CHAPTER I
INTRODUCTION

1.1 Rationale

Arsenic (As) from both natural and anthropogenic sources will impact on environment. As in natural occurs in air, soil, water, animals and plants. It will be released through natural activities such as erosion of rocks, volcanic action and forest fires. As contamination caused by human activities such as a forest preserve, metals, paints, dyes, soaps, drugs and semi-conductors. In some cases, high levels of As comes from animal feeding operations and base-pesticides in agriculture. Industrials such as mining, coal burning and copper smelting also release arsenic directly to the environment.

High concentrations of As tend to be found in groundwater than in surface water sources of drinking water (Li, Wu, & Qian, 2013; Stollenwerk & Welch, 2003). Drinking water constitutes a major pathway of exposure to arsenic in human bodies. Long–term arsenic exposure has various types of health effects, including several types of cancer, cardiovascular disease, diabetes, and neurological effects (Council, 1999). The standard of drinking water is set by environmental agencies: Those standards will protect the consumers serve the public water from the effect of long-term arsenic exposure.

Laem Chabang Sanitary Landfill is located at Si Racha District, Changwat Chonburi. The operation has started since May 1999 and be expected to operate for 20 years. Currently, this landfill contains around 100 tons of waste per day or 350,000 tons of waste per year. The surrounding environment is the agricultural areas and 4 kilometers away from the stream. According to water quality data in 2010 found 0.25

mg/L of arsenic in leachate which exceeded the standard in groundwater from monitoring well of landfill.

This thesis aims to describe mobility behaviors of As in column experiment. The adsorption properties will be determined by experiment. These parameters will be input into mathematic model to simulate As transportation in the future. An understanding of the groundwater quality will provide the drinking shallow groundwater information to communicate to the local consumers.

1.2 Objectives

The purposes of this study are:

1.2.1 To analyze sorption and transport properties of As in shallow aquifer at the Laem Chabang Sanitary Landfill, Changwat Chonburi.

1.2.2 To estimate groundwater flow and transport of As in shallow aquifer.

1.3 Scope and limitation

The scope and limitation of this study area is:

- Investigation As in shallow aquifer at the Laem Chabang Sanitary Landfill, Changwat Chonburi focuses in saturation zone.

1.4 Location of the study area

The Laem Chabang Sanitary Landfill is located in Changwat Chonburi, eastern Thailand. There is a Huai Saphan reservoir, located in the north of the Nong Klang Dong reservoir. This landfill occupies a total area of approximately 0.38 square kilometers. The study area lies between latitudes 13° 0′ N and 13° 6′ N and longitudes 100° 96′ E and 101° 07′ E where covers 3 Tambons (Tambon Bung, Tambon Takeantea, and Tambon Bowin). The scope of this study is based on watershed boundaries (Figure 1.1). The hydrogeology of this area is constituted by

the quaternary sediments, which mainly deposited at the base of hillslope and the fluvial deposits along streams. The groundwater in this area is stored in both unconsolidated rocks, as unconsolidated valley-fill aquifers (Qcl), and in consolidated rocks of granitic (Gr) (Figure 1.2).

