The Progress in the Deep Exploration and Study of Gold Deposits in Shandong Peninsula

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1 Introduction

The Shandong Peninsula that suited at East margin of North China Craton has been well studied though various ways including exploration and research study. It is the most well known area for gold prospecting and exploration. Prior to 2005, about 1700t of gold have been indicated from depth of 0-500m with both reserve and resources category. Since 2005, total number of 2700t of gold have been discovered within the depth of 500-2000m. This report will be dedicated on summing the progress of deep exploration according to the previous work.

2 Regional Geological Setting and Gold Distribution

Gold deposits in Shandong Peninsula are mainly distributed in Jiaobei Uplift and its surrounding, and are hosted in the Precambrian metamorphosed rocks and Mesozoic granites. The majority of gold deposits are structurally controlled by the NE-NNE-trending faults including Sanshandao Fault, Jiaojia Fault, Zhaoping Fault, Xilin-Douya Fault and Jinniushan Fault. There are approximately 200 gold deposits discovered in Shandong Peninsula, namely the Shandong Peninsula Metallogenetic Province. This metallogenetic Province includes three metallogenetic sub-regions namely the Jiaxibei, Qipengfu and Muru.

3 Significantly Deep Prospecting Fruits

Now, the depth drilling have examined 500-2000m in most of exploration targets in Shandong Peninsula Metallogenetic Province including three deep drilling which are 2755.7m, 2738.83m and 4006.17m in Xiling exploration area. Deep exploration has made significant progresses. Thirty-six medium to large deep gold deposits have been discovered and about 2700t gold resource reserves have been proven.

There are significant amount of deep gold deposits discovered in the southern segments of Jiaojia Fault, such as Sizhuang deep, Jiaojia deep, Zhuguiolijia, Nanlv-Xinmu, Shaling and Qianchen. These deep gold deposits connect or overlapping, and correspond with shallow deposits, comprising a unified super large-scale gold deposit, namely Jiaojia-Saling gold deposit, which in fact, the accumulated 1000t gold reserves or resources have been estimated.

In the northern segment of Sashandao Fault, super large deep gold deposits were defined in Xiling and alongshore area northern of Sanshandao respectively. This two deep gold deposits and Sanshandao gold deposit (shallow deposit) nearby are defined as same mineralization system. Total 900t gold reserves or resources have been estimated in this deposit namely Sanshandao-Xiling gold deposit.

In the northern segment of Zhaoping Fault, major breakthroughs have been found in terms of deep prospecting of Linglong gold field and Dayingezhuang gold field. About 300t gold reserves have been discovered in deep area of Linglong gold field including Shuiwangzhuang, Dongfeng, Taishang, Potouding and Lingnan deep gold deposits. Accumulative total about 660t gold reserves or resources have been estimated in shallow and deep seated of Linglong gold field. About
170t gold reserves have been found in deep seated of Dayingezhuang gold field including Yingezhuang, Houcang and Xiadian deep gold deposits. And accumulative total about 370t gold reserves or resources have been estimated in shallow and deep seated of Dayingezhuang gold field.

Accumulative total about 4000t gold reserves have been estimated in Jiaoxibei metallogenetic sub-region including Sanshandao Fault, Jiaojia Fault and Zhaoping Fault. Jiaoxibei gold-concentrated area ranks the third rock gold metallogenic region in the world after Witwatersrand of South Africa and Muruntau of Uzbekistan.

4 Advance in deep prospecting

(1) Second mineralization enrichment zone is found. We studied the vertical distribution of typical gold fields and discovered between the deep ore body and the shallow ore body existing a barren gap separates the two or a weak mineralization zone. The relationship between the shallow and deep ore bodies of the same deposit indicates that they are just like the first mineralization enrichment zone and the second mineralization enrichment zone of a big gold deposit, which have no definite or fixed boundary.

(2) A step metallogenetic model for gold deposits is established. We find that the three major ore-controlling faults of the Shandong Peninsula gold deposits, Sanshandao, Jiaojia, and Linglong Faults which are mainly controlled by structures are listric faults. They constitute a large extensional structure primarily between the Mesozoic granites and the Early Precambrian metamorphic complex. These ore-controlling faults have a number of steps or benches where the dip angle of the fault changes from steep to gentle, exhibiting step-like or slope-plateau character. The bigger and thicker parts of the ore body present in the gentle-dipping section of the step, indicating a step-like distribution pattern (Song et al., 2013).

(3) The “thermal upwelling- extension” metallogenesis is proposed. The key points of the recognition are: the gold deposits formed at a time when the eastern lithosphere of North China Craton was undergoing thinning that inducing large-scale magmatic activities in the Shandong Peninsula. During the period of 127–105 Ma, these intensive magmatic activities resulted in a large number of stocks of granite derived from the interaction between the crust and the mantle. Host rock fluids segregated and activated by magmatic activities became carriers for the migration and enrichment of gold deposits. The upwelling of magmas gave rise to extensional detachment in the overlying host rocks or processes of metamorphic core complex (Charles et al., 2013), which provided favorable environment for gold mineralization.

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References
