CHAPTER I

INTRODUCTION

The Lam Narai volcanic successions consist of a great variety of stratigraphic facies. They include lavas, deposits of explosive pyroclastic eruptions, primary volcanic autoclastic deposits and deposits resulting from the significant spectrum of sedimentary processes that operate in the Lam Narai volcanic area.

Study just only the chemistry, mineralogy and petrogenesis of these volcanic successions may not be possible to understand completely their physical processes and peculiar depositional environments which producing this diversity of stratigraphic facies. Therefore, to better understand these processes, it has to study in detail the stratigraphic facies of the Lam Narai volcanic successions.

1.1 Purposes of the Study

The main objective of the present dissertation is to study the distinctive characteristics of the stratigraphic facies of the Lam Narai volcanic successions that might feasible lead to the interpretation of their history and environment of eruptions and depositions. For the better understanding of all processes concerned here the purposes of study, therefore, are divided into two categories which are : 1) to study the general geology, the

characteristics of the stratigraphic facies, mineralogy, petrography and geochemistry, and 2) to correlate between the stratigraphic facies with their eruptive processes and environments of their depositions.

1.2 Location

The Lam Narai volcanic field is part of the volcanic region (or belt) which lying along the western margin of the Khorat Plateau (Figure 1.1). The study area is located within part of the Lam Narai volcanic field just west of Amphoe Chai Badan, Changwat Lop Buri (Figure 1.2). The area is bounded by latitude 15° 00' 52" to 15° 15' 25"N and longitude 100° 45' 07" to 101° 10' 09"E, covered an area of approximately 1,200 km^2. It is at the conjunction of topographic maps scale 1 : 50,000, series L 7071, sheet 5139 I (Ban Maha Pho), 5139 II (Ban Paniat), 5239 III (Amphoe Chai Badan) and 5239 IV (King Amphoe Sithep), and on the geologic map scale 1 : 250,000 sheet ND 47 (Amphoe Ban Mi).

The area is accessible from Bangkok, of which the most convenient, to Amphoe Chai Badan along the national highway number 1 via Sara Buri and then turn north to the national highway number 21 at Sam Yaek Phu Kae with total distance of approximately 207 km. Many routes that reach to outcrop are trails which can be used during the dry season, and may not be passable by any vehicles during the rainy season.

