PETROLOGY AND ANTIMONY MINERALIZATION IN THE TAUNGNYO FORMATION OF NATSAN, THWETHAUK AND TAGUNDAING AREAS, KYAIKMARAW, MAWLAMYINE AND MUDON TOWNSHIPS, MON STATE

PhD DISSERTATION

SANDA AYE

DEPARTMENT OF GEOLOGY
UNIVERSITY OF YANGON
MYANMAR

MAY 2017

ABSTRACT

The stibnite occurrences are situated within Mawlamyine, Mudon and Kyaikmaraw Townships, Mon State. The study areas are located in the middle part of Mon State, comprising the Shan-Tanintharyi unit as a northern continuation of Tanintharyi ranges, occupying the Sino-Burman Ranges which form part of the landmass of the Indo-Chinese Peninsula.

The study area is mainly composed of the clastic sedimentary rocks of the Taungnyo Formation (Early Carboniferous-Early Permian age). The Taungnyo Formation can be subdivided into three subunits are : Thick- bedded to Massive Sandstone with Shale and Mudstone (C_1-P_1t^1) unit; Medium- to Thick- bedded Sandstone interbedded with Shale and Mudstone, Greywacke, Pebbly Greywacke, Grit and Conglomeritic Sandstone (C_1-P_1t^2 unit); and Thin- to Medium- bedded Sandstone interbedded with Shale and Mudstone (C_1-P_1t^3 unit).

At Natsan, Muraung, Thwethauk and Tagundaing Prospects, mineralization occurs within the sandstone and greywacke interbedded with shale and mudstone, greywacke, pebbly greywacke, grit and conglomeritic sandstone (C_1- P_1t^2 unit). Stibnite deposits usually occur as veins in fissures, shears and joints or as regular replacement deposits. Stibnite is often found in veins with quartz and occasionally with various antimony minerals resulting from the decomposition of stibnite. Stibnite deposits are generated by crystallization of magma in fractures to form hydrothermal veins. Deposition of antimony minerals takes place in impermeable host rocks producing complex systems of veins, stockworks and impregnations.

Megascopically, antimony ore can be commonly found as stibnite-quartz mixed ore, and disseminated ore. Microscopically, eight mineralogical associations are found, viz. (1) quartz-stibnite, (2) quartz-stibnite-pyrite, (3) quartz-stibnite-sphalerite, (4) quartz-stibnite-tetrahedrite-magnetite-pyrrhotite, (5) quartz-stibnite-pyrite-chalcopyrite, (6) quartz-stibnite-pyrite-arsenopyrite (7) quartz-stibnite-stibiconite, (8) quartz-stibnite-jamesonite.

At the Natsan prospect, wall rock alteration such as silicification, sericitization, oxidation and pyritization are observed. At the Muraung and Thwethauk prospects, silicification, oxidation, pyritization and kaolinization occur. Silicification, sericitization, pyritization, oxidation and kaolinization are found at the Tagundaing Prospect.

In four prospects, ores may be deposited by vein textures, replacements, and open-space fillings or pore - space fillings. Open-space fillings is accompanied by some replacement. Field and microscopic observations, such as overgrowth, replacement and cross-cutting features of associated minerals and their assemblages in the study area, provides a basis for interpreting and determining the paragenetic sequence for ore and gangue minerals of the study area which runs as pyrite > chalcopyrite> arsenopyrite> sphalerite> stibnite> jamesonite> boulangerite> tetrahedrite> magnetite> pyrrhotite> stibiconite> cervantite.

The antimony ores of four prospects (Mon State) are composed of both stibnite and complex sulphides and oxides. EDXRF analysis of representative antimony concentrates with significant amount of chemical data which show a broad range of major elements content: 0.137 to 98.011 wt% Sb; 1.037 to 95.41 wt% Si; 0.077 to 15.173 wt% Fe; 0.017 to 3.047 wt% As; 0.005 to 0.112 wt%, Pb; 0.005 to 0.073 wt% Cu; 0.129 to 26.955 wt% S; and 0.203 to 44.063 wt% K. The frequency distribution of silica only is symmetrical distribution and other elements such as antimony, potassium, iron, sulphur, and arsenic elements are positive skweness, asymmetrical distribution. Generally, the correlation between Sb and Si, Fe, K and Zr are negative. The correlation between Sb and S and As, are positive.

By both field observations and laboratory findings, the probable genesis of the antimony mineralizations found in the study area are sediment-hosted, shallow-seated, epigenetic epithermal deposits similar to other antimony ore deposits elsewhere in the world. For reasons of more reliable field evidences, the post-Cretaceous or Early Tertiary is regarded as the probable age of the most antimony mineralization in the Mon State.

CONTENTS