



CHAPTER II

GENERAL GEOLOGIC SETTING

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

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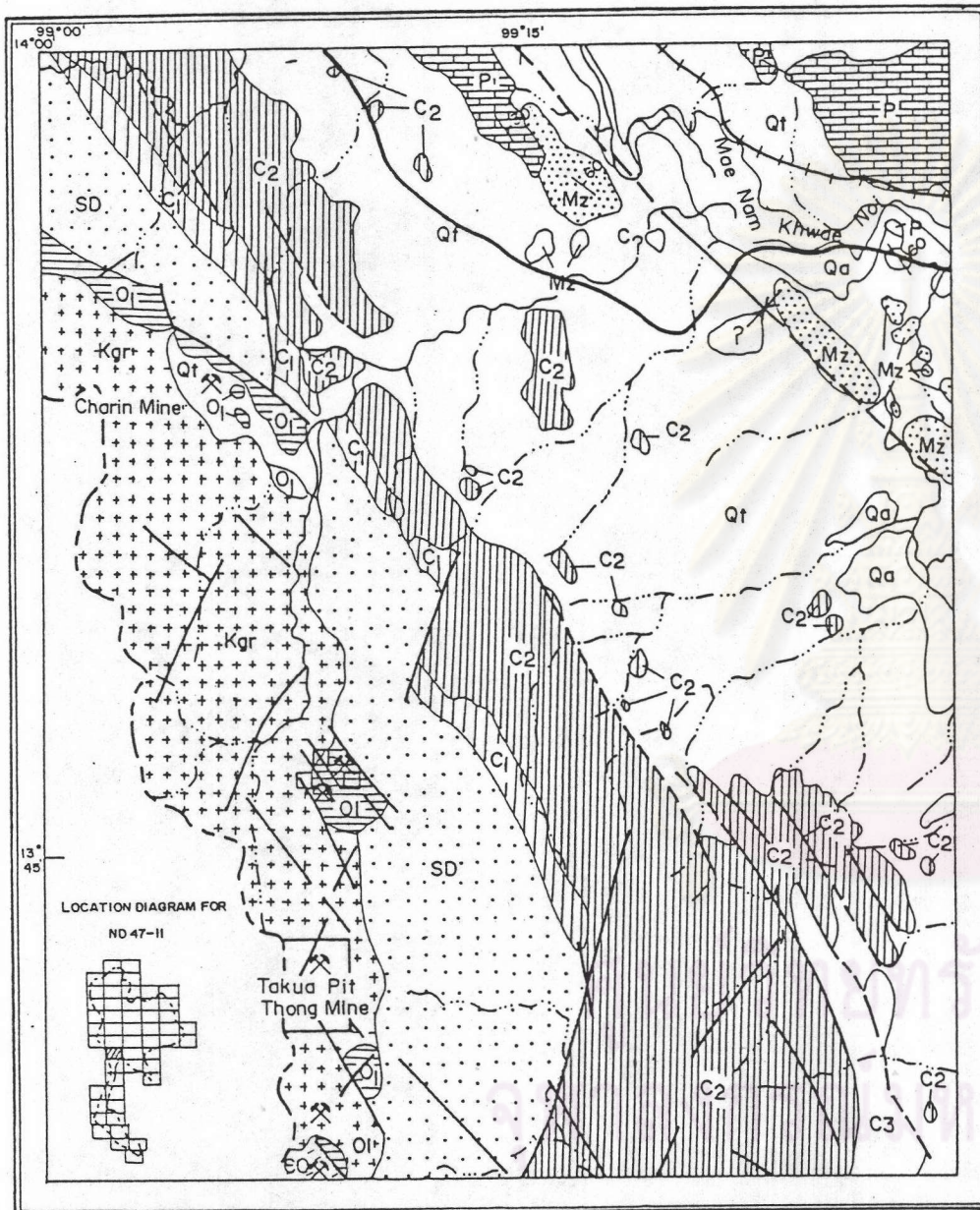


The most up-to-date regional geologic map covering the study area, is shown in Figure 3 (Dheeradilok, 1981). The regional geology of the area to the north and northwest of Amphoe Suen Phung including the Takua Pit Thong area, is underlain by sedimentary and metamorphic rocks ranging in their ages from Cambro-Ordovician to Triassic-Jurassic.

