relationship with Bai and Ba gold deposits respectively (Zhu et al., 2006, Nie et al., 2007).

2 Deposit Geological Characteristics

The gold mineralization as veins or bands within the Paleozoic granite intrusive body or along the contact zone with the Paleozoic ophiolitic mélange, formed a 12×2.5km gold metallogenic belt. The mineral composition is simple, mainly composed of primary sulfide minerals (pyrite, galena, chalcopyrite and Sphalerite) and oxide minerals (malachite, psilomelane, pyrolusite, limonite, jarosite and siderite). Gangue minerals are quartz, sericite, chlorite, calcite, biotite, kaolinite, epidote and garnet. The Au-bearing minerals are native gold and electrum, and occur as inclusions in pyrite, galena and chalcopyrite or as veinlet in fractures of pyrite and galena. Alterations consists of mainly silification, beresitization, serticization and propylitzation. Among them, the silification and beresitization shows an intimate spatially relations to the Au mineralization.

Combined the Bai-Ba geologic feature and the S-isotope data, Nie et al (2007) suggested that the sulfur of these deposits come from atmospheric precipitation, sedimentary strata and granitoids. The leaching of magmatic-meteoric waters to granitoids is the important source for fluid to obtain the metallogenic materials, and the mixture of rebalanced magmatic and meteoric water lead to the deposition of metallogenic materials.

For Bai deposit, the fluid inclusions reveals that the magmatic water is dominated and the meteoric waters is limited. And the hydrothermal ore-forming solution is a medium-temperature fluid with high alkalis and weak reductive. By comparison, for Ba deposit, the analysis of oxygen and hydrogen isotope shows that most
hydrothermal ore-forming solution comes from meteoric waters, and there almost no magmatic water. Compared to Bai deposit, the Ba deposit has higher K⁺ and Cl⁻, and lower CO₂. The hydrothermal ore-forming solution of Ba deposit is high alkalis and weak reductive.

Considering the granodiorite and quartiz-diorite are the host rock of Bai deposit, some scholars consider their U-Pb age (439.8±4 Ma) as the formation age of Bai deposit (Zhang et al, 2004). The Au mineralization at Bayanhar is closely associated with a number of granodiorite that has been dated at 363 Ma by U-Pb method (Xu et al, 1997; Zhang et al, 2004).

3 Discussions and Conclusions

Quite a few gold deposits have been found recently in the southern Sonid Zuooqi, Inner Mongolia. These deposits, together with the Xiaobaliang gold deposits in the east, the Zhulagaza gold deposits in the west and the Tallinn gold metallogenic belts 4 km from the Mongolian-Chinese border, all suggested that there is a great exploration potentiality in the border between the northern China and Mongolia. Gold deposits in the southern Sonid Zuooqi are featured by small scale, high grade, shallow bury and easily extracted and smelted, represented by the Baiyinbaolidao and Bayanhar gold deposits. Based on a comprehensive study, the authors hold that the Bayinbaolidao gold deposit, which is related to granite-porphyry formed in Early Paleozoic island arc environment, is of the mesothermal type. And the Bayan Har gold deposit, which is related to the granite-porphyry intruded in Sonid Zuooqi ophiolitic mélange belt in the middle-late stage of the Late Paleozoic, is of the epithermal type.

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