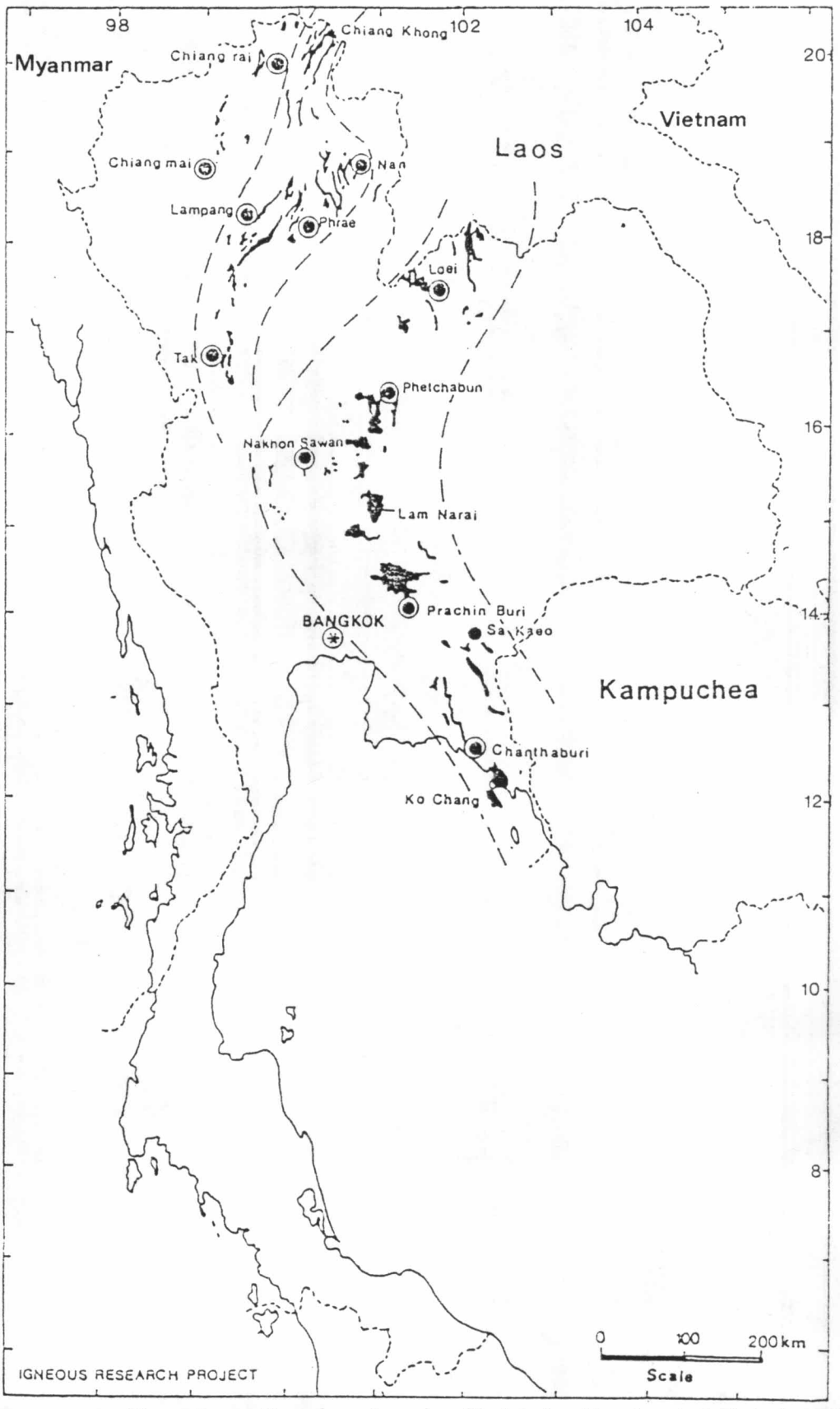

Figure 1.1 The Lam Narai volcanic field in the Loei-Petchabun-Ko Chang volcanic belt(after Nikom Jungyusuk and Somboon Khositanont, 1992).

