AN Fang, ZHU Yongfeng, WEI Shaoni and LAI Shaocong, 2014. The Baogutu Au-As-Sb Deposit in West Junggar, NW China: A Possible Epizonal Intrusion-related Gold Deposit. *Acta Geologica Sinica* (English Edition), 88(supp. 2): 681-682.

The Baogutu Au-As-Sb Deposit in West Junggar, NW China: A Possible Epizonal Intrusion-related Gold Deposit

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1 Geology of the Baogutu Deposit

The west Junggar, located in the eastern part of the Junggar—Balkash metallogenic province, is an important constituent of the central Asian metallogenic domain (CAMB, Zhu et al., 2007). Two gold deposits concentrating areas have been recognized in west Junggar: Hatu-Sartohy and Baogutu concentrating areas, locating in north and south sides of NE-trending Darbut faults, respectively. The Baogutu region locates in south side of Darbut fault. Granitic to dioritic stocks and dykes are intensively distributed in Baogutu region. Zircons separated from the porphyry were dated to be 310 to 320 Ma using SHRIMP and LA-ICP-MS methods (e.g., Wei et al., 2011; Shen et al., 2012). The diorite dykes expose in NE-trending faults in stocks or Lower Carboniferous outside of the stocks. The age of these dykes (310-314Ma, Tang et al., 2010) overlap the late stage of the porphyry.

The Baogutu gold deposit is located ~15km SW from the porphyry Cu deposit. It is hosted within the Lower Carboniferous Baogutu Formation. The tuff, tuff siltstone and silt-bearing mudstone are the wall-rocks of most Au-bearing veins. In Baogutu gold mine, there are lots of quartz diorite and diorite dykes crosscut the Baogutu Formation together with the gold-bearing veins. Spatial relationships between gold-bearing veins and dykes were investigated underground. 1. They are hosted in the same fault, the gold-bearing vein occurring in hanging wall, footwall of the dyke, or crosscutting the dyke; 2. They are controlled by two faults, paralleling to each other in space, with a horizontal distance of 20cm to more than 1m. Most of the Au-bearing veins are lensoid or ribbon-like in morphology, dipping to 301 to 328°, at angles of 70 to 77°. Some veins reach 400 m in depth with lengths of 10 to 150 m and planar thickness of 0.5 to 3m. Gold grade is highly variable, from ~1g/t to more than 100 g/t. The Au-bearing veins are composed of gold-bearing quartz veins and mineralized host rocks. Three kinds of quartz veins have been recognized in Baogutu gold mine: pyrite—quartz vein, stibnite-quartz vein and native arsenic vein (An et al., 2009; 2010).

2 Classification of the Baogutu Gold Deposit

The geological and geochemical characteristics of the Baogutu gold deposit mostly consistent with the intrusion-related gold deposit as described by Lang et al. (2000) and reviewed by Baker (2002). The intrusion nearby the Baogutu gold deposit is moderately reduced (ilmenite-series, Wei et al., 2014), which is alike with that in intrusion-related system. In intrusion-related system, there exists the Au-As-Bi-Mo-W mineralization as sheeted veins and dissemination in intrusion or as large veins in contact zone, and epizonal Au-As-Sb mineralization hosted in dykes or faults as veins (Lang et al., 2000). The Au-As-Bi mineralization has been recognized in Baogutu region, hosted in intrusion-related faults, and showing very close relationship between gold mineralization and native bismuth (Zheng et al., 2009). The Baogutu gold deposit with accessories of As and Sb should be representative of the epizonal gold deposit in intrusion-relation gold system. The gold-bearing veins in Baogutu gold deposit expose in 1-3 km external of the intrusions, and the gold mineralization was also coincident with the intrusions, showing their possible genetic relationship. Many dioritic dykes hosting or distributed together with gold-bearing quartz veins and veinlets, the metal suite of Au-As-Sb-Ag, the ore mineral assemblage of pyrite-arsenopyrite-stibnite-native arsenic and the dominant alteration of quartz, carbonate and sericite in Baogutu, are consistent with the geological features in typical epizonal gold deposit, such as Donlin Creek in Alaska and Brewery

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Creek in Yukon (Baker, 2002). The gold mineralization depth (1-2km), temperature (150-300℃) and occurrence of visible gold with arsenopyrite and arsenic-rich pyrite in Baogutu might warrant the classification of the Baogutu deposit as an epizonal gold deposit in intrusion-related gold system. Fluid inclusions in Baogutu are low salinity NaCl-H_2O inclusions containing small amount of CO_2 (Qi et al., 1992), very similar to later stage fluid in intrusion-related system (Baker, 2002).

Acknowledgement

This work is sponsored by National Natural Science Foundation of China (41203032) and autonomic research foundation of State Key Laboratory of Continental Dynamics.

References

An, F., and Zhu, Y.F., 2009. Significance of native arsenic in the Baogutu gold deposit, Western Junggar, Xinjiang, NW China. Chinese Science Bulletin, 54(10): 1744-1749.

An, F., and Zhu, Y.F., 2010. Native antimony in the Baogutu gold deposit (west Junggar, NW China): its occurrence and origin. Ore Geology Review, 37: 214-223.

Baker, T., 2002. Emplacement depth and carbon dioxide-rich fluid inclusions in intrusion-related gold deposits. Econimic Geology, 97: 1111-1117.

Lang, J.R., Baker, T., Hart, C.J.R., and Mortensen, J.K., 2000. An exploration model for intrusion-related gold systems. Society of Economic Geologists Newsletter, 40: 1, 6-15.

Qi, J.Y., and Xiong, Y.D., 1992. Characteristics and genesis of gold deposits in Baogutu, Xinjiang. Mineral Deposit, 11(2): 154-164.

Shen, P., Shen, Y.C., Pan, H.D., Li, X.H., Dong, L.H., Wang, J.B., Zhu, H.P., Dai, H.W., Guan, W.N., 2012. Geochronology and isotope geochemistry of the Baogutu porphyry copper deposit in the West Junggar region, Xinjiang, China. Journal of Asian Earth Sciences, 49: 99-115.

Tang, G.J., Wang, Q., Wyman, D.A., Li, Z.X., Zhao, Z.H., Jia, X.H., Jiang, Z.Q., 2010. Ridge subduction and crustal growth in the Central Asian orogenic belt: evidence from Late Carboniferous adakites and high-Mg diorites in the western Junggar region, norther Xinjiang (West China). Chemical Geology, 277: 281-300.

Wei, S.N., Cheng, J.F., Yu, D.B., 2011. Petrology and SHRIMP zircon ages of intrusive body III in Baogutu area, Xinjiang. Earth Science Frontiers, 18: 212-222.

Wei, S.N., Zhu, Y.F., An, F., 2014. Petrology, geochronology and geochemistry of intermediate-acidic intrusions in Baogutu area, west Junggar, Xinjiang. Acta Petrologica Sinica, in press.

Zheng, B., An, F., and Zhu, Y.F., 2009. Native bismuth found in Baogutu gold deposit and its geological significance. Acta Petrologica Sinica, 25(6): 1426-1436.

Zhu, Y.F., He, G.Q., and An, F., 2007. Geological evolution and metallogeny in the core part of the Central Asian metallogenic domain. Geological Bulletin of China, 26: 1167-1177.