

**UNIVERSITI TEKNOLOGI MARA**

**DETERMINATION OF HEAVY METAL  
CONTAMINATION AND HEALTH RISK  
ASSESSMENT BETWEEN EX-MINING POND AND  
RIVER FISH.**

**NOORAINI BTE JAMAL**

**Project paper submitted in partial fulfillment of the requirements for  
the degree of**

**Bachelor in Environmental Health and Safety (Hons.)**

**Faculty of Health Sciences**

**MAY 2011**

### **Declaration by Student**

Project entitled Determination of Heavy Metal Contamination and Health risk Assessment between Ex-mining Pond and River Fish is a presentation of my original research work. Wherever contributions of others are involved, every efforts is made to indicate this clearly, with due reference to the literature, and acknowledgement of collaborative research and discussions. The project was done under guidance of Mr. Ahmad Razali bin Ishak as Project Supervisor and Mdm Nadiatul Syima binti Mohd Shahid as Co-supervisor. It has been submitted for the Degree of Bachelor in Environmental Health and Safety (Hons).

Student's Signature:



(Nooraini bte Jamal)

2007287912

880817235516

Date: 26/5/2011

## **ACKNOWLEDGEMENT**

With the name of ALLAH, the most gracious and most merciful.

I would like to thanks ALLAh for the bless from Him that I finally finish my final year project. I success in completing this project also because of helps and support from others.

I would like to express my appreciation to my supervisor, Mr. Ahmad Razali bin Ishak and my Co-supervisor, Madam Nadiatul Syima binti Mohd Shahid for their support, advice and also constructive comments. I do appreciate every single of them.

Other than that, a bunch of thanks to my parents, Jamal bin Kasman and Zaliha binti Suleiman and also my family for their continuous support and advice which give me strength to finish my project.

Last but not least, thousands of thanks to my dear friends who willingly teach and help me whenever I need help. I really appreciate their kindness.

Thank you very much.

## TABLE OF CONTENTS

TITLE PAGE	
ACKNOWLEDGEMENT	ii
TABLE OF CONTENTS	iii
LIST OF TABLE	v
LIST OF FIGURES	vi
LIST OF APPENDICES	vii
LIST OF ABBREVIATION	viii
ABSTRACT	ix
CHAPTER ONE: INTRODUCTION	
1.1 Background Information	1
1.2 Problem Statement	2
1.3 Study Justification	3
1.4 Study Objectives	
1.4.1 General Objective	4
1.4.2 Specific Objectives	4
1.5 Study Hypothesis	4
1.6 Conceptual Framework	5
1.7 Conceptual and Operational Definitions	
1.7.1 Conceptual Definitions	6
1.7.2 Operational Definitions	7
CHAPTER TWO: LITERATURE REVIEW	
2.1 Heavy Metal as Environmental Toxicants	8
2.2 Heavy Metal and Ex-mining Pond	9
2.3 Heavy Metal in River	10
2.4 Heavy Metal in Fish	11
2.5 Health Effects	12
2.6 Standard Limit	13
CHAPTER THREE: METHODOLOGY	
3.1 Study Location	14
3.2 Study Design	15
3.3 Study Variable	
3.3.1 Independent Variables	15
3.3.2 Dependent Variables	15

## Abstract

### Determination of Heavy Metal and Health Risk Assessment between Ex-Mining Ponds and River Fish.

Nooraini bte Jamal

Anthropogenic activities continuously increase the amount of heavy metals in the environment, especially in aquatic ecosystem. Increase in population, urbanization, industrialization and agriculture practices have further aggravated the pollution of heavy metals in aquatic ecosystem. As heavy metals cannot be degraded, they are deposited, assimilated or incorporated in water, sediment and aquatic animals and thus, causing heavy metal pollution in water bodies. Therefore, heavy metals can be bioaccumulated and biomagnified via the food chain and finally assimilated by human consumers resulting in health risks. The study was conducted in an ex-mining pond at Kampung Gumut Tambahan, Kalumpang, Selangor. This ex-mining pond was reclaimed into aquaculture activity. The study design is cross-sectional study. Sampling data collection using Atomic Absorption Spectrophotometer (Perkin Elmer AA800) and also questionnaire which is distributed to respondents (n=35). The statistical analysis is done using statistical package for the social science (SPSS) version 17.0. The study was found that there is heavy metal detected in freshwater fish except for Tin. There is significance difference in different type of fish for lead and cadmium ( $p<0.05$ ) while no significance difference for mercury with  $p=0.201$ . There is significance difference between ex-mining pond fish and river fish for lead and mercury concentration with  $p=0.015$  and  $p=0.00$ . No significance difference between the ex-mining pond and river fish for cadmium concentration with  $p=0.679$ . All heavy metals are below the standard limit provided in Food Regulations 1985. The Hazard Index for Cd and Hg was below than 1. Heavy metal was detected in freshwater fish at ex-mining pond and river. There is also significance different between the concentration of heavy metal in fish from ex-mining pond and river. The level of heavy metal in the fish at ex-mining pond is below the limit stated in the Food Regulation 1985 and the fish are safe for consumption.

*Keywords: ex-mining ponds, heavy metal, fish, Hazard Index.*