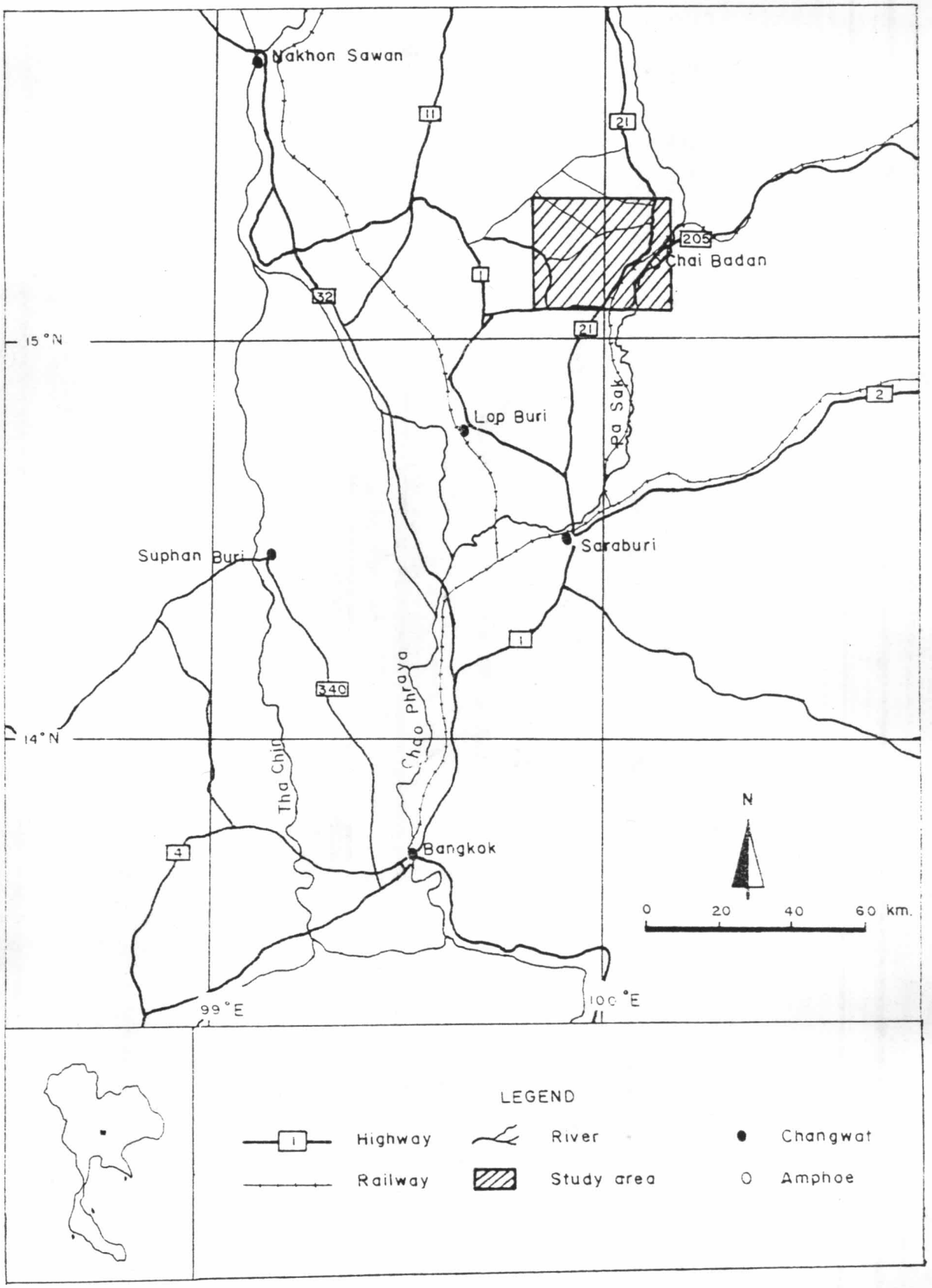

Figure 1.2 Location and accessibility of study area.

1.3 Physiography

The study area seems to have an elongate shape and apparently align parallel to the western margin of the Khorat Plateau. Its central part is the highest volcanic complex of silicic composition which is surrounded by the flat-lying plain of basaltic composition (Figure 1.3). The elevation of the lower plain is about 60-80 m above mean sea level. The main river in this area is the Pa Sak River which flows from the north to south along the eastern part of the study area.

The study area and vicinity are in the tropical zone, and there are three seasons; summer, rainy and winter. The summer season commonly ranges from February to the middle of May and the mean temperature is 30 ^{o}C. The rainy season starts from the middle of May to October. Heavy rain falls are in August. The winter season ranges from November to January, the minimum temperature is 10-15 ^{o}C and have strong wind.

1.4 Previous Works

The larger Lam Narai volcanic terrain; in which the study area is included, was previously investigated by numerous workers. 1) Nikorn Nakornsri(1976), a geologist from the Department of Mineral Resources, is the first worker who systematically compiled and published a geologic map scale 1 : 250,000 and reported geology and mineral resources of the area under map sheet ND 47-4, Amphoe Ban Mi. He divided igneous rocks in this area into plutonic granite and volcanic rhyolite, andesite, and related pyroclastic rocks of

