LI Ziying, ZHANG Jindai, CAI Yuqi, GUO Q. Y. and ZHU P. F., 2014. General Aspects and Resource Potential of Uranium Deposits in China. *Acta Geologica Sinica* (English Edition), 88(supp. 2): 1371-1372.

General Aspects and Resource Potential of Uranium Deposits in China

LI Ziying[1*], ZHANG Jindai[2], CAI Yuqi[1], GUO Q. Y.[2] and ZHU P. F.[1]

1 Beijing Research Institute of Uranium Geology，Beijing，China
2 Department of Geology and Mining CNNC，Beijing, China

1 Main Types of Uranium Deposits

Classification of uranium deposits is a basis for the resource potential evaluation. At present, the category of uranium deposits is based on their origins, and can be classified into magmatic, hydrothermal, continental and marine facies sedimentary ones. Furthermore, based on host rocks and metallogenic environments, uranium deposits can be traditionally classified into 4 categories, 9 types and 21 subtypes (see table 1). Among those types, granite (vein) type, volcanic (vein) type, sandstone type, carbonaceous – siliceous – pelitic rock (black shale) type are four main types of uranium deposits in China, which make up more than 90% of the whole uranium resources discovered in China.

Table 1 Classification of Uranium deposits in China

Category	Type	Subtype
Magmatic	Pegamatite	/
	Alkaline rock	/
Hydrothermal (vein)	Granite	Internal granitic body
		External granitic body
		Overlying basin above granitic body
	Volcanic rock	Volcanic breccia pipe
		Subvolcanic rock
		Broken dense fissures
Continental facies sedimentary	Sandstone	Interlayered
		Volcanic clastic
		Interlayer oxidation type
		Phreatic oxidation type
		Sedimentary
		Polygenic
	Mudstone	/
	Coal	/
Marine facies sedimentary	Black shale	Sedimentary
		Epigenetic reforming
		Hydrothermal reforming
		Hydrothermal and eluvial
	phosphate	/

2 Regional Uranium Metallogenic Characteristics

Compared with the ancient shield or large craton in the world, the ancient continental blocks are usually small in size, dispersion in distribution and younger in consolidation in China, Proterozoic uranium mineralization is much weaker than North America, Australia and South Africa (Chen Yuchuan, 1999; Zhang Jindai et al., 2008). On the contrary, the tectonic belts of continental block are well developed in China, in which late magmatic activities and tectonic movements are strong and frequent, leading to that uranium mineralizations mainly occur in the Paleozoic and Mesozoic-Cenozoic time, especially in the Meso-Cenozoic period.

Hydrothermal uranium deposits (including granite type, volcanic type, alkaline metasomatic type) are usually associated with acidic magmatism in space and time. Intrusive magma centers and volcanic eruption belts control distribution of uranium metallogenic zones. In addition, magmatic rocks formed in different ages from Paleozoic to Mesozoic with high uranium contents provide a good uranium source for sandstone type uranium deposits formed in later ages, especially Mesozoic-Cenozoic time.

Tectonic faults play both constructive and destructive roles in uranium mineralizations. It can be concluded that hydrothermal uranium deposits have been controlled by the second-order structures of major tectonics without exception. Faults play also important roles in sandstone type uranium deposits. They can act as hydrodynamic discharge zones and geochemical redox barriers for

* Corresponding author. E-mail: zyli9818@126.com

interlayer oxidation uranium mineralization because they are often easy to be reductant moving channels.

The complex geological and tectonic events correspondently lead to complicated uranium mineralization processes, phases and types of deposits. Originally, they are superposed by both endogenetic and exogenetic processes.

Black shale is an important sedimentary formation in China which is rich in uranium. And in these shales many carbonaceous-siliceous-pelitic rock type (black shale) uranium deposits have been discovered. Jurassic, Cretaceous and Paleogene sedimentary formations are developed in continental sedimentary basins, which are main ore beds producing sandstone-type uranium deposits. It is pointed out that interlayer oxidization sandstone-type uranium deposit should be main exploration target type, then paleo-phreatic oxidization type.

Uranium mineralization characteristics are generally accordance with the regional geotectonic background in China (Zhang Jindai et al., 2008).

3 Major Metallogenic Units

Based on the above mentioned classification and uranium metallogenic background, the metallogenic field, province, region and belt can be furthermore classified in China, namely, four fields (Ancient Asian, Qin-Qi-Kun, Pan-Pacific and Tethys metallogenic fields), ten provinces (Altai-Junggar, Tianshan, Tarim, Qilian-Qinling, Daxinganling, Jihei（orogenic belts）, North China Continental Block, Yangtze Continental Block, Southeastern China, Gangdisi-Shanjiang) and 49 regions and belts.

4 Uranium Resource Potential

China is located at the intersection places of the well-known world mineralization belts. Eastern China is geologically an important component of the world circum-Pacific uranium metallogenic belt, northern China is an important component of Eurasia rectangular uranium metallogenic belt and southwest China is part of Tethys metallogenic field (Chen Yuchuan, 1999). Many large, super-large uranium deposits have been already found in countries located in those Metallogenic belts, and a large number of uranium deposits also found in China. Therefore, there are favorable metallogenic conditions for uranium mineralization, which are of different geotectonic backgrounds favorable for different types of uranium deposits. Although the super-large uranium deposits discovered are few in China, uranium deposits are of more types, multiple mineralization periods from Proterozoic to Cenozoic and exist as group of small to medium-sized deposits, showing unique signatures and another advantage uranium resource potential.

There is great uranium resource potential based on the following aspects: (1) Good resource potential in the depth and around the known deposits; (2) Great potential in the areas with low or blank exploration degree; (3) Good potential of non-conventional uranium resource.

Since 2001, more and more investments have been given on uranium exploration in China, and a large progress made, new deposits and resources discovered, such as sandstone type deposits in Xinjiang, Inner Mongolia and hydrothermal deposits in bigger depth in southern China.

References

Chen Yuchuan, Mineral resource evaluation of major metallogenic belts of China. Geological Press, Beijing, 1999.

Zhang Jindai, Li Ziying, Uranium potential and regional Metallogenic characteristics in China. ACTA GEOLOGICA SINICA, Vol.82 No.4，2008，pp.741-744.

Xiao Keyan，Wang Yongyi，Chen Zhenghui et al: New Evaluation Technology and Models of Mineral Resoiurces in China. Geologial Press，2006.

Ye Tianzhu：Prognosis and Evaluation Techniques of Solid Mineral Resources[M]. China Land Press，2004.