1 Regional Geological Setting

This article is aiming at the Wudaqi copper-nickel ore reconnaissance area in Qiemo County, Xinjiang Province. We believe this ore deposit distribution is controlled by many factors. The rock bodies and fractures are the major factors that control the development of copper-nickel mineralization. When these various factors combined in a best way, the metallogenic probability of this ore deposit may increase greatly. Due to the fact that located and predicted the concealed ore body is developing towards multi-information integrated location predict, a growing use of GIS may lead to the prediction developed forward to the direction of multi-information, quantification and automation (Peng, 2001; Boyle, 1981; Mandelbrot, 1982). Combined with the Mineral Resources Assessment System, we are successful in delineating potential areas of mineralization and as evidenced by recent drilling data.

The exploration area is located in the Qimantag Early Paleozoic arc-ditch system of the active belt in southern margin of the Tarim plate. It lies north of the Karamiran Late Paleozoic arc-ditch system and south of the Arkin fault adjacent to Arkin continental margin basin of Tarim plate. The main exposed strata are Changchengian (Ch), Jixianian (Jx) and Devonian to Quaternary. The previous mineral-geological research in the surveyed area is low. The discovered mineral resources are mainly ore occurrences, mineralized points, metal minerals such as iron, copper and gold, non-metallic minerals such as pyrite, asbestos and halite.

2 Geological Characteristics of Mining Area

The reconnaissance area is situated on the north slope of East Kunlun Mountains. Landform undulates steeply and land surface is deeply incised. The altitude ranges from 3000 to 4000 m ASL. Exposed strata are the Lower Carboniferous Tokuzidaban Group (C1tk), Lower Permian Yesanggang Formation (P1y), Lower Jurassic Shayitashi Formation (J1sh) and Quaternary Xingjiang Group (Qp3x). Magmatic rocks are widely distributed in the region, Late Hercynian ultrabasic rock, secondly the moyite and quartz porphyry.

The strata in WuDaQi copper-nickel mining area show regional low metamorphism and include carbonaceous siltstone, slate, palimpsest siltstone, siliceous slate, crystalline limestone, etc. In strongly tectonised areas show dynamic, hydrothermal and contact metamorphic phenomenon. Wall rock alteration such as the graphitization in carbonaceous slate, hornfels in boundary strata to intrusions shows marblisation in carbonate rocks etc. In ultrabasic rock oxidation zones, limonite, jarosite, covellite and malachitization, etc occurs.

3 Preliminary Study of Ore Deposit Genesis and Ore-controlling Factors

3.1 Ore deposit genesis

Nickel mineralization is distributed in ultrabasic rock and is basically identical with ultrabasic rock distribution. There are no obvious boundaries between mineralized bodies and surrounding rock. Only according to the characteristics of mineralized rock components and structures, tectonics in mineralized bodies, illustrated that the mineralized bodies only developed in ultrabasic rock, nickel metal minerals relatively enriched and formed mineralized bodies. So, we preliminary consider the type of deposit genesis is magmatic segregation sulfide nickel deposit.

The characteristics of magmatic segregation deposit show ore bodies mostly produced in depression part of intrusion bottom surface and it is related to under-layer intrusion and underside dike-like rock bodies. It is produced in the middle and lower part of rock bodies.
3.2 Ore-controlling factors

Two NEE regional reverse faults called F1 and F2, control the distribution of ore-bearing host rock (ultrabasic). Nickel mineralized bodies are controlled by ore-bearing host rock: I, II, III nickel mineralized section produced in middle and lower part of ultrabasic rock. The ultrabasic rock body presents the geochemical nickel anomaly, geophysical magnetic anomaly and induced polarization intermediate gradient anomaly. These anomaly sets define nickel mineralized areas.

4 Ore Body Location Prediction

The large scale metallogenic prognosis is the highest level in the metallogenic prediction system. It is serving for exploration and prospecting directly and paid great attention to methodology. When the concealed ore occurs at great depth, dimensions of anomalies formed at the ground surface are small and intensity is weak. So we need a new non-traditional geochemical exploration method. Metallogenic prediction is foreseen the possible points of different types of mineralized hosting. Through using numerous theories to explain the ore-forming environment, factors, ore-controlling conditions and prospecting criteria, and establish metallogenic model. Then, using the principles of simulation theory to find out similar geological environment and the metallogenic conditions, and guide the ore-prospecting work (Tang, 2010; Mark, 2007; Derek et al., 2002; David et al., 2003).

Based on the basic field exploration works, combined with the corresponding geophysical and geochemical data, through extracting the mine sites, rocks, Cu and Ni single element soil anomaly, electrical anomaly, magnetic anomaly, as well as give up fracture factor, we got favorable ore-forming information for a comprehensive study.

By using the MARS software to outline target areas, the result is satisfactory. It reached actual requirements to guide production and has considerable practical significance. The follow-up drilling project has verified mineralization enrichment in this region. However, the ore grade is lower than cut-off grade (value is 0.3%Ni), there exists some relations to “copper-nickel ore bodies are in middle and lower part of ultrabasic rock” and ore bodies has lie concealed and beyond controlled. So, it cannot illustrate the selection of predicting area has something wrong. The prospecting prospect is still good.

Acknowledgements

First and foremost, I would like to show my deepest thanks to my classmates, Mr. Zhou Zhiming who provided me most of the materials for this paper. Then, I shall extend my thanks to all members of the team, we work and research together. Last but not least, I would like to acknowledge all my friends and researchers who encourage or help me in study and writing.

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