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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

REGULATION OF TOXIC AND HAZARDOUS  
WASTE MANAGEMENT UNDER THE  
ENVIRONMENTAL QUALITY ACT 1974

BY

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INTERNATIONAL ISLAMIC UNIVERSITY  
MALAYSIA

NOVEMBER 2005

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*“Mischief has appeared on land and sea because of what the hands of men have done,  
that (Allah) may give them a taste of some of their deeds, in order that they may turn  
back (from evil).”*

(Translation from Qur’an, Chapter 30: Verse 41)

## **ABSTRACT**

Development activities in the various economic sectors, particularly the industrial sector, have generated not less than 380, 000 tonnes of toxic and hazardous wastes every year in Malaysia. Improper management of the wastes might lead to disastrous impacts not only to human being but also to the environment as illustrated by the Love Canal incident in New York and the Minamata incident in Japan. To minimize such adverse impacts and to promote proper management of toxic and hazardous wastes, Malaysia has promulgated several regulations related to toxic and hazardous wastes. Besides that, amendment to the existing laws has been made. Unfortunately, despite all the efforts of strengthening the legislation, environmental problems triggered by the mishandling of toxic and hazardous wastes still continue to occur rampantly. The most worrisome is the problem of illegal dumping which is at an alarming rate. Thus, the purpose of this study is to examine the existing legislations and their effectiveness in ensuring sustainable management of the toxic and hazardous wastes. To achieve this, the research analyses the scopes and strategies of the Environmental Quality Act 1974 in regulating proper handling of toxic and hazardous wastes and identifies factors considered to be the major constraints undermining the efficacy of the law. Apart from that, the study also assesses the involvement of Department of Environment and other environment-related agencies under various ministries in addressing the issue of toxic and hazardous wastes management. The study concludes, among other things, that successful regulation of toxic and hazardous waste management depends on the elimination of the existing obstacles within the present legislative framework and minimization of the limitations of the laws.

380,000

Love Canal

Minamata

1974

## **APPROVAL PAGE**

I certify that I have supervised and read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality as a thesis for the degree of Master of Comparative Laws.

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## **DECLARATION**

I hereby declare that this thesis is the result of my own investigations except where otherwise stated. Other sources are acknowledged by footnotes giving explicit references and a bibliography is appended.

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UNDER THE ENVIRONMENTAL QUALITY ACT 1974**

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Cambridge Water Co. v. Eastern Countries Leather Plc, [1994] 1 ALL ER 53.

Kent CC v. Queensborough Rolling Mill Co. Ltd (1990) 89 L. G. R 306 55.

Leight Land Reclamation Ltd v. Walsall Metropolitan Borough Council (1991) 155 JP  
547.

Lohtra Enterprise Petaling Jaya Session Court, Case No. 63-1-2004.

Long v. Brook (1980) Criminal LR 109.

P. P v. LK Metal (M) Sdn. Bhd In the Session Court at Klang, Case No. SS2-63-88-00.

P. P v. Mayer parry recycling Ltd. v Environment Agency [1999] Env LR 489.

P. P v. Muruganathan Metal Sdn. Bhd In the Session Court at Shah Alam, Case No.  
63-37-00.

Public Prosecutor v. Ta Hsin Enterprise Sdn Bhd [1998] 6 MLJ 748.

R v. Metropolitan Stipendiary Magistrate, ex parte London Waste Regulation Authority  
[1993] ALL ER 113.

Thames Waste Management Ltd v. Surrey Country Council [1997] Env LR 148.

Woon Tan Kan (Deceased)& 7 Ors. V. Asian Rare Earth Sdn Bhd [1992] 4 CLJ 2299.

## **LIST OF STATUTES**

Civil Law Act 1956 (Act 67).

Commercial Vehicles Licensing Board Act, 1987 (Act 334).

Control of Pollution Act, 1974. The United Kingdom.

Customs (Prohibition of Export) Order, 1998.

Customs (Prohibition of Import) Order, 1998.

Customs Act, 1967 (Act 235).

