ECONOMIC GEOLOGY OF THE HOPANG AREA, 'WA' SELF-ADMINISTERED DIVISION IN THE NORTHERN SHAN STATE, MYANMAR

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Abstract

The investigated area is situated in Hopang Township, "Wa" Self-Administered Division in northern Shan State, Myanmar. This area is mainly composed of various lithologic units ranging in age from Precambrian to Mesozoic. Precambrian units are mostly metasedimentary rocks and Paleozoic to Mesozoic units are carbonate and clastic sedimentary rocks. A number of known lead-zinc mines within the Shan Plateau lie in a broad NE-SW orientated belt extending from the Shan Scarp in the west up to the Chinese border in the east. Hopang area is economically important because the sizeable Pb-Zn-Cu mineral deposits are well developed at Hpalin mine. The carbonate-hosted Pb-Zn-Cu veins are observed as fissure filling and cavity filling types occurred along the northeast-southwest striking fault. The major ore minerals such as pyrite, chalcopyrite, sphalerite and galena are associated with the lesser amount of azurite, malachite, chalcocite, bornite, arsenopyrite, chrysocolla and laurionite. Limestone, dolomite and porphyritic biotite granite are mostly abundant and they are used for industrial materials, construction materials and decorative stone.

Keywords: Hopang, Shan Plateau, Hpalin mine, industrial materials, construction materials

Introduction

Location of the study area

The study area is situated in the Hopang Township, 'Wa' Self-Administered Division in the northern Shan State. It is located about 156 km NE of Lashio Township. This area lies between the North Latitude 23º 19' 00" to 23º 26' 30" and East Longitude 98º 42' 30" to 98º 48' 00" in UTM map sheet No.2398 (11and15). It covers about 48 square miles. Lashio-Chinshwehaw Highway passes through the northern part of the Hopang Area. The location map of the study area is shown in (Fig.1).

The present study area is economically important because the sizeable Pb-Zn-Cu mineral deposits are well developed at Hpalin mine. Industrial raw materials, such as limestone and dolomite are present extensively in the study area.

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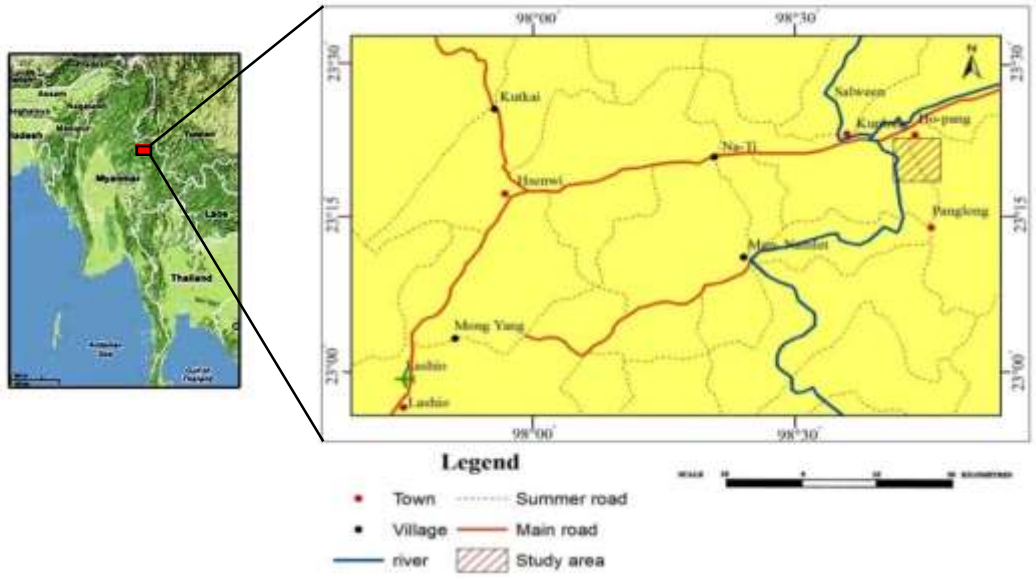


Figure 1 Location map of the Hopang Area, Northern Shan State.

