

Guo Baojian and Li Yongfeng, 2014. Exploration and Development of the Tieluping-Shagou Vein type Silver-Lead Deposit in Western Henan. *Acta Geologica Sinica* (English Edition), 88(supp. 2): 1237-1238.

Exploration and Development of the Tieluping-Shagou Vein Type Silver-Lead Deposit in Western Henan

GUO Baojian and LI Yongfeng

*Henan Provincial Engineering and Technological Centre of Nonferrous Metals Minerals Exploration,
Zhengzhou 450016, China*

1 Introduction

Vein type silver-lead deposits, which occur in structure-controlled alteration belts, are very common in the western Henan Province of China. In the past years, many silver-lead prospecting targets were abandoned due to thin thickness and discontinuous mineralization. Now the situation is significantly changed due to the successful operation and booming of the mineral industry in the last decade. Since 2004, Silvercorp Metals Inc. has cooperated successfully with Henan Provincial Nonferrous Metals Geological and Mineral Resources Bureau in exploring and developing the Tieluping-Shagou silver-lead deposit in a region of about 80 km² in west Henan. Now the Joint Venture – Henan Found Mining Company has become one of the largest silver and lead suppliers in China.

2 Geological Setting and Mineralization

2.1 Geological setting

The Tieluping-Shagou silver-lead deposit is about 145 km southwest of Luoyang which is the nearest major city in west Henan.

It occurs in the East-West trending Qinling Orogenic Belt, a major structural belt formed by the collision of North China and Yangtze Cratons in Late Paleozoic to early Mesozoic. In Mesozoic large-scale hydrothermal mineralization occurred in response to rapid lithospheric thinning in eastern China (Mao et al., 2003). In this region, hydrothermal mineralization such as crypto-explosive breccia type gold deposits, porphyry molybdenum (tungsten) deposits, and vein type gold, silver, lead and zinc deposits, constitute the important mineralization belt of the eastern part of the Qinling Orogenic Belt (Guo et al., 2005).

Tieluping-Shagou silver-lead deposit is located in the

Xiong'er Shan metamorphic-core complex structure. The Neo-Archean Taihua Group gneiss is the host rock and all mineralization occurs in steeply-dipping fault-fissure zones (mainly north-east trending).

2.2 Mineralization

The ore contains multiple mesothermal silver-lead-zinc-rich quartz carbonate veins. To date, significant mineralization has been defined or developed in at least 131 discrete vein structures and many other smaller veins have been found but as yet not well explored. Structurally the veins are all somewhat similar in that they occur as sets of veins of generally similar orientation enclosed by fault-fissure zones which trend most commonly north-east, less commonly north-south. The structures extend for hundreds to a few thousand meters. The vein systems consist of narrow, tabular or splayed veins often occurring as sets of parallel and offset veins. The veins thin and thicken abruptly along the structures in classic “pinch-and-swell” fashion with widths varying from a few centimeters up to a few meters. “Swells” formed in structural dilatant zones along the veins are often sites of rich pockets of mineralization known as “ore shoots” and range from 30m to more than 60m in vertical and horizontal dimensions with true vein widths of 0.4 m to 3 m.

The metallic minerals are confined to the veins and occur as massive accumulations or disseminations. The galena often occurs as massive tabular lenses comprised of coarsely crystalline aggregates or fine-grained granular bodies. Gangue in the vein system consists mostly of quartz-carbonate minerals. Wall rock alteration is commonly marked as a myriad of quartz veinlets which are accompanied by sericite, chlorite and silicification on fractures. ⁴⁰Ar/³⁹Ar dating of fuchsite and sericite from altered rocks close to ore veins shows the ages of 145 to 147 Ma (Mao et al., 2006). The resource estimation to 31 veins of the main Shagou mine in 2013 shows that the

* Corresponding author. E-mail: baojian_guo@126.com

average grade of silver is about 300g/t and the combined lead and zinc content is about 8%.

3 Exploration and Mine History

Mineralization in the district has been known and intermittently mined for the last several hundred years. The first systematic geological survey was initiated in 1956 by the Government. From 1980 to 2003 Henan Provincial Nonferrous Metals Bureau has completed surveys and exploration in the region, including geochemical and geophysical survey of the region and surrounding area. The large-scale Tieluping silver-lead deposit was discovered in 1987 to 1995 and the small-scale exploration on Shagou and surrounding area. Silvercorp acquired a 77.5% to 80% interest of the permits in 2004 and rapid exploration has resulted in the discovery of a number of silver-lead-rich ore bodies and the area has become one of the largest silver-lead mines in China today.

4 Exploration and Development

In 2003 to 2004, the geologists and manager of the company realized the value of this type mineralization through detailed site investigation and market assessment. And at same time, they believe that, other than surface drilling, the underground workings should be the main effective means. The workings follow the vein structure along strike, on levels spaced approximately 40 m apart. It is an effective and efficient way to define the geometry of the mineralized structures, in part due to the discontinuous character of the high-grade mineralization but also the relatively inexpensive development costs. Meantime, drilling at underground workings is also an effective

means controlling the veins or altered structure-fissures zone, especially the buried ones. From 2004 to present more than 300km of tunnelling and 400km of drilling (mainly underground drilling) has been completed. As the orebodies are defined resources and reserve increases rapidly meet the needs of developing the mine.

5 Conclusions

Through detailed site investigation and reasonable evaluation shows high-grade, but thin and discontinuous mineralization of silver-lead vein type is a worthy means of investment during a booming period of the mining industry. At the same time rapid operation and effective exploration approach is also necessary.

Acknowledgements

This study was supported by Industry Public Welfare Project of MLR of China (Grant No.201111007-2).

References

- Guo, B.J., Li, Y.F., Wang, Z.Z., and Ye, H.H., 2005. Type, metallogenetic regularities, mineralization model and prospecting proposal in the Xiong'ershan District. *Geology and Prospecting*, 41(5): 43-47 (in Chinese with English abstract).
- Mao, J.W., Xie, G.Q., Zhang, Z.H., Li, X. F., Wang, Y.T., Zhang, C.Q., and Li, Y. F., 2005. Mesozoic large- scale metallogenic pulses in North China and corresponding geodynamic settings. *Acta Petrologica Sinica*, 21(1): 169-188 (in Chinese with English abstract).
- Mao, J.W., Zheng, R.F., Ye, H.S., Gao, J.J. and Chen, W., 2006. $^{40}\text{Ar}/^{39}\text{Ar}$ dating of fuchsite and sericite from altered rocks close to ore veins in Shagou large- size Ag- Pb- Zn deposit of Xiong' ershan area, western Henan Province, and its significance. *Mineral Deposits*, 25(4): 359-68 (in Chinese with English abstract).