THE GEOLOGICAL CHARACTERISTICS AND GENESIS OF ANTIMONY MINERALIZATION AT THABYU AND MEKATHAR AREAS, KYA-IN-SEIKKYI TOWNSHIP, KAYIN STATE

PhD DISSERTATION

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ABSTRACT

The study area is located in the southeastern part of Kayin State, Kya-in-seikkyi Township, near Myanmar-Thai border. The Mekathar area is located 160 kilometres southeast of Mawlamyaing and about 11 kilometres north of Phayathonzu. The Thabyu area lies 28 kilometres north of Mekathar area.

Regionally, the study area consists mainly of Paleozoic and Mesozoic rocks. The Carboniferous strata of this area are known as the Mergui Group, which is overlain by the Permian Moulmein Limestone. The igneous rocks of study area intruded along the SSE-NNW direction and which is the northern continuation of Tenasserim Granite. Tectonically, the study area occupies in the Sino-Burman Ranges which is formed part of the Indo-Chinese Peninsula Landmass. The rock units of study area are quartzite, quartzose sandstone, shale, slaty shale and slate of the Mergui Group (Carboniferous) and laminated limestone, calcitic limestone, dolomitic limestone, dolomite of Moulmein Limestone (Permian). In the study areas, antimony mineralization is mainly confirmed along the NNW-SSE and NW-SE trending fault zones and hosted in the slate and quartzite units of Taungnyo Formation.

There are two types of antimony mineralizations, viz, quartz-stibnite-barite deposit in Thabyu area and quartz-stibnite deposit in Mekathar area. Discontinuous lenses and veins are dipping to the NW at the Mekathar area and NE at the Thabyu area showing fracture filling type deposits and also disseminated type deposit. Spheroidal-shaped ore masses which are products of weathered ore veins occurred as residual deposits in the clayey soil.

There are two major structural features related with mineralization in both mine areas, namely regional folding and faulting. According to the previous work, the metasedimentary units of Taungnyo Formation were regionally tightly folded in several areas. The two major fault systems observed in the mine area can be described as (a) Pre-mineralization fault system and (b) Post-mineralization fault system. Pre-mineralization fault system includes numerous layered parallel faults between the foliation planes of metasedimentary units of Taungnyo Formation which are associated with regional folding during Hercynian orogeny. The pre-mineralization faults/shears/ fractures provide the channel ways for invading hydrothermal fluid for subsequent mineralization in the study area.

The common types of hydrothermal alterations are silicification, vuggy silica (vuggy quartz) alteration, argillic alteration, propylitic alteration, and pyritization/sulphidation. Classification of quartz textures observed in the mineralized vines and wall-rocks of the study area are –primary growth texture, recrystallization texture, and replacement texture.

The primary antimony ore minerals mainly consist of stibnite with subordinate other sulphide minerals such as pyrite, chalcopyrite, sphalerite, tetrahedrite, jamesonite and chalcostibite. Valentinite is major secondary oxide antimony mineral altered from the stibnite. Consistently observed textural relationship, both in field and under microscopic investigation, such as overgrowth, replacement and cross cutting fracture have been used to establish the generalized paragenetic sequence for antimony mineralization in study area.

Geochemically, Thabyu area suggest that it contain the chemical composition of antimony with barium, silicon, sulphur, iron, arsenic, potassium, aluminium, titanium, zinc, copper, lead, and rubidium, etc, with antimony content varies form 15.84 wt% to 56.29 wt% Sb. Mekathar area consists of antimony with silicon, sulphur, iron, potassium, aluminum, titanium, zirconium, zinc, copper, lead, and rubidium, etc, and contains antimony percentage ranging from 22.25 wt% to 69.238 wt% Sb.

The fluid inclusions in vein quartz crystals of study area observed are two-phase (liquid and vapour inclusions) and the vapour ratio ranging from 8 to 20. The final ice melting temperature (Tm) occurs between -0.7 to -2.9 and corresponding to salinities of 1.2 wt% to 4.8 wt% NaCl equivalent and the homogenization temperatures range from 75° C to 152.3° C, which yield trapping temperatures (Tt) of 79.46° C to 169.5° C.

Structural, chemical and stratigraphy are major controlling factors of ore deposition. The antimony mineralization of study area could be referred to as epigenetic. According to the various data under the investigation and available literatures, it is probable that the Early Carboniferous trench volcanism is the source of Sb and deposited together with clastic sediment of Taungnyo Formation. Remobilization of ore fluid and ore transportation along channel way of weak zone was observed when Cretaceous igneous activity took place along the Taungnyo Formation. Deposition of ore form this fluid and forming the antimony deposits in the study areas.

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