Granitic plutons presumably of upper Cretaceous in age intruded into the sedimentary and metamorphic rocks of Cambro-Ordovician to Triassic-Jurassic ages (Figure 3). Brief description on sedimentary and metamorphic rocks from stratigraphically lower to upper successions and the associated igneous rocks is outlined below.

The oldest rocks in this area are the metamorphic rocks of Cambro-Ordovician in age (E0). The rocks are consisted of sillimanite-mica schist, paragneiss, calcsilicates, granite-gneiss, and leucogranite gneiss. These rocks occupy the northwestern part of Amphoe Suen Phung, south of the study area and close to the Thai-Burmese border. These rocks were grouped into the Khao Taphan Group by Dheeradilok (1981).

The next younger rock unit exposed in the area, belongs to the Khao Noi Sethi Formation (O1) of the Thung Song Group (Dheeradilok, 1981). These rocks presumably of Ordovician age are composed



EXPLANATION

SEDIMENTARY AND METAMORPHIC ROCKS

- | | | |
|--|--|----------------------------|
| | Alluvial deposits. | } QUATERNARY |
| | Older terrace deposits. | |
| | Sandstone conglomeratic sandstone. | TRIASSIC-JURASSIC (?) |
| | Limestone massive and bedded limestone with fossils; brachiopods, fusulinids and bryozoa. | PERMIAN |
| | Sandstone orthoquartzite, tuffaceous shale. | } DEVONIAN - CARBONIFEROUS |
| | Pebbly mudstone and sandstone, shale, graywack. | |
| | Quartzite, slate, carbonaceous shale, hornfels. | } SILURIAN - DEVONIAN |
| | Quartzite, phyllite, slate | |
| | Limestone, thin bedded lamimated, intercalated with argillite and fairly well developed minor drag fold on such thin layers; marble. | ORDOVICIAN |
| | Gamba - Ordovician rocks, sillimanite - mica schist, paragneiss, calciliccate; granite - gneiss and leuco - granitogneiss. | CAMBRO - ORDOVICIAN |

IGNEOUS ROCKS

- | | | |
|--|--|-------------------------|
| | Granite, biotite - muscovite, medium to coarse grained, porphyritic tourmaline granite, pegmatite; apite quartz veins and dikes. | JURASSIC-CRETACEOUS (?) |
|--|--|-------------------------|

SYMBOLS

- | | | | |
|--|--|--|---------------------------|
| | Boundary contact, dotted where approximated located. | | Thrust, or reverse fault. |
| | Strike and dip of beds. | | River |
| | Anticline, showing trace of axial plane and plunge of axis dashed where approximately located. | | Road |
| | Syncline, showing trace of axial plane and plunge of axis dashed where approximately located. | | Rail Road |
| | Fault, dashed where approximately located. | | Study area |

Figure 3 Map showing general geologic setting covered the Takua Pit Thong area (modified after Dheeradilok, 1981).

essentially of gray to dark gray limestone and marble. The limestone unit is thin bedded to finely laminated, partly recrystallized and intercalated with argillite with fairly well developed minor drag folds on the thin layers. The marble unit is gray in color and very well recrystallized. These rocks were found on a few localities in the study area especially near the contact zone of granitic rocks.

The next younger rock unit belongs to the Kanchanaburi Group of Silurian-Deveonian age (SD). This rock unit exposed widely along the contact of the granitic rocks from north to south (Figure 3). This unit of rocks is consisted of brown to yellowish brown quartzite, brown to greenish gray phyllite intercalated with quartzite. Locally an crenulation was developed on schistosity planes of gray to dark gray slate (Dheeradilok, 1981).

Overlying conformably on the Kanchanaburi Group is the Kaeng Krachan Group of Deveonian-Carboniferous age. This rock unit is exposed to the east of the Kanchanaburi Group (Figure 3). The rocks of the Kaeng Krachan Group are composed of three formations (Dheeradilok, 1974, 1981). The lowermost formation, namely the Huai Phu Ron Formation (C1), is made up of dark gray massive fine-grained quartzite, slate, carbonaceous shale, dark gray to black hornfels, fine-to-coarse-grained elongate-spotted schist. The spots are generally composed of mica and quartz. The middle formation, namely the Khao Phra Formation (C2), is consisted of pebbly mudstone and sandstone, gray to reddish gray shale with friable and conchoidal fracture and slaty cleavage, brown graywacke, and calcareous sandy shale. On the top part of this

