

CHAPTER II

GEOLOGY OF THE STUDY AREA

General geology

According to previous investigation by Bunopas (1988), the rocks in the study areas, Loei-Na Duang and Wang Saphung, are composed predominantly of Paleozoic rocks to Quaternary sediments. Sedimentary rocks consist of fossiliferous marine Upper Paleozoic rocks, continental Mesozoic rocks which extensively distributed in this areas and Quaternary sediments. Igneous rocks consist of intrusive Permo-Triassic granite and grano-diorite, and extrusive rocks of andesite, rhyolite and rhyolitic tuff (Figure 7). Structurally, the large area of synclinal fold was dominantly observed with NNW-SSE fold axis and SSE plunging. The minor anticlinal fold was occasionally occurred as a result from some igneous intrusion and tectonic activities after deposition. In the area under investigation, the bedding of Permian limestone is frequently observed.

Stratigraphy

Sedimentary sequence of the areas under investigation consists of Carboniferous, Permian, Triassic and Quaternary sediments. The igneous rocks are Permo-Triassic in age (Bunopas, 1988). The sedimentary rocks are described from older to younger units and related igneous rocks are also mentioned as follows :

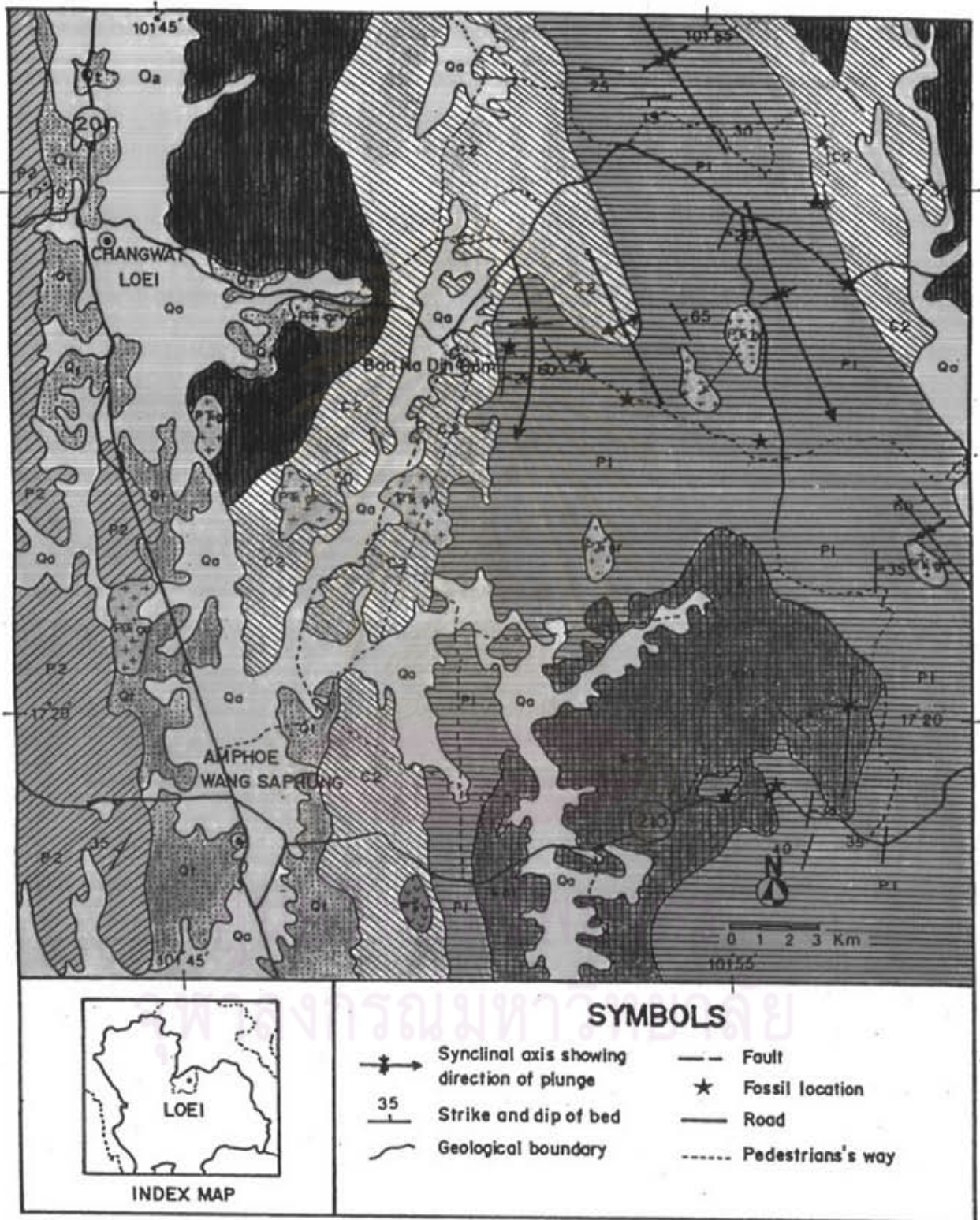









Figure 7 Geological map of the study areas. (Bunopas, 1988)