General Geology of the Hopang Area

The study area lies in the Shan-Tanintharyi Block (Mg Thein, 2014). It is situated in the Shan Plateau (Eastern Highlands) which is generally trending NNE-SSW direction. The Shan Plateau largely comprises a series of Ordovician-Triassic dominantly carbonate rocks overlying the Precambrian metasedimentary rocks of the Chaung Magyi Group, the Cambrian Pangyun Formation and associated Bawdwin Volcanics (Mitchell et.al., 1977). Major lineament identified from satellite image of the area is Momeik Fault, trends approximately ENE-WSW in direction. Moreover, the area lies between the Momeik Fault (Nanting) in the north and Lashio Fault in the south.

The Hopang area is mainly composed of various lithologic units ranging in age from pre-Paleozoic to Mesozoic sediments which are shown in geological map of the Hopang area (Fig.2). They are the Precambrian Chaungmagyi Group (La Touche,1913) near Nan-pi and Pan-kauk Villages, Cambrian Pangyun Formation (Brown,1917) near the Hsup-kun village, Ordovician Sitha Formation (Ko Ko Gyi,1991) near the Har-phyat village, Silurian Nyaungbaw Formation (I.G.C.P,1980) Narzayet-Pangmong car-road, Plateau Limestone (La Touche,1913; Aye Ko Aung, 2012) Hen-na Village and car-road between Hopang to Hpa-lin mine and Nwabangyi Dolomite Formation (Garson et al.,1976) car road between Hopang to Chushwe, near Naung-san and Hpa-kyut Villages, and Late Jurassic Hsipaw Red Bed (Brunnschweiler,1970) Naung-hate, Na-za-yet villages and road cut section from Ma-hwe to Hwai-pon. Good exposures can be observed along the road cutting side. The porphyritic biotite granite boulders are well exposed along the streams section and eastern part of Thanlwin River (Mitchell, 1977) along the Hpa-lin and Chu-shwe, Tong-ma-ka Village, Nam-leng Chaung, Nam-hkan Chaung, Mong-kun Chaung, and near the Hsup-kun Village. Some metamorphosed limestones are well observed near the Hpa-lin mine and Pan-kauk Village.

