An Exploration-Evaluation Model for Uranium-Beryllium Resources in Xuemisitan Volcanic Belt, NW Xinjiang, China

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1 Introduction

Xuemisitan Paleozoic volcanic rock belt is an east-west elongated poly-metallic ore belt of uranium, beryllium, molybdenum and copper, about 120 km long from west to east and 5-6km wide on average. From west to east a uranium-beryllium ore deposit and a lot of ore occurrences and anomalies are well developed, which shows a good potential of mineral resources. How to explore and evaluate potential poly-metallic resources is a hot issue to be discussed.

2 Metallogenetic Environment and Ore-controlling Factors

2.1 Regional metallogenetic environment

In Paleozoic Xuemistan belt was active, the old Zhaisang ocean basin closed from Devonian to Early Carboniferous, and ore formed in north margin of Khazakstan-Jungar micro-plate during post collision evolution from Late Carboniferous to Permian (Li Jinyi, et al, 2006; Wang Jingbin, et al, 2006; Zhu Baoqing, et al, 2006). Since Triassic ore deposit have been preserved when Xuemistan started intracontinental evolution.

Xuemistan has good uranium and beryllium sources. Acidic volcanic rocks in Xuemistan belt have high uranium concentration (7-8×10^-6), especially, subvolcanic rocks and rhyolite have more than 10×10^-6 uranium concentration. Beryllium concentration is also high in subvolcanic rocks and rhyolite (8-9×10^-6 to more than 20×10^-6).

Xuemistan ore belt has suffered from multistages of transformation of various dykes at post collision stage and later. Radioactive isotopic dating shows diabase dykes (254.6Ma), diorite porphyry dykes (290±18Ma, 222±18Ma), and alaskite dykes (255±2.2Ma, 246±1.1Ma) transformed older subvolcanic rocks (309.2Ma).

2.2 Ore-controlling factors

Uranium and beryllium deposits and occurrences are located along east-west striking Chagantalgay-Bayinbulake deep fault, and co-controlled by fissure-effusive volcanic edifices, sub-fault/fractures and acidic volcanic- subvolcanic rocks along the fault.

Uranium mineralization is controlled by subvolcanic rock contacting, hydrothermal activities and alterations. Hematitization and dark purple fluorite occurred in close periphery of uranium mineralization, hydromicazation and chloritization area are larger.

Beryllium mineralization is controlled by contacting zone between subvolcanic rock and crystal tuff, hydrothermal activities and alteration. Bertrandite and fluorite are close related to beryllium mineralization. Sometimes beryllium mineralization is associated with coarse grain calcite, and in some cases beryllium mineralization is spatially superimposed by uranium mineralization.

3 Exploration-Evaluation Model

3.1 Prospecting directions and indicators

Uranium prospecting should be focused on acidic volcanic rocks, fractures, subvolcanic rock contacting, high-uranium field, altered areas and dykes. Hydromicazation, hematitization, chloritization and kaolinitization, especially hydromicazation, are indicators for uranium prospecting.

Beryllium prospecting should be mainly focused on acidic volcanic rocks, subvolcanic rock contacting, fluoritization, coarse calcite, and uranium mineralization. Fluorite is primary prospecting indicator for beryllium ore. Uranium mineralization or coarse calcite can be regarded as beryllium prospecting indicators.

3.2 Exploration-evaluation model

Considering various methods for ore exploration, an integrated exploration-evaluation model has been...
4 Conclusions

The geotectonic setting, uranium and beryllium sources, and multi-staged dykes of Xuemistan belt imply good uranium-beryllium potential.

Deep fault, acidic volcanic rocks, subvolcanic rock contacting, sub-level faults and fractures, hydromicazation and fluoritization are controlling uranium ore, and fluorite is closely related to beryllium mineralization.

An exploration-evaluation model has been established to separate 1 level-A, 5 level-B and 2 level-C perspective areas.

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References