LEGEND

Sedimentary rocks

	Alluvial deposits : gravel, sand, silt and clay	QUATERNARY
	Terrace deposits : gravel, sand, silt, clay and laterite	
	Sandstone, shale and basal lime conglomerate	TRIASSIC
	Shale, sandstone and limestone	PERMIAN
	Limestone, sandstone, shale and chert	
	Shale, greywacke sandstone, conglomerate and conglomeratic sandstone chert and limestone lens	CARBONIFEROUS
	Shale, mudstone, sandstone, chert, limestone, tuff and conglomerate	

Igneous rocks

	Hornblende biotite granite, granite, granodiorite, muscovite-biotite granite, hornblende, monzonite	PERMIAN-TRIASSIC
	Andesite, rhyolite, agglomerate, tuff, rhyolitic tuff, basaltic andesite	

1. Carboniferous (Wang Saphung Formation)

The Wang Saphung Formation (Bunopas, 1992) consists mainly of sandstone, shale with some thin limestone beds and conglomerates. The rocks were deposited mainly in shallow marine environment. Some fossil leaves and coal were observed near the lower part, indicating continental conditions intervened in this area during the Late Paleozoic time. This formation is subdivided into two members, from bottom to top as follows :

1.1 Nong Dok Bua Member (C1)

The Nong Dok Bua Member covers the northwest and northeast of the area. It consists of shale, mudstone, sandstone, chert, limestone, tuff and conglomerate (Bunopas, 1988). The limestones are composed of crinoid stems, bryozoan (fenestella) and trilobites. Based on fossils found at Ban Pak Nium and Ban Sa Ngao, the age of the Nong Duk Bua Member ranges from the Latest Devonian to Early Carboniferous. It may, however, extend to early Middle Carboniferous (Upper Bashkirian) at Ban That (Bunopas, 1988).

1.2 Wang Saphung Member (C2)

The Wang Saphung Member is distributed widely in the central and northeast of the investigated area. It consists of shale, greywacke sandstone, conglomerate and conglomerate sandstone, chert and limestone lens yielding crinoid stems, bryozoa and coral. In places, some intercalations of red shale are recorded in this sequence. Shale and sandstone of this unit along the Wang Saphung-Nong Bua

Lamphu highway consist of Carboniferous brachiopods (Yanigida, 1975 ; Waterhouse, 1982). They grade into the Lower Permian limestone nearby.

2. Permian (Saraburi Group)

The Saraburi Group in the investigated area is composed of two Formations ; Nam Mahoran Formation (P1) and Huai E-Lert Formation (P2). These formations are mentioned from bottom to top as follows :

2.1 Nam Maholan Formation (P1)

The Nam Maholan Formation consists mainly of white to grey, massive limestone with occasionally fine-clastic sediments and chert interbedded. It yields fusulines, corals and brachiopods. Its age is considered to be Early Permian based on fusuline (Bunopas, 1988).

2.2 Huai E-Lert Formation (P2)

This Formation consists mainly of limestone and interbedded shale containing Middle Permian fusulinids and ammonoid (*Agathiceras* sp.). Along the Loei-Dan Sai highway, fusulinids and ammonoid of the same were also observed in black chert and black shale.

3. Triassic (Huai Hin Lat Formation, R hl)

The Huai Hin Lat Formation is the basal unit of the Khorat Group. It is exposed in the low area overlying the erosional surface of the Permian rocks. This Formation comprises conglomerate, sandstone and shale. Based on fossils that were found in the vicinity of the Nam Phrom Dam, they indicate Norian to Rhaetian (Latest Triassic) age for the rock unit.

4. Quaternary

Quaternary rocks in the study area are recorded in both sides of Loei river running north-southerly. Quaternary sediments in the investigated area can be subdivided into 2 units from older to younger as follows :

4.1 Colluvial, Terrace and Residual Deposits (Qt)

The deposits contain undulating grounds and colluvial high terraces ranging in altitude from 250 to 300 m. above mean sea level.

4.2 Alluvial and Valley Deposits (Qa)

The deposits consist of silt, sand and gravel covering the alluvial and valley plains or distributary channels. These sediments are varied from place to place as they were found in a rather high gradient basement.

5. Igneous rocks

Permo-Triassic igneous rocks in the study area consist mainly of plutonic rocks which are exposed sporadically as small bodies and associated with the volcanic rocks. The plutonic rocks are granite, granodiorite and hornblendite. The volcanic rocks are andesite, rhyolite, tuff and basaltic andesite.



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