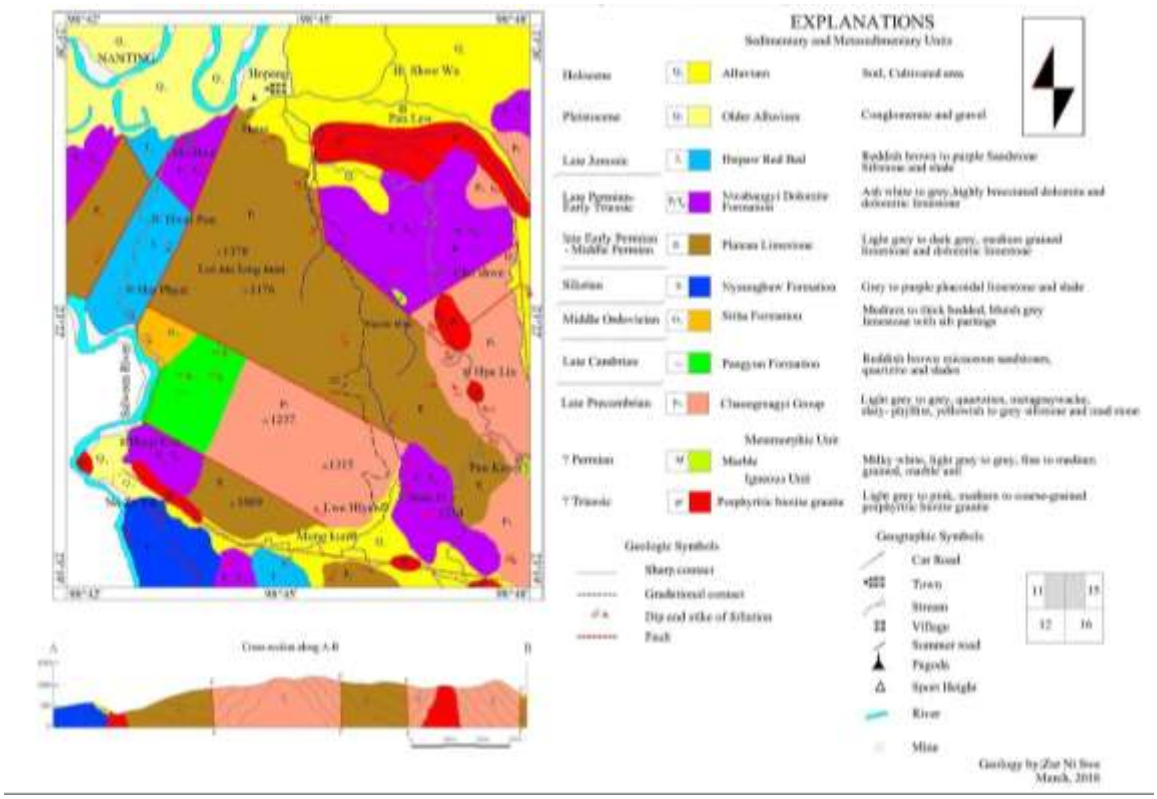


Figure 2 Geological map of the Hopang area, Northern Shan State.

Mineral Resources

A number of known lead-zinc mines within the Shan Plateau lie in a broad NE-SW orientated belt extending from the Shan Scarp in the west up to the Chinese border in the east (Gardiner et al., 2016) (Fig. 3A). The carbonate-hosted lead-zinc-copper veins are observed as fissure filling and cavity filling types. The hydrothermal solution enters the fractures and it does dissolve the country rocks.

