USING BIOREACTOR MEDIA IN DEVELOPING WASTE STABILIZATION PONDS

A Thesis
Submitted to the Faculty of Engineering
Ain Shams University for the Fulfillment
of the Requirement of M.Sc. Degree
In Civil Engineering

Prepared by
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B.Sc. in Civil Engineering, June 2005
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2014

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Date: - ---/--/2014

DEDICATION

To the persons who helped and supported me and encouraged me during this long journey of hard work;

To my family,

TO THE SOUL OF MY FATHER & MY MOTHER

TO

MY DEAR SISTER,

Also, I wish to dedicate my thesis

TO

My Dear Professor

PROF.DR.MOHAMED EL HOSSEINY EL NADI

For his encouragement and help to complete this work .

STATEMENT

This dissertation is submitted to Ain Shams University, Faculty of Engineering for the degree of M.Sc. in Civil Engineering.

The work included in this thesis was carried out by the author in the department of Public Works, Faculty of Engineering, Ain Shams University, October 2008 to April 2014.

No part of the thesis has been submitted for a degree or a qualification at any other University or Institution.

The candidate confirms that the work submitted is his own and that appropriate credit has been given where reference has been made to the work of others

Date:- ---/-- /2014

Signature:- ----------

Name:- ***Heba Saeid Ismail El Dewy***

ACKNOWLEDGMENT

The candidate is deeply grateful to **Prof. Dr. Mohamed El Hosseiny Abdel Rahman EL Nadi**, Professor of sanitary and Environmental Engineering, Faculty of Engineering, Ain Shams University, for suggesting the problem, help, encourage, co-operation sponsoring and patient advising during preparation of this work.

Also, great thanks to **Dr. Enas Sayed Ahmed Wahb,** Associate Professor of sanitary and Environmental Engineering, Ain Shams University, for her help, and co-operation during the preparation of the study.

And thanks to **Dr. Nany Aly Hassan Nasr,** Associate professor of sanitary and Environmental Engineering, Ain Shams University, for her help, and co-operation during the preparation of the study.

Also, Iam very grateful to the sanitary engineering staff and the laboratory personnel Faculty of Engineering, Ain Shams University for their encouragement and support during thesis preparation.

ABSTRACT

Name : - . ***HEBA SAEID ISMAIL ELDEWY***

Title : - "USING BIOREACTOR MEDIA IN DEVELOPING WASTE STABILIZATION PONDS**".**

Faculty : - Faculty of Engineering, Ain Shams University.

Specialty: - Civil Eng., Public Works, Sanitary Engineering.

Summary:-

Waste stabilization pond technology is considered the most economic wastewater treatment technology for the removal of pathogenic micro-organisms. The treatment is achieved through natural disinfection mechanisms depending on Sun, algae and temperature.

The study was conducted in the existing Waqued Waste stabilization pond in Behira governorate. The pond was monitored for five weeks. Then bioreactor media was applied to the inlet of both facultative and maturation pond, the system performance was monitored and evaluated on a weekly basis for six months. The study revealed that although the pond overloading and constant area for existing case, effluents are within desirable range, indicating over estimation of pond dimensions. By applying different on the existing case it was found they do not suit Egyptian conditions.

The proposed modification of bioreactor media application at inlet of facultative and maturation enhanced the pond performance by raising removal efficiencies of TSS by 2.6 % (to be 92.55%), BOD by 8.56% (to be 92.05%) in facultative pond . Also in maturation pond TSS was raised by 34.46 %,(to be 84.46%) and BOD by20.17 % (to be 64.67%).In the same time the applied media reduced a part of the pond equivalent to 2.14 % of facultative pond area and 3.19 % of maturation pond area.

The treated effluent TSS, BOD and fecal coliform were found to be in permissible range according to regulations and standards therefore can be disposed in natural streams or used for irrigation purposes.

Supervisors:-

Prof. Dr. MOHAMED EL HOSSIENY EL NADI,

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Key Words:-

Wastewater Treatment, Biological Treatment, Stabilization Ponds, Bio reactor Media.

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CHAPTER I
INTRODUCTION

1.1 BACKGROUND

Wastewater treatment has been always a must which has no any alternative. Since at last wastewater is disposed to water down streams or reused. This highlights the importance of finding a high performance system as waste stabilization ponds.

Waste stabilization pond technology is considered the most economic wastewater treatment technology for the removal of pathogenic micro-organisms. The treatment is achieved through natural disinfection mechanisms.

It is particularly well suited for tropical and subtropical countries because the intensity of the **sunlight** and **temperature** are key factors for the efficiency of the removal processes which is very much suitable to climatic conditions in Egypt.

Depending on natural biological action it doesn't need highly trained operators for operation and maintenance. Its Big area of land uses has been a problem that limited its application in several sites.

Most of the researches work to develop the system by several procedures to decrease the area required without affecting the efficiency.

1.2 STUDY OBJECTIVES

The main target of this study is to improve both efficiency and capacity of stabilization pond by using bio reactor media at facultative and maturation pond inlets.

1.3 SCOPE OF WORK

The scope of work is divided to two main parts as follows:

1. The first is the experimental work that is done on Waqued Stabilization pond treatment plant in Behira governorate to evaluate the existing situation and do the modification by adding the bioreactor media at the inlet of both its facultative and maturation ponds.

2. The second is the all theoretical and official works that includes the following:
    - Data collection for the literature about the stabilization pond system and its modification around the world and also its applications in Egypt.
    - Analysis of field results and discussion of its values in the existing case before adding the biomedia and also after the addition of the bioreactor media in its unit influents.
    - Writing the thesis and review with the supervisors.

1.4 THESIS ORGANIZATION

The thesis contains six chapters in addition to References, English and Arabic summaries as follows:

1.4.1 CHAPTER I: INTRODUCTION

The chapter includes background about the Stabilization ponds, and then the study objective, scope of the study work divided into theoretical and practical work and finally the thesis organization that covers conducted work and conclusions.

1.4.2 CHAPTER II: LITERATURE REVIEW

The chapter includes introduction about stabilization ponds worldwide applications, and the factors affecting design equations used and the Egyptian equations developed recently for stabilization ponds.
The chapter also mentions modifications introduced to the stabilization ponds system to improve the system performance and discuss their effluent results and cost.