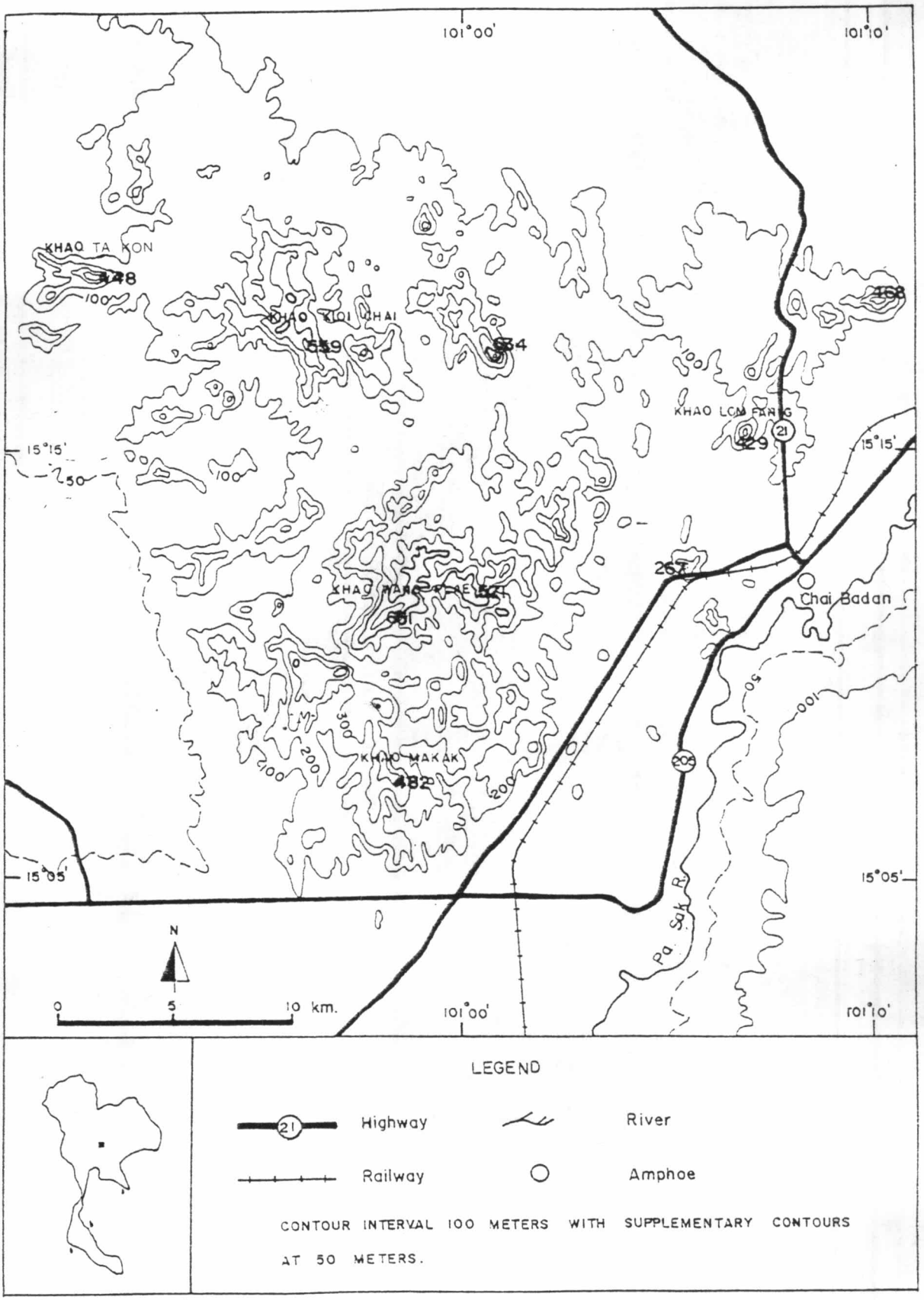

Figure 1.3 Physiographic features of the study area and vicinity (modified after Nikorn Nakornsri, 1976).

Triassic age and basaltic rock of Tertiary (1981). 2) Nikom Jungyusuk and Yongyut Trangcotchasan (1972), however, designated igneous rocks of silicic and intermediate to be Permo-Triassic age whereas the age of the mafic igneous rocks remained the same.

Nikom Jungyusuk and Tanawut Sirinawin (1983) reported geology of the Lam Narai volcanic rocks by dividing into rhyolitic tuffs, rhyodacitic and basaltic rocks. Lately, in 1987, Nikom Jungyusuk and Panya Suriyachai reported a more detailed study of geology and mineral resources of the Lam Narai Volcanic field at scale 1:50,000 of sheets 5139 I, 5139 II, 5239 III and 5239 IV. These volcanic rocks had been divided on the basis of chemical composition and mineral constituents. They are porphyritic andesitic rock, quartz latitic rock, quartz trachitic rock, rhyolitic rock including pyroclastic deposits, glass, and rhyolite porphyry, microgranitic rock and basaltic rocks.

1.5 Methods of Investigation

The approach to understanding the Lam Narai volcanic successions starting from describing through documenting to interpreting the sequences, has benefited much from the equivalent approach in sedimentology. In particular, the facies concept is proposed as a useful means of documenting and interpreting the characteristics of stratigraphic facies. The essence of facies analysis is the identifications of distinctive characteristics that lend themselves to the interpretation of their eruptions, depositional processes and environments of depositions.

Field study has been carried out during the summers of 1989 and 1990. The topographic map scale 1 : 50,000 of Royal Thai Army have been used as a base map. Describing and documenting the characteristics of, and measuring stratigraphic sections of pyroclastic deposits including thickness, maximum grain size, grain size distribution, proportion of components, color, degree and style of welding and relative stratigraphic position, have been carried out, together with collecting samples of those stratigraphic sections. The sampling method being used is the stratified sampling.

In the laboratory, microscropic examination in transmitted light provided information on the physical characteristics, textures, and mineralogy of the rocks. Microscopic study was integrated with extensive x-ray powder diffraction study, in an effort to define the minerals even high-power microscopy employing oil-immersion lenses doses not permit the ambiguous identification of the minerals.

The fresh samples for chemical analysis were ground into powder by the disc mill with tungsten carbide vessels and analyzed by the two-solution method revised by Shapiro (1975). The 6 major oxides ; SiO_2, TiO_2, Al_2O_3, FeO, TiO_2, MnO and P_2O_5 were determined by colorimetry method and 4 of the alkalines ; MgO, CaO, K_2O and Na_2O determined by atomic absorption spectroscopy. These experiments were performed at Department of Geology, Chulalongkorn University.