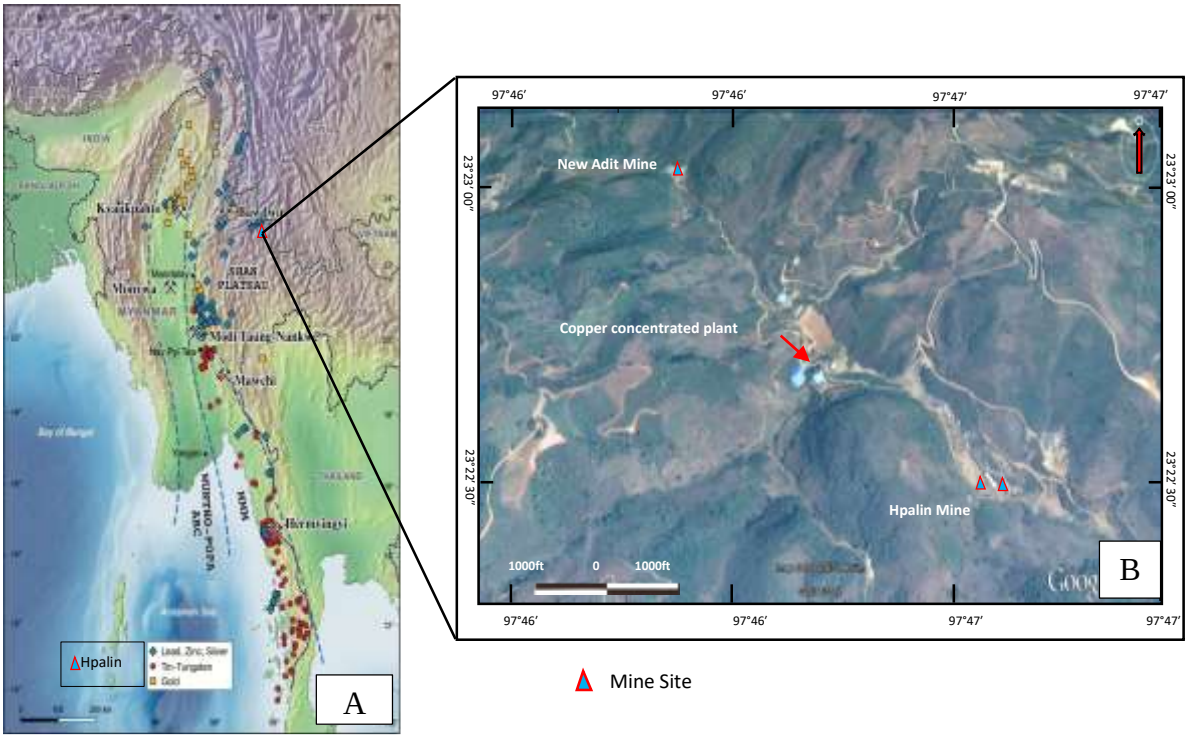


Figure 3 (A) Map showing locations of primary lead-zinc, tin-tungsten and gold deposits and working in Myanmar. (After Gardiner et.al, 2016)
(B) Location of Hpalin mine site, at Wa area. (Source: Google Earth)

Hopang area has been famously known as Hpalin lead-zinc-copper mine since British colonial time and until recently very limited production has been done (Fig.3B). Available descriptions indicate dominantly limestone host rocks, with reference to old workings and slag dumps suggesting a reasonably long history of mining to the British colonial era or before, and noted grades ranging from around (1-10) % Pb or Zn, up to (40, 50, 80)% Pb or Zn (with Fe grades noted also, occasionally). The mineralization consists of galena, sphalerite, chalcopyrite, pyrite and magnetite (Fig.4) and (Fig.5).

Figure 4 Observation of ore minerals extracted from Hpalin mine during Unity E&R field trip.

Figure 5 High-grade copper ore minerals exposed near the Hpalin mine during Unity E&R field trip.

Hpalin Mine

Hpalin mine (N 23˚ 22' 42.0", E 98˚ 46' 43.3") is located at 12 km from the border of mainland China and stands at the elevation of the 884 m in the northern Shan State (Fig.6). This area lies between the two principal cross-faults (Momeik and Mongkun) and most of mineralization zones are contacting with granite and marble (or) limestone.

Figure 6 Main production of lead-zinc-copper ore minerals working at Hpalin adit mine in 2014 (N 23˚ 22' 31.0", E 98˚ 46' 58.4")

In general, lead-zinc-copper mineralized zone occurred along the northeast- southwest striking fault. The lead-zinc-copper mineralization in study area has been controlled by regional structure. The igneous activity manifested in the east of the area must have been the source of the silica and subsequent sulfide which were brought into the fractures and cavities caused by faulting. They are found as stringers, veinlets, lenticular and banded nature. The mineralization occur Permian Plateau Limestone which consists of light grey to grey, thick-bedded to massive carbonates. The major ore minerals such as pyrite, chalcopyrite, sphalerite and galena are associated with the lesser amount of azurite, malachite, chalcocite, bornite, arsenopyrite chrysocolla and laurionite (Fig.7). Subsequent oxidation and near-surface alterations resulted in some iron oxide in the upper part. From the surface to the depth 100 m, mineralized zone is striking nearly north-south direction and dipping 60˚ east in direction. The width of the mineralized zone is about 20- 30 m and the length of strike is about 100-150 m. At the deeper level of the mine, the mineralized zone is hard and compact.

A few years ago, Chinese Company was producing high-grade copper and also builds copper concentrated plant (Fig.8). Recently, all operations were shut down as Chinese company cheated on their partners.

Rock Resources

In the study area, limestone, dolomite and porphyritic biotite granite are mostly abundant and they are used for industrial materials, construction materials and decorative stone.

Plateau Limestone

Plateau Limestone is exposed in the middle part and south western part of the study area. The calcitic limestone is more resistant to weathering and most of the ridges are commonly occupied by very steep hill sides with irregular surface topography (Fig.9). Good exposures can be observed near the Hen-na Village and between the car-road from Hopang to Hpa-lin mine (Fig.10).

