



Veins System of Mineralization in The Polymetallic Deposits of Beruang Kanan Site, Central Kalimantan

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Abstract. The research location is in the Beruang Kanan area, Tumbang Miri District, Gunung Mas Regency, Central Kalimantan Province. Epithermal sulphidation deposits are generally formed at a depth of 300 - 800 m (rarely > 1000 m). These deposits are formed on host rocks such as domes, diatremes (Andesite-Ryodasite), pyroclastic, and clastic volcanic rocks. Deposits formed by the epithermal system usually have deposits in the form of veins, hydrothermal breccias, and dissemination. The typical ore texture of this deposit is a coarse band. The Beruang Kanan area consists primarily of polymetallic mineralization. Associated mineralization is generally controlled by structure. It is highly oxidized near the surface. Mineralization is hosted by volcanic and volcaniclastic rocks in the study area, especially in the center and southeast of the study area. Veins in the study area were identified through field observations, thin sections and polishing sections. The vein system that develops in the research area is filling extensional fractures and dilational jogs associated with the fractures. The veins formed in the research area include massive sulfide veins with a dominant composition of pyrite-chalcopyrite-covelite-bornite sulfide minerals, as well as hematite-goethite quartz-oxide which is also associated with quartz with an enormous vein texture, in addition, there are breccia veins and veins with a drusy texture filling the cracks.

Keywords: Mineralization, Epithermal, Vein, Fracture, Mineral.

1 Introduction

The Beruang Kanan area is located within the PT Kalimantan Surya Kencana Contract of Work Concession, Central Kalimantan Province, which is included in the Indonesian Topographic Map-Tumbang Miri Sheet published by Bakosurtanal. The administrative location of the research area is as stated in Fig. 1.

Beruang Kanan is located north of Palangkaraya City, Central Kalimantan's capital, approximately 190 kilometers away. Geographically, it is located at 768,300-768,500 UTM and 9,931,500-9,932,850 UTM. The area of the research area is 999,614 m².

Physiographically, it is a mountainous area located north of the Kahayan River headwaters. Access to reach this place is by daily air flight connecting Jakarta with Palangkaraya, the capital of Central Kalimantan, with a travel time of 2 hours 45 minutes, then heading to the Beruang Kanan prospect will take about eight hours by vehicle (approx. 350 km) or 50 minutes by helicopter from Palangkaraya [1].

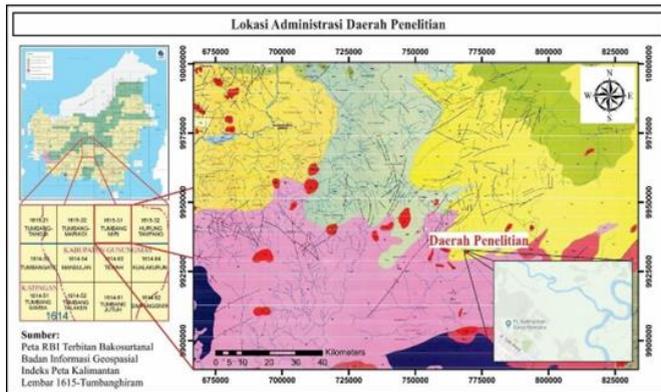


Fig. 1. Administrative location of the research area [1]

2 Material and Methods

The methodology includes four parts: literature study, fieldwork, laboratory analysis and data analysis and interpretation. The pre-field research consists of a literature review and secondary data. Fieldwork will be carried out on mapping, data collection, and sampling. The laboratory analysis to be carried out is petrographic analysis, which will meet the study's objectives [2].

The observation and sampling of rocks consist of three parts: fresh rock samples (host rock) to determine the lithology of the research area and rock samples that have undergone alteration to determine the type of alteration and mineralization that occurs in the research area.

The samples used for petrographic analysis are fresh rocks and altered rocks. The samples taken are rocks with ore mineral content (altered rocks) for microscopic analysis of polished section ore. In contrast, samples of soft altered side rocks containing a lot of clay are taken for XRD analysis.

These samples were selected from drill core samples at different depths of mineralization, associated alteration, and rock types. In addition, drill hole information helps complete mineralization and alteration studies.

3 Results and Discussion

Mineralization of the Beruang Kanan area mainly consists of polymetal mineralization. One of them is related to copper mineralization. The associated mineralization is generally controlled by structure. It is highly oxidized near the surface. Mineralization

center and southeast [3].

3.1 Types of Veins

Veins in the research area were identified through field observations, thin sections and polishing sections. The vein system developed in the research area is filling extension fractures and dilational jogs associated with faults. Veins formed in the research area include quartz veins with quartz-oxide composition (hematite, limonite and goethite minerals resulting from oxidation of sulfide minerals) with various vein textures such as massive, comb, drusy, saccharoidal, bladed and breccia veins were also found.