Environmental Protection Act, 1990. The United Kingdom.

Environmental Quality (Prescribed premises) (Scheduled Wastes Treatment and Disposal Facilities) Regulations, 1989.

Environmental Quality (Prescribed Premises) (Scheduled Wastes Treatment and Disposal Facilities) Orders, 1989.

Environmental Quality (Scheduled waste) Regulations, 1989.

Environmental Quality Act, 1974 (Act 127).

Federal Constitution of Malaysia.

Interpretation Acts 1948 and 1967 (Act 388).

Interpretation Acts, 1948 and 1967 (Act 388).

Local Government Act, 1976 (Act 171).

Motor Vehicles (Construction and Use) Rules, 1959.

National Land Code (Act 56 of 1965).

Road Transport Act, 1987 (Act 333).

Street, Drainage and Building Act, 1974 (Act 133).

Town and Country Planning Act, 1976 (Act 172).

UK Waste Management Licensing Regulations, 1994.

## LIST OF ABBREVIATIONS

AKMAL	Malaysian Customs Academy
ALL ER	All England Report
ASEAN	Association of South East Asian Nations
(CP)	cleaner production
(MV(C/U)	Motor Vehicles (Construction and Use) Rules, 1959
CLJ	Current Law Journal
DG	Director General of Environment Quality Malaysia
DNAA	discharged not amounting to acquittal
DOE	Department of Environment Malaysia
e.g.	( <i>exempligratia</i> ); for example
EEC	European Economic Community
EIA	Environmental Impact Assessment
Eimas	Environment Institute of Malaysia
EMS	environmentally sound management system
EPA	Environmental Protection Act 1990
EQA	Environmental Quality Act 1974 (Act 127)
EQR	Environmental Quality Report
etc	( <i>et cetera</i> ); and so forth
GDP	gross domestic product
IMP	Industrial Master Plan
KA	Kualiti Alam Sdn Bhd
L.G. R.	Knight's Local Government Reports
MAWAR	Malaysian Agenda for Waste Reduction
MITI	Ministry of International Trade and Industry
MLJ	Malayan Law Journal
MP	Malaysia Plan
MPSJ	Subang Jaya Municipal Council
MY/Y	metric tonne per year
n.n.p	no name of publisher
n.p	no place of publication
NDP	New Development Policy
NEP	New Economic Policy
NGOs	non-governmental organizations
OECD	Organization for Economic Co-Operation and Development
P.B.U.H	Peace Be Upon Him
RM	Ringgit Malaysia
SMIs	small and medium industries
SW	scheduled wastes
UK	United Kingdom



# CHAPTER ONE

## INTRODUCTION

### **Significance of Study**

Around the world millions tonnes of toxic and hazardous wastes are produced every day particularly by the modern industry. The generation of hazardous wastes is not, however, confined to large-scale industrial plants. Small-scale industry, small workshops, garages and very small production units also collectively produce large quantities of hazardous wastes. Their volume is usually difficult to monitor and quantify. Besides that, transport services, hospitals, research laboratories and even households are sources of hazardous wastes as well. In Malaysia, a study on the treatment and disposal of hazardous wastes indicated that not less than 380, 000 tonnes of toxic and hazardous wastes were being generated annually from some 1,000 sources.<sup>1</sup> Although in the years 2000 and 2002 the generation of toxic and hazardous wastes decreased, yet the amount of waste generated was high compared to other Asian countries like Singapore and Thailand.<sup>2</sup>

The necessity for proper handling of the toxic and hazardous wastes has been highlighted over and over again in recent days as news on improper management of

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<sup>1</sup> Malaysia, *Sixth Malaysia Plan 1991-1995*, Chapter XV, p.391.