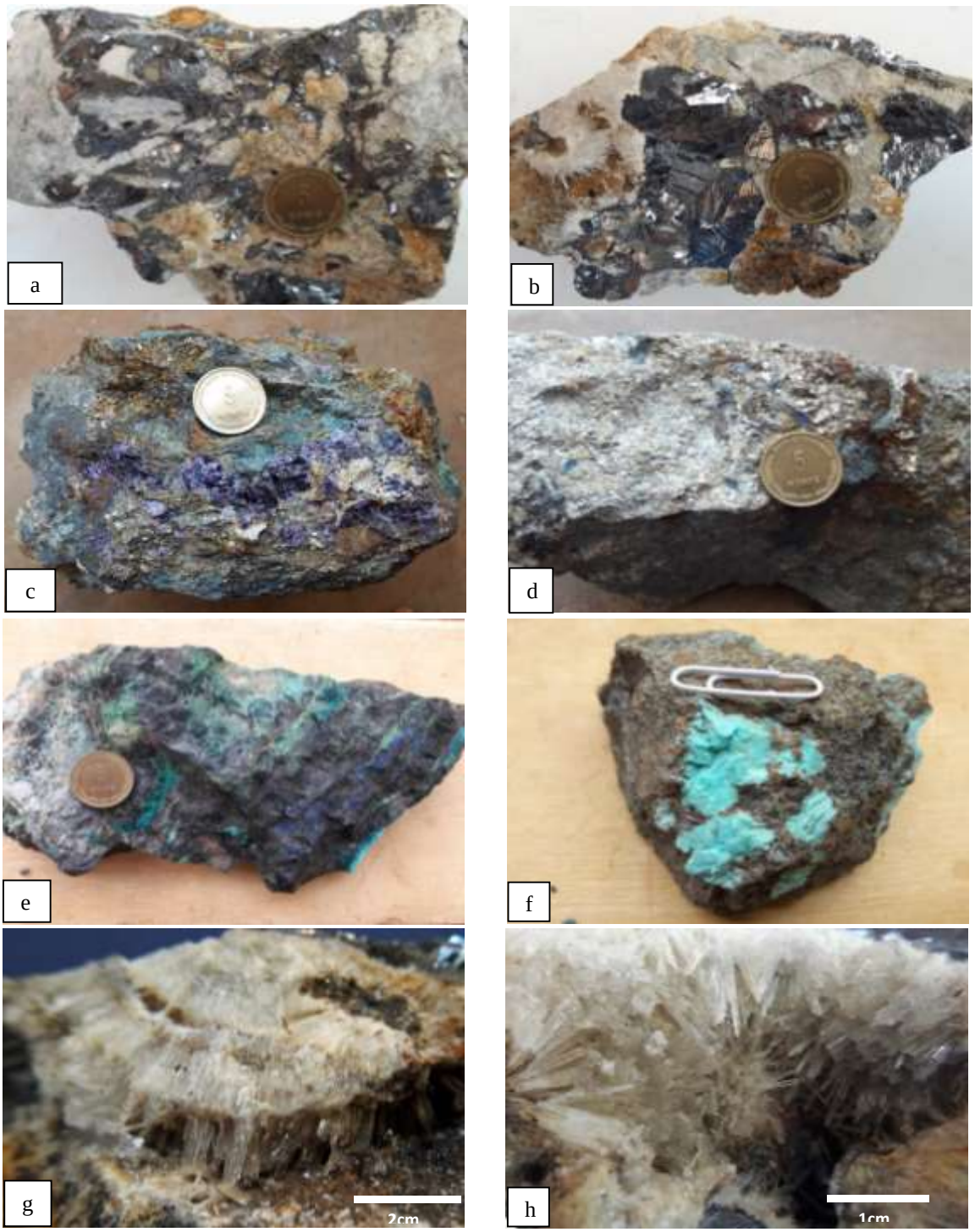
