CHEMICAL EMERGENCIES MANAGEMENT
THE DEPARTMENT OF ENVIRONMENT PERSPECTIVE

By

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Project Paper Submitted in Fulfillment of the Requirements for the Degree of Master of Science in the Faculty of Engineering Universiti Putra Malaysia

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Abstract of project presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirements for the degree of Master of Science.

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SEPTEMBER 2001

Supervisor : **Asso. Professor Dr. Fakhru'l-Razi Ahmadun**

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Faculty : **Engineering**

In the event that incidents such as fires, explosions or leakages involving chemicals occur in major hazardous installations, The Occupational Safety and Health (Control of Industrial Major Accident Hazards) (CIMAH) Regulations 1996, would operate to control the on-site situation. However, should such incidents escalate into disasters, there is the National Security Council's Directive 20 that outlines a

policy to manage them. As a supporting agency under this Directive 20, the Department of Environment (DOE) is entrusted to fulfill its primary function of preventing and controlling pollution. The objective of this study is to evaluate that state of preparedness, both at the headquarters as well as the state level, as regards to the availability of equipment, the personnel's competence to handle monitoring, communication and safety equipment, their knowledge of the roles and responsibilities of DOE as a responding agency and about the contents of Directive 20. Information gathered was by way of a questionnaire targeted at different levels of the DOE personnel and it covered the various areas of focus outlined in the objective. The measurements of the variables were then quantified by devising a rating scale and analysed statistically using the SPSS program. The t-Test method of comparison of the means was also utilised to compare the headquarters and state groups. A Checklist and Audit of the availability and condition of the monitoring, communication and safety equipment needed during a chemical emergency were also carried out. Then, an Emergency Response Plan was formulated in line with

DOE's role under Directive 20. The findings of the study indicate that though the personnel's knowledge of the roles and responsibilities of DOE is good, their understanding of Directive 20 is insufficient, and their ability to handle monitoring, communication and safety equipment is lacking. Capacity building programs such as trainings for the personnel and exercises to test its preparedness would be able to enhance DOE's capability and overcome any shortcoming in the management of a chemical emergency.

Abstrak projek yang dikemukakan kepada Senate Universiti Putra Malaysia sebagai memenuhi keperluan untuk Ijazah Master Sains.

PENGURUSAN KECEMASAN BAHAN KIMIA DARI PERSPEKTIF JABATAN ALAM SEKITAR

Oleh

VELLAYUTHAM A/L PACHAIMUTHU

SEPTEMBER 2001

Penyelia : Profesor Madya Fakhru'l-Razi Ahmadun, Ph.D.

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Jika berlaku insiden kebakaran, letupan atau kebocoran yang melibatkan bahan kimia di pemasangan bahaya besar, Peraturan–Peraturan Keselamatan dan Kesihatan Pekerjaan (Kawalan Terhadap Bahaya Kemalangan Besar dalam Perindustrian)1996 atau CIMAH akan beroperasi untuk mengawal keadaan di dalam tapak. Walau bagaimanapun sekiranya insiden tersebut menjadi lebih serius dan menjadi sesuatu bencana, Arahan 20 oleh Majlis Keselamatan Negara akan berkuatkuasa untuk menanganinya. Mengikut Arahan

tersebut Jabatan Alam Sekitar (JAS) adalah salah sebuah agensi sokongan yang perlu menjalankan peranan mencegah dan mengawal pencemaran dengan segera dan berkesan. Objektif projek ini adalah untuk mengkaji persediaan JAS dari segi keperluan alat-alat pemantauan, komunikasi dan keselamatan dan kecekapan kakitangan JAS menggunakannya dan sejauh manakah mereka memahami peranan dan tanggungjawab JAS sebagai sebuah agensi sokongan. Untuk tujuan tersebut maklumat telah diperolehi melalui soalselidik yang telah meliputi aspek-aspek yang digariskan dalam objektif. Hasil pengukuran variabel-variabel yang dikaji telah diubah kepada nilai kuantiti dan dijalankan analisa statistik dengan menggunakan program SPSS. Untuk membandingkan perbezaan, sekiranya ada, antara kumpulan ibu pejabat dan negeri, perbandingan min-min melalui t-Test telah dijalankan. Selain pada itu bilangan dan keadaan alat-alat yang didapati disemak dan dijalankan odit. Dengan itu, satu Pelan Tindakan Kecemasan untuk JAS disediakan. Mengikut kajian yang dijalankan itu, didapati bahawa kakitangan JAS mempunyai pengetahuan yang baik mengenai peranan dan tanggungjawab JAS. Tetapi, terdapat kekurangan dalam mengetahui menggunakan alat-alat pemantauan, komunikasi dan keselamatan dan juga mengenai

Arahan 20. Adalah disyorkan JAS mengadakan latihan untuk kakitangannya dan menjalankan 'Exercise' untuk menguji sejauhmanakah JAS bersedia untuk menangani kecemasan yang disebabkan oleh bahan kimia.