<sup>2</sup> below p.9.

dumping have been widely publicized.<sup>3</sup> The irresponsible and reckless act of toxic and hazardous wastes<sup>4</sup> such as improper storage, improper disposal and illegal mismanaging hazardous wastes is a serious threat to public health and the environment. These hazardous wastes can lead to safety and health problems such as respiratory illness, skin diseases, fires, explosion, and generation of toxic gases, which could be dangerous to human being if not properly handled. If dumped indiscriminately on land the wastes have an immediate effect in contaminating the soil and if vegetables planted in the contaminated land were eaten by animals, the toxicity might enter the food chain and endanger human's health and life. Apart from that, hazardous leachate from toxic and hazardous wastes can pollute the underground water system or contaminate the riverine and sea resources, leading to the killing of marine life and threatening the safety of people who depend on the river for water. Some of the toxic and hazardous wastes are reactive in nature and might release toxic and dangerous gases. Obviously, improper management of toxic and hazardous wastes may lead to disastrous impacts not only to human being but also to the environment as reflected in the Love Canal incident in Niagara Falls in New York and the Minamata incident in Japan.<sup>5</sup> There are abundant materials written on the subject matter; yet it is very rare to find such literature discussing the matter in the

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<sup>3</sup> Tan Cheng Li, "Sullied by pollutants", *The Star*, Section StarTwo, 22 June, 2004, 1-3; "Cases of illegal waste dumping in Selangor", *The Sun*, 9 April, 2000, 22; Elizabeth John, "It's all a question of money", *New Sunday Times*, 14 December, 2003, 3; R. S. Kumar and Cindy Tham, "Dumping toxic waste on the sly", *The Sun*, 9 April, 2002, 22; "Looking for safe site for second waste center", *New Straits Times*, 19 May, 2004, 4; Siti Ainiza Kamsari, "Semuanya tidak berlaku-JAS jawab persoalan tiga kes jadi perhatian umum", *Utusan Malaysia*, 19 April, 2005, 1; Siti Ainiza Kamsari, "Kehilangan trailer disita JAS jadi misteri", *Utusan Malaysia*, 8 April, 2005, 3; "DOE refutes claims of gag on officers", *The star*, 20 April, 2005, 1.

<sup>4</sup> For a detailed discussion of the dumping of toxic wastes and its effect in the third world refer WHO, Examples of toxic waste, ins. Third World Network (edit.), *Toxic terror: dumping of hazardous wastes in the third world*, Third World Network, Penang, 1998, p.102.

<sup>5</sup> Both incidents are discussed further in Chapter Two.

light of the Malaysian context comprehensively, especially from the legal perspective. If any, the existing literatures very often merely reiterate what is written in the *Environmental Quality Act, 1974* without further examining the provisions. Thus, this research is intended to provide a comprehensive overview of the legal aspects of toxic and hazardous waste management in Malaysia by examining the existing regulations, understanding the policy and the institutional arrangements and problems that hinder the effective implementation of the laws.

## **Scopes and Justification**

Although the research basically discusses about the management of toxic and hazardous wastes, every process involved in the circle of toxic and hazardous waste management will not be discussed in detail. The paper is meant to be a legal research and not intended to elaborate more than necessary on the technicalities such as the hazardous waste disposal techniques or the treatment options in hazardous waste management or the best technology available for the toxic and hazardous wastes management.

## **Structure**

This dissertation has seven chapters. The chapters are arranged in a logical sequence to explain better the toxic and hazardous wastes management in Malaysia and its development. Following the introduction, Chapter 2 discusses the definitions, the generation of and the current issues on toxic and hazardous wastes in Malaysia.

Chapter 3 provides a discussion of the formation of national environmental policy and strategy vis-à-vis toxic and hazardous wastes by looking at all the Malaysia Plans and the National Environmental Policy on Environment. Chapter 4 then highlights and explains the legal strategies of toxic and hazardous wastes in Malaysia and examines the *Environmental Quality Act, 1974* and its regulations. Chapter 5 provides the institutional arrangements of Government Departments and Agencies entrusted or involved directly or indirectly with the task of ensuring environmentally sound management of hazardous wastes and their disposal. A discussion of limitations and constraints of the existing laws comprises Chapter 6. Chapter 7 presents the conclusion remarks and some suggestions to improve the toxic and waste management in the country. A brief discussion on the Islamic perspective of the subject matter is also discussed in the concluding chapter.

