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Alteration and Mineralization of the Shaquanzi Fe-Cu Deposit, Eastern Tianshan Orogenic Belt, NW China

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1 Regional Geological Setting

The Eastern Tianshan Orogenic Belt (ETOB), located in NW China, is separated into four main tectonic units (the Dananhu-Tousuquan arc belt, the Kanggurtag belt, the Aqishan-Yamansu belt and the Central Tianshan belt) from north to south by several approximately E–W-trending faults (Kangguer Fault, Yamansu Fault and Aqikekuduke-Shaquanzi Fault) (Huang, Qi et al. 2013). Our study area, located at the eastern part of the Aqishan-Yamansu belt, host an important cluster of Fe-Cu deposits.

2 The Shaquanzi Fe (-Cu) Deposit

Among the Fe-Cu deposits, the Shaquanzi Fe -Cu deposit is located ca. 180 km south of Hami city and ca. 500 m north of the Aqikekuduke-Shaquanzi fault. The deposit, which is hosted in the Late Carboniferous calc-alkaline intermediate-mafic volcanic rocks and clastic rocks of the Shaquanzi Formition, contains a reserve of 2.49 Mt with grades at 26%−49% Fe, and 2040 t with grades at 0.23%−1.58% Cu. Ore bodies are usually lenstoid and fault-controlled. There are more than four ore bodies, which are 5–500 m in length and 2–6 m in thickness (a maximum thickness of 11.3 m). The copper-rich ore body occurs at a depth of 20–40 m, with a general length of 230 m and thickness of 2–5 m and has a maximum depth of 165 m and a maximum thickness of 6.13 m (Huang, Qi et al. 2014). Ore minerals at Shaquanzi are dominated by magnetite, pyrite, chalcopyrite, hematite and sphalerite with garnet, epidote, chlorite, calcite, quartz, K-feldspar and minor amphibole and diopside as the gangue minerals. Ore textures are mainly disseminated, massive, and banded.

3 Alteration and Mineralization Paragenesis

Based on mineralogical assemblages and crosscutting relationships, the hydrothermal alteration and hypogene mineralization of the Shaquanzi deposit can be divided into six stages (I through VI). Stage I—Early skarn alteration: the main minerals are garnet with minor diopside. Garnet is usually polygonal, and locally replaced by amphibole of stage II, and magnetite of stage III; Stage II—Late skarn alteration: the main mineral is amphibole and often characterized by chloritization, The magnetite of stage III locally occurs along the cleavage of the amphibole; Stage III—Main magnetite mineralization: the main minerals are “mushketovite”, magnetite, pyrite, epidote, K-feldspar and quartz. According to the mineralogical assemblages and textures, this stage can be further divided into stage IIIA and stage IIIB. IIIA is dominated by “mushketovite”, unambiguously pseudomorphous after specular hematite, which may represent the changing of the oxidation-reduction environment. IIIB is dominated by magnetite, pyrite, anhedral-to-subhedral K-feldspar and quartz, as well as the fine-grained epidote. They may be intergrown with the magnetite. Stage IV—Epidote alteration: the main minerals are epidote and fine-grained magnetite. They occur in the fissures of stage III coarse-grained pytite. The epidote is obviously more euhedral and lower in interference colors compared with those of IIIB; Stage V—Chalcopyrite mineralization: the main minerals are chalcopyrite, hematite, sphalerite, chlorite, calcite, with minor quartz. The above assemblages locally cut the stage III magnetite-pyrite and the sage IV epidote. Stage VI—Late veins: In this stage, abundant calcite, quartz as well as epidote veins can be observed. The description above is summarized in Figure1, and our further work will be conducted on the basis of it.

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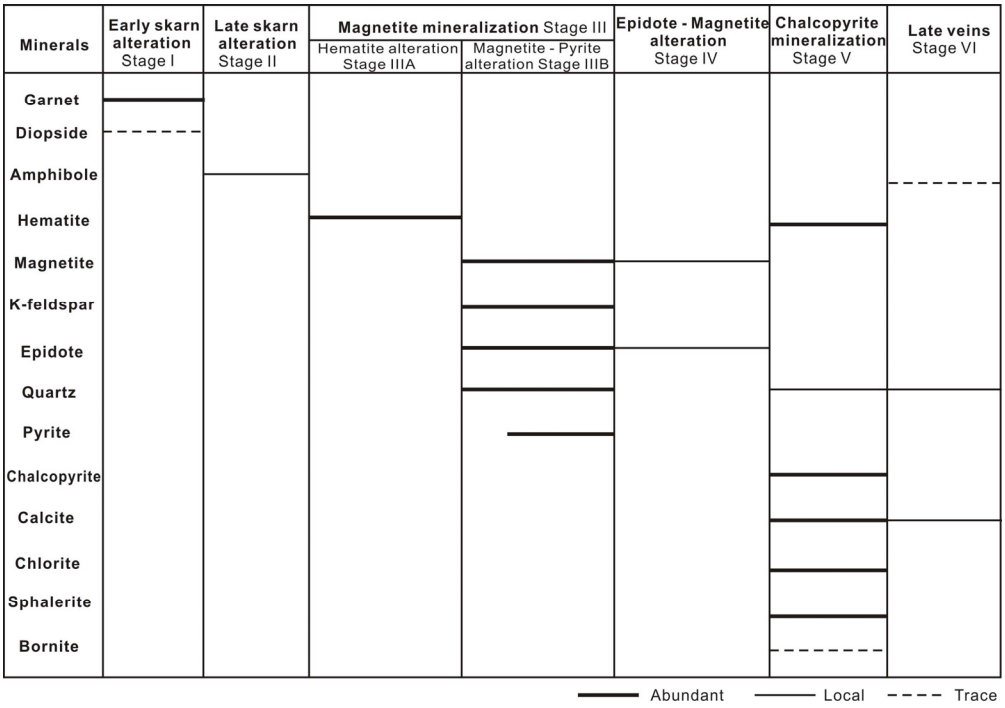

Fig. 1. Alteration and mineralization paragenesis of the Shaquanzi Fe (-Cu) deposit.

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