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LIST OF TABLES

LIST OF ABBREVIATIONS

APELL	AWARENESS AND PREPAREDNESS FOR EMERGENCIES AT THE LOCAL LEVEL
CAER	COMMUNITY AWARENESS AND EMERGENCY RESPONSE
CIMAH	OCCUPATIONAL SAFETY AND HEALTH (CONTROL OF INDUSTRIAL MAJOR ACCIDENT HAZARDS) 1996
CSDS	CHEMICAL SAFETY DATA SHEET
DOE	DEPARTMENT OF ENVIRONMENT
DOSH	DEPARTMENT OF OCCUPATIONAL SAFETY AND HEALTH
EQA	ENVIRONMENTAL QUALITY ACT 1974
ERP	EMERGENCY RESPONSE PLAN
OSHA	OCCUPATIONAL SAFETY AND HEALTH ACT 1994
OSH-CPL	OCCUPATIONAL SAFETY AND HEALTH (CLASSIFICATION, PACKAGING AND LABELLING) REGULATIONS 1997
PPE	PERSONAL PROTECTIVE EQUIPMENT
PIC	PRIOR INFORMED CONSENT
POPs	PERSISTENT ORGANIC POLLUTANTS
UNEP	UNITED NATIONS ENVIRONMENT PROGRAMME

CHAPTER ONE

INTRODUCTION

1.1 Background

Chemicals have played a major role in the development of human societies in the field of agriculture, industry, transport, housing and health. Manufacturing has become far more complex with an ever increasing number of new chemicals entering the market each year. According to United Nations Environment Programme (UNEP), over 11 million chemical substances are known and some 60,000 to 70,000 are in regular use (UNEP, 1999). Currently, new chemicals are entering the market at the rate of about 600 each month (or over 7000 per year) (Lillibridge, 1997).

The life cycle of a chemical can be divided into a number of phases, namely production, storage, transport, use and disposal. More than 4 billion tons of hazardous chemicals are moved each year around the world by motorway, rail and pipeline system. In each phase of the life cycle of a chemical there is a chance for a chemical incident to occur.

The probability of mishaps will vary amongst the different phases with different chemicals, but it is important to accept the fact that no chemical in any phase is completely immune from the possibility of being involved in a chemical incident. The life cycle of chemicals has an important bearing on coping with chemical incident and such incident can best be avoided at all stages of the life cycle.

The production phase can include a wide range of physical and chemical processes, all of which provide a potential site for a chemical incident to occur, with the risks being greater for an accident to occur with the higher number of steps in the process. Generally, the problems arising with the production part of operation are as follows with examples of the incidents: manufacturing (e.g. Bhopal in India, 1984), releases and spills (e.g. Colloid Industries Sdn. Bhd., 2000, Serveso in Italy, 1976), fires (e.g. Port Klang Shell Depot, 1992, Shell Distillate Plant in Bintulu, 1997) and explosions (e.g. Bright Sparklers,1991, Flixborough in Great Britain, 1974).

1.2 Statement of Problem

Emergencies can happen at any time and due to many causes, but the potential harm is eventually to people, property and the environment. Incidents due to fire, leakages, explosions or even spills of hazardous chemicals or toxic wastes have the potential to escalate into disasters. Hence it is essential for a responding agency to act promptly with cooperation and coordination among agencies to contain such events from turning into a harmful incident. In emergency planning, the roles and responsibilities of the responding agencies have to be clearly defined and stated. Emergency response usually calls for the co-operative efforts of a broad range of agencies (Granot, 1997). Therefore, in this regard, while the Department of Environment had to respond to such emergencies, guidance on its role, responsibility and scope of work in line with National Security Council's Directive 20 requirements were not clearly established. Under such circumstances experience has shown that preparedness with clear guidance in the context of DOE's role and responsibility is a crucial factor for the successful prevention and control of pollution in relation to the management of chemical incidents .

1.3 Objectives

The objectives of this study are:

(i) to evaluate the state of preparedness of the Department of Environment (DOE) in responding to prevent and to control pollution during chemical emergencies as one of the supporting agencies outlined under the National Security Council's Directive 20;

(ii) to evaluate the knowledge, awareness and understanding of the DOE personnel both at the headquarters as well as state levels as regards to the ability to handle monitoring, communication and safety equipment when responding to an emergency involving toxic chemicals or hazardous wastes; and

(iii) to formulate an Emergency Response Plan (ERP) for DOE at headquarters as well as state levels to manage any incident that involves toxic chemicals or hazardous wastes.

1.4 Significance of Study

The results obtained from this study would:

(i) identify the weaknesses or key areas of needs of DOE in the management of pollution caused by chemical incidents or disasters;

(ii) provide information on the level of preparedness of DOE at headquarters level as well as state levels to respond to chemical emergencies;

(iii) provide information on the DOE personnel's ability to handle monitoring, communication and safety equipment in the event of a disaster; and

(iv) identify what action to be taken in order to increase/improve DOE's level of preparedness and thereby formulating a plan to respond to chemical emergencies.

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