## **Research Method**

A lot of library-based research is done in order to get some clear understanding about the subject and to collect the relevant data and information from books, journals, reports and articles. As noted earlier, not much has been written on the legal aspects of the matter in the Malaysian context, especially on the policy and institutional arrangements. Thus, empirical studies need to be carried out to obtain various relevant information. Interviews with officers from the Department of Environment and several other environment-related government agencies, including local authorities, were made to get a closer view of problems encountered by them in enforcing the laws. The approach of the research is mainly analytical.

## CHAPTER TWO

### TOXIC AND HAZARDOUS WASTES IN MALAYSIA

#### Introduction

In this chapter, the researcher discusses various matters relating to toxic and hazardous wastes in the country, ranging from their generation, definitions, classifications, their impacts on the environment and the current problem of illegal dumping. The objectives of this chapter are to introduce the definitions and effects of toxic and hazardous wastes and to give a broad picture of the Malaysian state of the environment vis-à-vis toxic and hazardous waste problems.

#### Generation and Sources of Toxic and Hazardous Wastes

It is a well established fact for many countries that as they develop and grow stronger economically, the amount of waste produced substantially increases accordingly. In other words, the growth of GDP per capita is accompanied by increases in waste generation as kg per capita. For example, a 6.5 per cent increase in the GDP in OECD Europe (1990-1995) was accompanied by a nearly 10 per cent increase in waste generation.<sup>6</sup> In Malaysia, continual development in the light of achieving the goals of

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<sup>6</sup> But the association of the GDP with waste from industries is weak at its best. In some countries, waste production is reduced due to the introduction of cleaner technology and the closing of heavy industries and moving production to Asia. See J. P. Paul, *Hazardous futures: waste and related challenges for policy-makers in Malaysia*, Lestari Public Lecture, Institute for Environment Development (LESTARI), Selangor, 1999, p.7.

the New Economic Policy (NEP)<sup>7</sup> and the New Development Policy (NDP)<sup>8</sup> has resulted in the setting up of more factories manufacturing finished and semi-finished products. These intensified activities lead to further degradation of the environment especially in relation to river water pollution, marine pollution, air pollution, solid waste, and toxic and hazardous waste pollution.<sup>9</sup> Despite the fact, the manufacturing sector is rapidly growing in importance in Malaysia<sup>10</sup> and the diversity and complexity of industrial processes and products have resulted in the production of more and diverse types of waste.<sup>11</sup> According to an initial survey carried out by the Department of Environment (DOE) in 1983/1984, over 52 per cent of the toxic and hazardous wastes were generated by the electronic industry, 14 per cent by the metals and electroplating industries and the remainder by the chemical, rubber, plastics, printing, packaging, tannery and pharmaceutical industries. The nature of the waste varies rather widely. Most of the waste, about 52 per cent in volume, was in the form of galvanized metals. However, in terms of weight, over 74 per cent of the waste was in settling-sludge generated by the metal and electroplating industry and 12 per cent

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<sup>7</sup> The NEP was introduced by the Government in 1970, after the racial riots in 1969, to promote growth with equity with the objective of fostering national unity among the various races. The Second Malaysia Plan to the Fifth Malaysia Plan have been implemented within the framework of the NEP. See also below, pp. 32-33.

<sup>8</sup> The Government introduced the NDP in 1991 to replace the NEP, which was meant to accelerate the process of eradicating poverty and restructuring the society so as to correct social and economic imbalances. It provides a broader framework for achieving these socio-economic objectives within the context of a rapidly expanding economy.

<sup>9</sup> For detailed discussion of the environmental degradation since 1970s, refer Jamaluddin Mohd. Jahi, *Striking a balance between environment and development: is Malaysia prepared to manage the environment to face challenges in the next millennium*, Centre for Graduate Studies, UKM, Selangor, 1999, pp.13-32; refer also the annual Department of Environment Malaysia's Environmental Quality Reports.

<sup>10</sup> The country's tendency towards industrialization through the manufacturing sector is depicted in the various Malaysia Plans, which are discussed in Chapter Three of this dissertation.

