

**UNIVERSITI TEKNOLOGI MARA**

**EFFECTIVENESS OF NITRATE AND  
PHOSPHORUS REMOVAL FROM RURAL GREY  
WATER USING BIOLOGICAL TREATMENT  
SYSTEM (BTs)**

**JEFENDY BIN JAMALLUDDIN**


**Project paper submitted in partial fulfillment of the requirements  
for the degree of  
Bachelor in Environmental Health and Safety (Hons.)**

**MAY 2011**

## Declaration by Student

Project entitled "Effectiveness of Nitrate and Phosphorus Removal from Rural Grey Water using Biological Treatment System (BTs)" is a presentation of my original research work. Wherever contributions of others are involved, every effort is made to indicate this clearly, with due reference to the literature, and acknowledgement of collaborative research and discussions. The project was done under the guidance of Mr. Hashim Bin Ahmad as Project Supervisor and Mr. K. Subramaniam as Co-Supervisor. It has been submitted to the Faculty of Health Sciences in partial fulfillment of the requirement for the Degree of Bachelor in Environmental Health and Safety (Hons).

Student's Signature:

A handwritten signature in blue ink, consisting of a large loop followed by a smaller flourish, positioned above a horizontal dotted line.

(Jefendy Bin Jamalluddin)

Matric No: 2007238336

I/C No: 770802-07-5639

Date: .....

## ACKNOWLEDGEMENT

In the name of Allah S.W.T, the Almighty and Merciful, I am so grateful for the chances, strength and patience in me in the accomplishment of this study. My appreciation goes much to my supervisor, Mr. Hashim Bin Ahmad and my co-supervisor, Mr. K. Subramaniam for their guidance, expertise, knowledge, and opinion that help me to complete this study.

My thanks go to close friends Mr. Khairul Nizam Bin Wahi Noordin (Kerian District Health Office, Perak), Mr. Abu Yazid Bin Muhammad Ariff, Mr. Baharudin Bin Osman, Mr. Azian Rizal Bin Ahmad and all technicians that are giving full commitment and cooperation during this study. My thanks also dedicated for all my friends and lecturers for their helps, advices, and supports.

Lastly, a special compliments for the most important person in my life, my parents, and family for their supports. Their loves give me strength to accomplish this study.

## TABLE OF CONTENTS

<b>TITLE PAGE</b>	<b>PAGE</b>
ACKNOWLEDGEMENTS	i
TABLE OF CONTENTS	ii
LIST OF TABLES	v
LIST OF FIGURES	vi
LIST OF ABBREVIATION	vii
LIST OF APPENDICES	viii
ABSTRACT	ix
ABSTRAK	x

### **CHAPTER ONE: INTRODUCTION**

1.1	Background Information	1
1.2	Problem Statement	1
1.3	Study Justification	2
1.4	Study Objectives	3
	1.4.1 General Objective	3
	1.4.2 Specific Objectives	3
1.5	Study Hypothesis	3
1.6	Conceptual Framework	3

### **CHAPTER TWO: LITERATURE REVIEW**

2.1	Global Situation of Rural Wastewater Pollution	7
2.2	Detergent Agents (Dish and Laundry)	7
2.3	Phosphorus	8
2.4	Nitrates	9
2.5	Algal Blooms	10
2.6	Dissolved Oxygen (DO)	11
2.7	Biological Wastewater Treatment	13
2.8	Types of Equipment for Biological Treatment	14
	2.8.1 With Mechanical	14
	2.8.2 Without Mechanical	15

# EFFECTIVENESS OF NITRATE AND PHOSPHORUS REMOVAL FROM RURAL GREY WATER USING BIOLOGICAL TREATMENT SYSTEM (BTs)

JEFENDY BIN JAMALLLUDDIN

## Abstract

**Introduction:** Grey water is water that has been used for washing dishes, laundering clothes, or bathing. Essentially, any water, other than toilet wastes (black water), draining from a household is grey water. Most of residents in rural area having problem with grey water disposal. Wastewater containing high levels of phosphorus and nitrogen cause several problems, such as eutrophication, oxygen consumption, and toxicity, when discharged into the environment (Luostarinen *et al.*, 2006). It is, therefore, necessary to remove such substances from wastewaters in order to reduce their harm to the environment (Wang *et al.*, 2006). Nitrates and phosphorus can be considered as a nutrient waste for aquatic plants that cause an eutrophication of surface water and encourage production of the blue-green algal bloom. **Objective:** The objective of this study is to determine an effectiveness of Biological Treatment System (BTs) in removal of nitrate and phosphorus in rural grey water. **Methodology:** Using available information / data; grey water sampling ("in-situ and "ex-situ" analysis) and interview (questionnaires). **Result and Conclusion:** This study indicated that these BTs are able to reduce level of nitrate (until to 6.547 mg/L or 27.99% between before and after) and phosphorus (until to 6.2473 mg/L or 42.74% between before and after) in grey water. There is much weak correlation between KAP of the studied houses and the effectiveness of biological treatment process. **Recommendation:** These BTs design are recommended to add the several types of plant (crop uptake method) to increase their effectively to reduce more level of nitrate and phosphorus in biological treatment of grey water especially in the rural areas.

**Keyword:** Biological Treatment System (BTs), Grey Water, Nitrates and Phosphorus Removal.