

# CHAPTER 1

## INTRODUCTION



### 1.1 Motivation

Generally, small waterworks may not be operated under the optimal dosage of coagulant in coagulation process. In addition, the objective of treatment process in small waterworks mostly focus on turbidity removal and maintaining free chlorine residual for disinfection in produced water and so as to make the consumers safe from bacteria, viruses and parasites. Chlorine is commonly used as disinfectant in small waterworks because of being relatively cheap and having prolonged action as a disinfectant. Due to improper coagulation process prior to chlorination, natural organic matter (NOMs) may not be reduced efficiently, thus chlorine can react with NOMs to form Trihalomethanes (THMs). Under this situation, THMs may affect directly to the consumer, since there is no THMs standard in Thailand to control THMs level in water supply.

At the time being, raw water supply of Chiang Mai university small waterworks from Aung-Keaw and Mae-Hea reservoirs are considerably contaminated animal excrement, domestic wastewater, and natural organic matters (NOMs). Therefore, trihalomethane formation in produced water may be supplied for drinking, bathing and household use for all communities, faculties, offices and dormitories which are located in the area of Chiang Mai university.

### 1.2 Objectives

1. To determine THMs and trihalomethane formation potential (THMFP) in raw water and in water supply from selected small waterworks in Chiang Mai.
2. To determine THMFP and its reduction by using the same raw water from the above-mentioned selected small waterworks and polyaluminum chloride (PACl) using as coagulant in Jar-Test experiment

### 1.3 Scopes of Work

1. Two conventional small waterworks using raw water from the reservoirs of Chiang Mai university were selected for this study.
2. To determine THMs and THMFP in raw water and in water supply produced from the selected waterworks.
3. THMFP in coagulated water from Jar-Test experiments were also determined by using the same raw water under the conditions of various dosages of PACl and different controlled pH.
4. Four THMs species, namely chloroform( $\text{CHCl}_3$ ), bromodichloromethane ( $\text{CHBrCl}_2$ ), dibromochloromethane ( $\text{CHBr}_2\text{Cl}$ ) and bromoform ( $\text{CHBr}_3$ ) were determined.
5. Total organic carbon (TOC), Dissolved organic carbon (DOC) and Ultraviolet absorption at wave length 245 nanometer (UV-254) were considered as NOMs surrogate parameters and its correlation in coagulated water were established.

### 1.4 Benefits of this work

1. Data on THMs and THMFP in water supply from small waterworks were presented.
2. Possibility of THMFP reduction by coagulation process with PACl were notified.
3. Results from this study would be useful for developing the THMs standard of Thailand in the future.
4. Correlations among surrogates of NOMs were demonstrated.