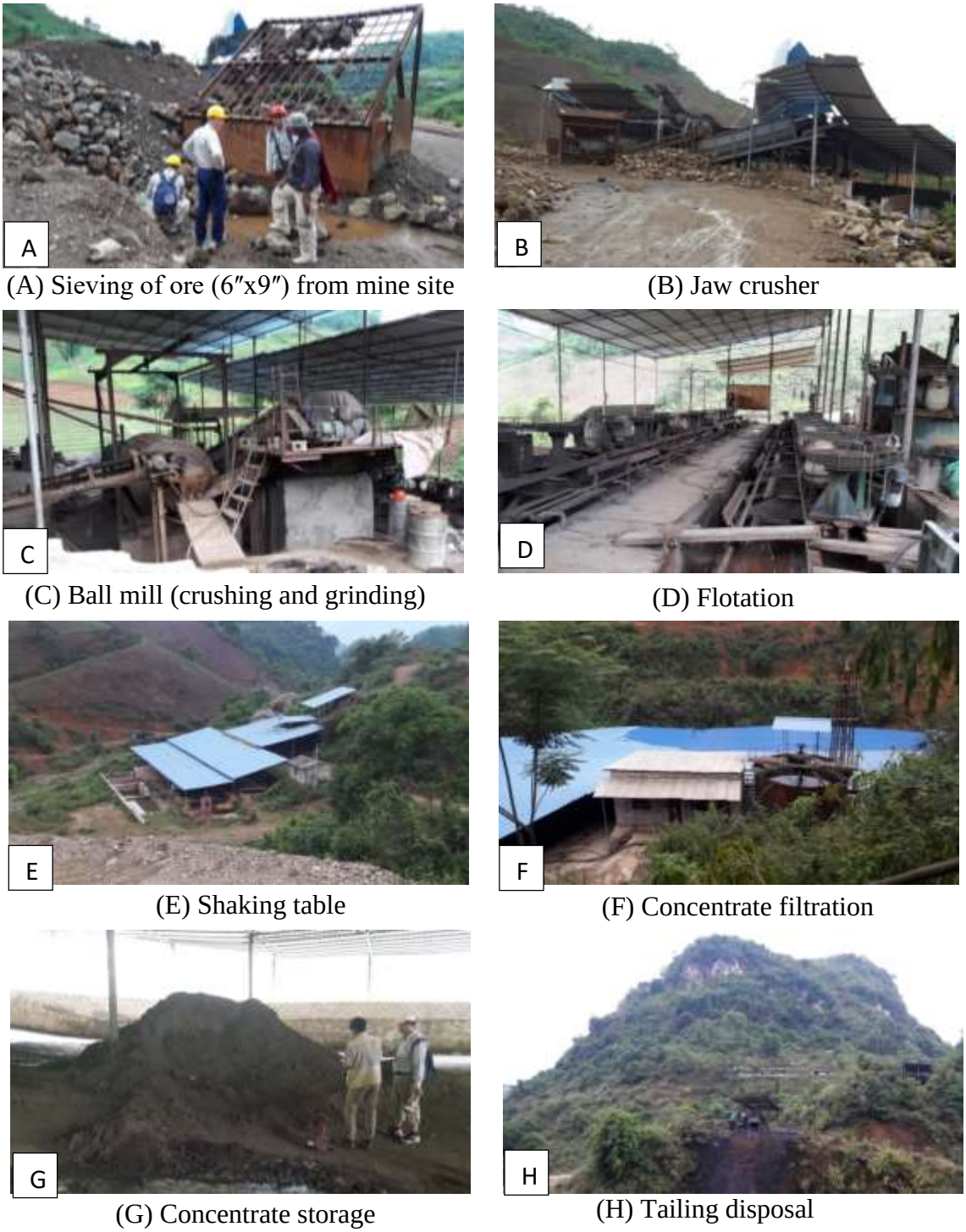


