

**QUALITY OF WASTE WATER EFFLUENT FROM WASTE
WATER TREATMENT PLANT UITM PULAU PINANG USING
SAND FILTRATION**

By

LUNGAN EGA

Report is submitted as the requirement for the degree of
Bachelor Engineering (Hons) (Civil)

**UNIVERSITI TEKNOLOGI MARA
NOVEMBER 2007**

ACKNOWLEDGEMENTS

I would like to express my gratitude to Almighty God for giving me the guidance and strength in making this project research success.

I sincerely thank my supervisor Madam Caroline Marajan, for her guidance, great ideas and continuous support throughout the preparation of this project. I greatly appreciate all the support that she has been given to me on this study.

I wish to thank every staff in the Environment laboratory of UiTM Pulau Pinang especially Puan Rokibah for her clear explanations and help me to understand the rule in environment laboratory.

My special appreciation goes to my family, whose love and care have brought me to this level. Their substantial encouragements and moral support have helped me to succeed in finishing this thesis.

ABSTRACT

In this study, wastewater effluent from UiTM Pulau Pinang wastewater treatment plant is taken as the first sample (initial reading) and effluent that is pass a sand filtration process as a second sample (final reading). The entire sample taken was evaluated and tested using experiment method in UiTM Pulau Pinang Environmental Laboratory to test the parameter. The result is compared to WHO, INTERIM and EQA (A and B) standard.

A small model of sand filter was constructed with sand and gravel as a filter media. It is open sand filter where the sand filter surface is open to the atmosphere Sieve analysis was carrying out to evaluate the media. The effluent passes with vertical movement to downward using gravity force or gravity flow.

Sand filtration can improve wastewater quality such as to reduce pollutants in wastewater. The sand filtration effluent can use for domestic purposes such as cleaning and watering plant, in fact to reduce water consumption.

Properly designed and functioning sand filters can provide for enhanced BOD₅, COD, SS removal, color reduction, and heavy metal of wastewater effluent. In this study sand filtration can remove suspended solid, BOD₅, COD, color, ammonia, chromium and zinc, but sand filter is very effective in suspended solid removal and can achieved until 100 percent removal compared to other parameter. It is also can adjust pH values. This study shows that the sand filter improves the wastewater effluent into a better quality water confirm to the WHO Drinking Standard Guidelines, EQA (1979) and the Interim National River Water quality standard for Malaysia (within class 1 and IIA) which makes its suitable for a variety of non potable uses.

TABLE OF CONTENTS

CONTENT	PAGE
Declaration	i
Acknowledgement	ii
Abstract	iii
Table of Contents	iv
List of Figure	viii
List of Table	x
List of Abbreviations	xi
 CHAPTER 1	
1 INTRODUCTION	
1.1 Background	1
1.2 Problem statement	2
1.3 Objective	3
1.4 Scope of Works	3
1.5 Study Significance	4
1.6 Limitation	4
 CHAPTER 2	
2 LITERATURE REVIEW	
2.1 Introduction	5
2.2 Types of Wastewater	7
2.2.1 Residential Wastewater	7
2.2.2 Nonresidential Wastewater	8
2.3 Wastewater parameter	8
2.3.1 Temperature	8
2.3.2 pH	9
2.3.3 Chemical Oxygen Demand	9

CHAPTER 1

INTRODUCTION

1.1 Background

Sand filtration is a relatively an old technology. It has been used extensively for onsite and small community applications for treating both water and wastewater, with numerous installations. Sand filtration can be used to treat septic tank effluent or effluent from other types of pretreatment processes such as aerobic tanks.

Sand filters treat wastewater using naturally occurring physical, biological and chemical processes. They are one of the best options for additional onsite treatment where septic tank or soil absorption systems have failed or are restricted due to high groundwater, shallow bedrock, poor soils, or other site condition. Sand filters have also been used where centralized treatment is unavailable or too expensive for homes, businesses, institutions and small residential communities. (www.danpatch.ecn.purdue)

Sand filtration on the other hand is a model developed in India and Malaysia, to treat rainwater from rainwater harvesting. It is developed to conserve water and to minimize water consumption from the water supply treatment plant. The sand filtration is design to filter the rainwater until it can be use for drinking purpose. Sand filtration is also use in most water treatment plant in Malaysia. In this research, sand filtration is used to filter the effluent from wastewater treatment plant so that the quality of the effluent can be improved.