1 Introduction

In recent years, a number of Pb-Zn deposits have been discovered along the Dadu River valley in the western margin of the Yangtze block. The area is well known for MVT and SEDEX type Pb-Zn deposits which are related to the dolomite of Upper Sinian and Lower Cambrian (Lin Fangcheng, 2005). Wusihe Pb-Zn deposit is a typical Pb-Zn deposit occurs in the Cambrian Maidiping and Qiongzhusi Formation in the western margin of the Yangtze block, near the eastern of Kang-Dian axis. There is a paucity of information in the international literature of Wusihe Pb-Zn deposit. In this paper, we describe the geology of the Wusihe Pb-Zn deposit, with particular focus on the petrology and mineralization. Doing so, we aim to better understand the tectonic setting of this deposit and to constrain the ore controlling factors.

2 Deposit Geology

Wusihe Pb-Zn deposit lies in the Hanyuan County, Sichuan province. The geological position lies in western margin of Yangtze block, in eastern margin Kang-Dian axis. The strata outcropped in this deposit are mainly Sinian, Cambrian, Ordovician, Silurian, Permian and Quaternary. The most relative formations are the dolomite of Cambrian Maidiping Formation and the gray claystone under Cambrian Qiongzhusi Formation. The Qiongzhusi Formation was unconformity with the Maidiping Formation. The main structure framework in the region is characterized by the SN-trending Wanlicun Syncline and NE-trending Wangmaoshan thrust fault, NW-trending Matuo thrust fault and nearly east-westward faults (Fig. 1).

Two layered ore bodies are found in the Maidiping Formation. The upper orebodies outcropped in the mining area are mainly Pb-Zn mineralization, which gray medium and heavy lead-zinc mineralized dolomite, lenticular dolomite and layered, stratoid and lenticular lead-zinc orebodies included. The thickness of the ore bodies ranges from 6.32m to 16.33m with the mean of 12.27m. And it shows veined, net-veined, lamellar and banding zinc mineralization in these orebodies. Most veins are broadly concordant with foliations of the wall rocks, and sphalerite occurs as disseminations or net-veined in dolomite. In this area, a compressive bedding fault developed between the lenticular dolomite and the lead-zinc orebodies played an important role on ore controlling.

The lower ore bodies consist of gray medium and heavy...
lead-zinc mineralized dolomite and some lenticular ore body. The width of the ore bodies is 10.91m to 19.77m, with an average width of 14.08m. Even though the mineralizing intensity of this zone is weaker than the upper ore zone, its silicification is stronger than other where. The lenticular lead-zinc orebodies are locally clipped in this ore zone.

Under Qiongzhusi formation, the bedding and insequent veins are connected with each other. The veins are filled with corase-grained galenite in the center and grain sphalerite near the vein wall. And there has developed brecciated mineralization and dolomite breccia near the parallel unconformity between the Maidiping and Qiongzhusi Formation.

The oxidized zone with crustificated oxidized ore is widely distributed in the peripheral zone of the mine district besides the canyon sides of Dadu river. The composition of ore minerals are sphalerite, galenite, pyrite, etc. The gangue minerals assemblages are dolomite, quartz, organic matter, apatite and calcite. Textures of ores have granulitic, hypidiomorphic granular, metasomatic palimpsest and metasomatic solution. The structure of ores have been classified as laminated, banded, spotted, block, breccia, veinlet disseminated, circle layered(colloform structure) and crusty structure.

Wall-rock alteration of Wusihe deposit contains silicatization, bituminization, calcitization, etc. The silicatization is related to mineralization, which is usually under the orebody floor, especially the lower ore zone in the Maidiping Formation(Li Tongzhu, 2007). Some lead-zinc orebodies are occurred in the silicified zone. The bituminization is mainly developed in the gray claystone of the Qiongzhusi Formation, and a few in the Maidiping Formation. It behaves as crumb and vein bitumen and associates with barren carbonate vein or geode where occasionally has zinc breccia. The calcitization always assumes post metallogenic intersecting carbonate veins scattered in the deposit.

Base on the field survey and microscopic examination, there are three different periods in this deposit: sedimentary metallogenic period, hydrothermal reformation period, and supergenetic oxidation period. In sedimentary metallogenic period, the layerd and stratoid lead-zinc ore bodies are controlled by the stratum, showing laminated, striped, circle layered, and colloform structure in the Maidiping Formation. The major ore mineral is grain sphalerite and pyrite. In the hydrothermal reformation period, the mainly ore bodies are also hosted in the Maidiping Formation, including spotted, veins, net-veins and banding zinc mineralization. The bedding and insequent veins in the Qiongzhusi Formation are still resulted from the hydrothermal reformation. The mineral association is coarse grain galenite and sphalerite. The oxidized zone with crustificated oxidized ore exposed besides the Dadu river is shaped out in supergenetic oxidation period.

3 Ore Controlling Factors

The host rocks of Wusihe lead-zinc deposit are stable. The mineralization is closely related with formation and lithology. The orebody floor and hanging side are dolomite in Maidiping formation and claystone in Qiongzhusi formation. Dolomite is easy to break and bring out fractures. It provided pathway for migration of ore fluid. Claystone is an impermeable layer upon ore zones to block the ore fluid upflowing. The plane between Maidiping and Qiongzhusi formation is a geochemical barrier which is beneficial to minerogenesis. Many ore spots have been found near the plane in the east of Wusihe deposit, such as Honghua, Hetaoping and Yangshaxi, Baoshuxi, etc. (Lin Fangcheng, 2005).

The morphology of ore bodies controlled by Wanlicun downfold and accordant with the ore zones in Maidiping formation. The bedding compressive fault in Maidiping formation controlled the lateral persuasion of the ore fluid. The width of ore body shows a positive correlation with interlayer fracture zone. The width of orebodies swelled at the intersection part of structural fissures and interlayer fracture zone.

4 Conclusions

1.Wusihe lead-zinc deposit occurred in Maidiping and Qiongzhusi formation, lower Cambrian. The congenial host rocks are dolomite in Maidiping formation and claystone in Qiongzhusi formation.

2. Three different periods are assessed in this deposit: sedimentary metallogenic period, hydrothermal reformation period, and supergenetic oxidation period. Layered, stratoid orebodies, vein, net-vein orebodies and oxidized zone were formed respectively in three periods.

3. Formation, lithology and structure are important ore-control factors in this deposit. The formation and lithology provided sedimentary context for early layered mineralization and pathway for migration of ore fluid.

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