Figure 7 Ore samples collected from Hpalin mine.
(a-b) Very coarse euhedral galena crystals (c-d) High-grade copper sulfide ore (e) Secondary copper minerals of malachite (pale green) and azurite (blue) (f) Chrysocolla (copper silicate) mineral (g-h) Fibrous and acicular form of laurionite crystals.



(A) Sieving of ore (6″x9″) from mine site (B) Jaw crusher

(C) Ball mill (crushing and grinding) (D) Flotation

(E) Shaking table (F) Concentrate filtration

(G) Concentrate storage (H) Tailing disposal

Figure 8 Photographs showing the process of copper concentrated plant that production for lead-zinc-copper ore minerals at Hpalin mine.

Nwabangyi Dolomite Formation

This formation is well exposed in north eastern part and central part of the study area. This unit is occupied by scanty vegetation and display low-lying, rolling knolls. In many places, this unit is covered either by a thick residual terra-rossa soil or by grass. The dolomites have a characteristically shattered appearance on fresh and weathered surfaces. Good exposures can be observed at the car road section between Hopang to Chushwe Village (Fig.11) and near the hydroelectric power (Fig.12).

Figure 9 Outcrop nature of Plateau Limestone near the Hen-na Village.

Figure 10 Thick-bedded to massive, light grey Plateau Limestone unit exposed near Hopang.

Figure 11 Highly brecciated Nwabangyi Dolomite Formation exposed along the car road section

Figure 12 Light grey to grey, medium to thick bedded, highly brecciated dolomite.

Porphyritic biotite granite

The granite intrusive bodies are extensively found along the streams section (Fig.13). In the eastern part of the Thanlwin River, various sizes of rounded granite boulders are also well observed near the Hsup-kun Village (Fig.14).

Figure 13 The spheroidal weathering of granite boulder exposed on Nam-leng Chaung.

Figure 14 The smooth surface and well-rounded granite boulders exposed in the eastern bank of Thanlwin River.

Findings and Discussion

The important minerals, such as copper, lead, and zinc are found at Hpalin mine. Copper is primarily used for electrical applications because it is an excellent conductor of electricity. An important use of lead is in batteries; among its many other applications and is used in paints and ceramics. The zinc coating on steel cans keeps the cans from rusting and zinc is also used in the manufacture of brass and other alloys.

Limestone and dolomite are used as fluxing materials in iron and steel industry. Limestone is used in cement factory, paper mill, agricultural dressing and water purification. Lime is mainly consumed in building trade, but it is applicable in the chemical industries and is an important fertilizer. The various sizes of angular pebbles and conglomerate are applied as paving-stone of floor slab, table, chair, vase, paper-weight, etc., and also used in building houses and walls. Light to pink colour porphyritic biotite granite is used for flagstone (Fig.15). Phacoidal limestone of Nyaungbaw Formation and white marble unit can be used as a decorative stone. Highly brecciated dolomite or dolomitic limestones used as construction and building materials. The broken pieces of limestones are used as road ballast, construction and building materials (Fig. 16). Gravels and sand from Thanlwin River are used as construction material and road materials.

Figure 15 Photograph shows the making of flagstones, cut off from the decorative stones.

Figure 16 Construction materials are produced from Plateau Limestone at quarry site.

Therefore, the economic potential of Hopang area is very interesting and the local Company has planned to exploit the ore from this mine with Unity (Energy & Resources) Australia Company.

Conclusion

Hopang area is located in the Shan Plateau which is generally trending NNE-SSW direction. This area largely comprises the Precambrian Chaung Magyi Group, Pangyun Formation, Sitha Formation, Nyaungbaw Formation, Plateau Limestone, Nwabangyi Dolomite Formation and Hsipaw Red Bed. The porphyritic biotite granite and some metamorphosed limestone are observed near the Hpa-lin mine. The famously known Hpalin lead-zinc-copper mine since British colonial time and until recently very limited production has been done and noted grades ranging from around (1-10) % Pb or Zn, up to (40, 50, 80)% Pb or Zn (with Fe).The major ore minerals such as pyrite, chalcopyrite, sphalerite and galena are associated with other sulfide minerals. In the study area, limestone, dolomite and porphyritic biotite granite are mostly abundant and they are used for industrial materials, construction materials and decorative stone.

Acknowledgements

The authors are deeply thankful to Dr Than Than Nu, Professor and Head of Geology Department, University of Mandalay, for her kind permission to carry out field works in this area. We also thank to Professor Dr Khin Khin Lin, Head of geology Department, Shwebo University for her guidance and valuable suggestions. The authors also acknowledge to U Aung Soe Min (WSAD), Pan-Khun Company, for willing help, arrangement for field trip and giving facilities during the field investigation. Special thanks are due to U Khin Maung Si, Director (Retd.) D.G.S.E, Chief Geologist, Unity Energy and Resources Co.Ltd, Managing Director, High Land Hopang Resources, for encouragement and help during this field work.

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