Massive Quartz-Sulfide Veins. In general, all types of veins are focused on the central and eastern areas of the research area, namely along the sandstone unit. The oxide composition in the veins results from oxidizing previously existing pyrite minerals. The geometry of the veins in the research area also generally shows a relatively tiny average size, namely having a maximum width of around 1 - 3 cm with a length reaching approximately 1 m on average. Vein geometry with a width of > 1 cm is called a vein. If the width is < 1 cm, it is called a veinlet; if < 1 mm, it is called a vein string. These veins generally have NNE-SSW, NE-SW, NW-SE and WNW-ESE directions (Fig. 2).

In general, in-field observations, the vein system developed in the research area is filling extension fractures and dilational jogs associated with faults. (Fig. 3).



Fig. 2. A1 and A2. The appearance of massive sulfide veins containing sulfides in the form of covellite and pyrite. B1 and B2. The appearance of massive quartz sulfide veins in the LP 46 field. C. Appearance of massive quartz sulfide vein type in the core of hole ID BK 058 Box 25 from 121.23 m – 122.23 m showing the appearance of massive quartz sulfide veins.

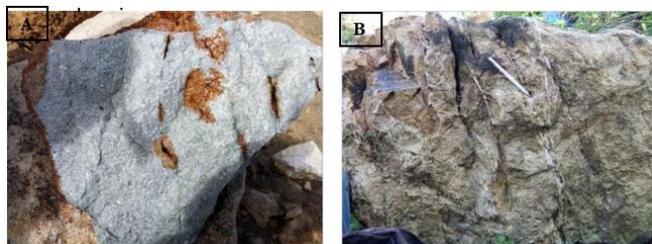


Fig. 3. Textural and geometric appearance of veins in tuff sandstone rocks. Figure A. Dilational jog vein appearance in andesite rocks. Figure B. Geometric appearance of stockwork with quartz vein composition.

Breccia Veins. Breccia veins are also called hydrothermal breccia/breccia veins. These veins are defined as a mass of rock that has undergone pervasive/intact cracks and formed fragments that are still interconnected/connected and have not undergone rotation. Then, the intensive cracks become gaps to enter hydrothermal solutions (hydrofracturing). The complexity of the structure highly controls these veins. The more cracks formed, the higher the permeability, becoming a path for hydrothermal solutions [4].

In terms of petrological description, the hydrothermal breccia STA 49 sample shows a yellow-brown to dark brown rock color, clast-supported, clastic/fragment composition >75%, jig saw fit texture, monomic fragment type, clastic/fragment originating from andesite. Sometimes, there is silicified andesite, the shape of clastic/fragment is generally subangular-angular, fragment size 2 cm-10 cm, matrix in the form of cemented silica, with the presence of cavity filling by quartz-limonite veins (oxide), undergoing sericite alteration with a gradation or irregular fragment boundary relationship (Fig. 4).



Fig. 4. Breccia vein outcrop appearance at STA 49.

Drusy Veins. This vein is defined as a mass of rock that has undergone cracks pervasively/intact and formed fragments that are still interconnected/connected and have not undergone rotation. Then, the intensive cracks become gaps to enter

hydrothermal solutions (hydrofracturing). The complexity of the structure highly controls this vein. The more cracks formed, the higher the permeability, becoming a path for hydrothermal solutions [5], [6]. In terms of petrological description, the STA 52 drussy sample shows the appearance of yellow-brown to dark brown rock color, clast-supported, clastic/fragment composition >75%, jigsaw fit texture, monomic fragment type, clastic/fragment originating from andesite. Sometimes, there is silicified andesite, the shape of clastic/fragment is generally sub-angular-angular, fragment size 2 cm-10 cm, matrix in the form of cemented silica, with the presence of cavity filling by quartz-limonite veins (oxide), undergoing sericite alteration with a gradation or irregular fragment boundary relationship (Fig. 5)



Fig. 5. Appearance of various vein textures in dacitic tuff rocks. Figures A and B. Drussy vein textures.

4 Conclusions

Mineralization of the Beruang Kanan area mainly consists of polymineral mineralization. One of them is related to copper mineralization. The associated mineralization is generally controlled by structure. It is highly oxidized near the surface. Mineralization is hosted by volcanic and volcanoclastic rocks in the research area, especially in the center and southeast.

Veins in the research area were identified through field observations, thin sections and polishing sections. The vein system developed in the research area is filling extension fractures and dilational jogs associated with faults. Veins formed in the research area include quartz veins with quartz-oxide composition (hematite, limonite and goethite minerals resulting from oxidation of sulfide minerals) with various vein textures such as massive, comb, drusy, saccharoidal, bladed and breccia veins were also found.

Disclosure of Interests. The authors have no competing interests to declare that are relevant to the content of this article.

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