formation contains brachiopods and bryozoan beds. The pebbly mudstone and sandstone of the Khao Phra Formation are consisted of various sizes of clasts, including notably, quartz, quartzite, granite, feldspar, slate, phyllite, and limestones. The matrix of pebbly mudstone is composed of mud or clay, fine sand to medium sand with siliceous and calcareous cements. The rocks are generally massive occasionally show slumping structure, crossbedding, turbidity flow, sand pipe, ripple marks and sole marking features. The uppermost formation of the Kaeng Krachan Group is the Khao Wang Sadung Formation (C3). The rocks in this formation are consisted of sandstone, orthoquartzite, and tuffaceous shale. The sandstone and orthoquartzite are fine-to-coarse-grained, feldspathic, white to white gray in color. The tuffaceous shale is pinkish and white to white gray, massive to thin bedded, frequently intercalated with dark gray siliceous shale (Dheeradilok, 1981).

The next younger rock unit exposed to the north of Amphoe Suan Phung, belongs to the Ratburi Group (Dheeradilok, 1981). This rock unit (P) is characterized by fossiliferous Permian limestone. The rock is massive to bedded, locally interbedded with feldspathic sandstone at the base part (Dheeradilok, 1974, 1981).

The youngest rocks in this area are sedimentary rocks of Triassic-Jurassic? in ages (Mz). The rocks are consisted of sandstone, conglomeratic sandstone and basal conglomerate. The sandstone is fine-to-medium-grained, feldspathic, red to grayish red in color. The conglomeratic sandstone is red and coarse-grained. Basal conglomerate is consisted of pebbles of limestone, sandstone with calcareous

cementing material. These rocks were grouped into Khao Luang Formation (Dheeradilok, 1981).

In addition to the above sedimentary and metamorphic rocks, the area of Amphoe Suan Phung and its adjacent are also covered with the unconsolidated Quaternary sediments. The Quaternary deposits are made up of older terraces and alluvial deposits. The older terraces are consisted of the gravel beds containing boulders, loosed blocks, and pebbles of quartzite, quartz, chert, slate, sandstone and granite. The terraces, generally found in higher elevation. The alluvial deposits are river gravels, sand, silt, clay, and mud (Dheeradilok, 1981).

The granitic plutons generally form as an elongated belt of approximately 1.5 to 2 km wide extending in N-S direction on the western part of the area. The granitic rocks are medium-to-coarse-grained biotite-muscovite granite, porphyritic tourmaline granite, aplite, with quartz veins and dikes (Dheeradilok, 1981). In addition to those granitic rocks, three kinds of granite, namely porphyritic biotite granite with allanite accessories, equigranular medium-to coarse-grained biotite-muscovite granite, and fine-to medium-grained muscovite-tourmaline granite were reported at the Khao Daen (around a major tin placer deposit of Charin mine) approximately 20 km north of the Takua Pit Thong mine (Nakapadungrat et al., 1985). The last two phases of granite reported by Nakapadungrat et al. (1985) are probably equivalent to the two granites outlined by Dheeradilok (1981). The age determination was carried out on the Khao Daen granites, which form as a part of the same pluton as the granites at the Takua Pit

Thong mine, to be 93 ± 4 Ma (Upper Cretaceous) from the Rb-Sr whole rock isochron technique with an initial $^{87}\text{Sr}/^{86}\text{Sr}$ ratio of 0.7338 ± 0.0007 (Beckinsale et al., 1979; Nakapadungrat et al., 1985). The K-Ar ages from biotite and muscovite separated from those granites are concordant at C.72 Ma which appear to be somewhat discordant from the Rb-Sr whole rock isochron age (Nakapadungrat et al., 1985). The Khao Daen granite was believed to be a highly evolved S-type (Chappel and White, 1974) from crustal origin based on their chemistry and $^{87}\text{Sr}/^{86}\text{Sr}$ ratios (Beckinsale et al., 1979; Nakapadungrat et al., 1985).

Structurally, the development of broad folds trending NNW due to the Hercynian Orogeny was the most prominent in the area. The subsequent Mesozoic Orogeny taking place in Jurassic or Cretaceous age had resulted in the development of tight folds and fractures of the former broad folding in the country rocks. Subsequently, the Himalayan Orogeny which was sparse from late cretaceous to early Tertiary had involved the NW fault movement. The effect of the movement could result in the development of cross-folding and joint sets in NE direction. Coincident with these orogenic cycles, volumes of granite were emplaced in this area which extended in the western part of Thailand along north to south in various places (Dheeradilok, 1974, Suensilpong et al., 1978).