<sup>11</sup> CAP and SAM, *State of the Malaysian Environment, Statement and Conclusions of the CAP-SAM National Conference on the state of the Malaysian environment*, n.np, Penang, 1996, p.44.

in solid pieces of highly contaminated waste generated by the electronics industry alone.<sup>12</sup>

There was not much change even after the 1980s. Although periodic surveys to monitor the generation and management of toxic and hazardous wastes were carried out, a study on the treatment and disposal of hazardous wastes indicated that not less than 380, 000 tonnes of toxic and hazardous wastes were being generated annually from some 1,000 sources.<sup>13</sup> According to the DOE's Environmental Quality Reports from 1997 to 2002, types of industries that are the major producers of hazardous waste include chemical, metal finishing, textile, electronic, printing and packaging, pharmaceutical and rubber and plastic.<sup>14</sup> See table 1 below.

Table 1: Sources and Percentage (%) of scheduled wastes generated by major industrial sources by year

INDUSTRY \ YEAR	YEAR				
	1997 (%)	1998 (%)	2000 (%)	2001 (%)	2002 (%)
<b>Metal Finishing</b>	10.8	34.97	33.30	35.12	26.04
<b>Chemical</b>	31.6	15.61	23.95	16.48	21.42
<b>Textile</b>	13.8	2.20	0.22	2.23	-
<b>Electronic</b>	4.6	9.22	9.56	14.15	18.41
<b>Packaging &amp; Printing</b>	2.02	5.87	1.09	1.56	5.37
<b>Pharmaceutical</b>	0.3	2.99	1.01	1.87	6.49

<sup>12</sup> Ministry of Science, Technology and Environment Malaysia, *State of the environment in Malaysia*, DOE, Kuala Lumpur, 1984, p.25.

<sup>13</sup> above, note 1.

<sup>14</sup> See the annual DOE's Environmental Quality Reports from 1997 to 2002.

Table 1 (continued)

<b>Rubber &amp; Plastic</b>	2.9	1.62	4.26	3.73	2.83
<b>Gas</b>	2.4	1.77	5.67	1.51	2.30
<b>Petroleum</b>	0.7	0.71	1.67	2.99	1.99
<b>Others</b>	29.1	23.97	16.36	6.43	9.79
<b>Workshop</b>	1.3	0.80	2.07	- (no data)	- (no data)
<b>Oleochemical</b>	0.2	0.28	0.44	- (no data)	1.61
<b>Resin &amp; Adhesive</b>	0.1	0.00	0.32	- (no data)	- (no data)
<b>Asbestos</b>	0.07	0.00	0.07	- (no data)	- (no data)
<b>Total quantity in Metric Tonne/Year</b>	<b>279, 511</b>	<b>398, 518</b>	<b>344, 550</b>	<b>420, 198</b>	<b>363, 017</b>

Source: Malaysia Environmental Quality Reports

The sudden fall in the nation's economy as a result of world economic recession in 1997 is depicted by the lower generation of hazardous wastes amounting to 279, 511 Metric Tonnes (MT) only as compared to the following years as shown in Table 1 above. In 1998, the total quantity of scheduled wastes generated was 398, 518 MT. The total amount of scheduled wastes generated was slightly reduced to 344, 550 MT/Y in 2000 but increased a little in 2002 to 363, 017 MT/Y. Although in the years 2000 and 2002 the generation of scheduled wastes decreased, the amount of waste generated was still high compared to other Asian countries like Singapore and Thailand.<sup>15</sup> Besides that, industrialized states such as Selangor, Johor and PulauPinang, which have undergone relatively greater industrial expansion, faced problems of toxic and hazardous waste disposal far more acutely than less developed states.

<sup>15</sup> It's estimated that the hazardous waste generated in Singapore amounted to 28000 T/Y and for Thailand 22,000 T/Y. See P.C. Sinha and K.C. Cherry, *International Encyclopedia of Environmental Laws (Toxic and Hazardous Materials)*, n.np., n.pp, 1996, p.3226.