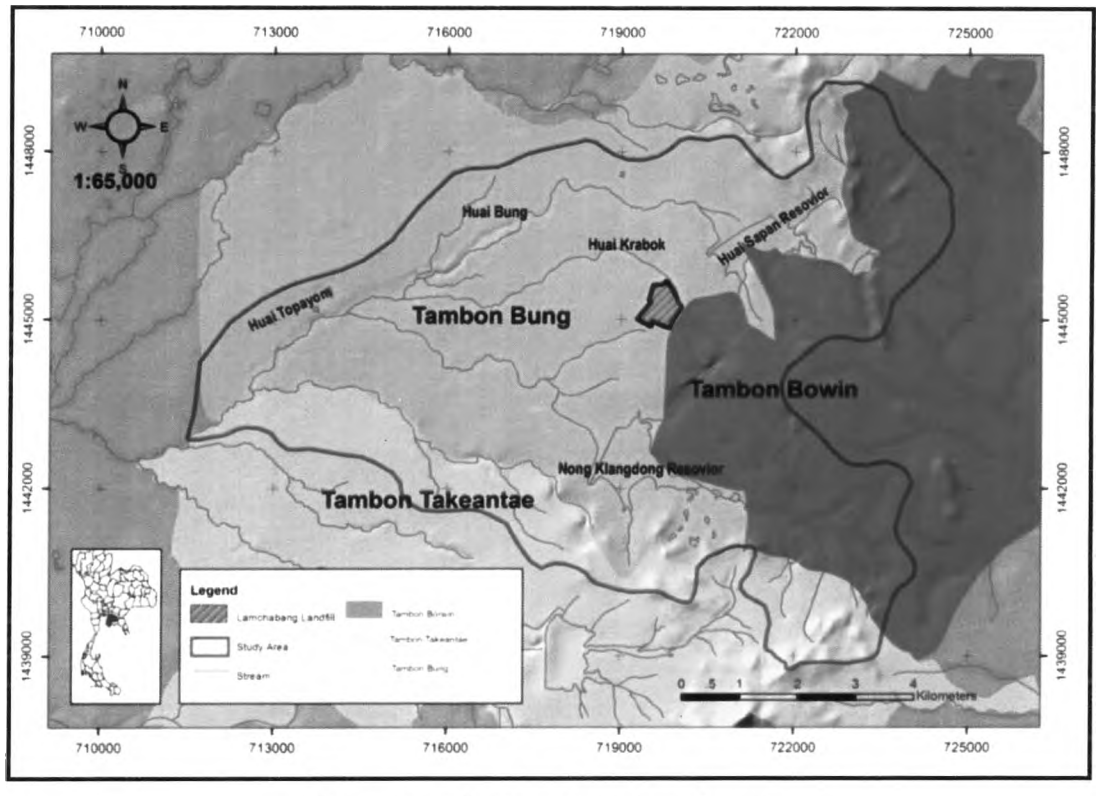

Figure 1.1 The Location of study area

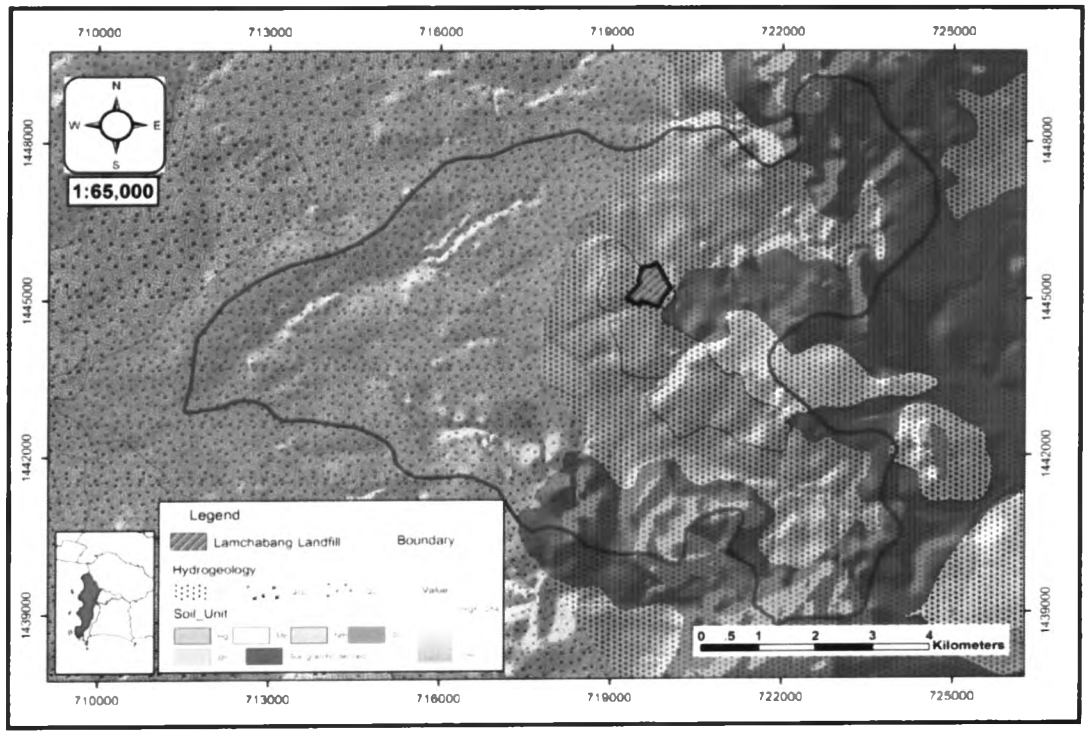

Figure 1.2 The hydrogeology of study area

1.5 Expected outputs

The expected outputs of this thesis are:

1.5.1 Sorption and transport properties of As, which can be determined by column experiment under saturated condition.

1.5.2 The groundwater flow direction and the behaviors of As contamination trend using MODFLOW and MT3D model, which can be determined the area under risk of pollution around the landfill.

1.6 Components of the thesis

This thesis consists of five chapters, including this introduction is in the first chapter. The second chapter is the theory and literature review. Material and methodology are provided in the third chapter. Results are given in the fourth chapter. The last chapter is a part of discussion and conclusions.