

## LABORATORY SAFETY GUIDELINE

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### Abstract

Laboratory workplace must be safe and conducive for all workers to work. Workers in chemical laboratories or are designated as Chemical Technologist and Technicians are exposed to lots of hazards. In some the hazards are well recognized. Where hazards are recognized, precautionary measures can be taken. Thus, all workers need to be aware of the issues that have an effect on their health and safety at the workplace. Accidents at the workplace happen due to various reasons i.e. from laboratory facilities to nature of work.

Consequently in order to ensure a safety, healthy and a favorable working environment, proper safety procedures at the workplace must devise and adhere to. At this juncture, both the employer and employees ought to be well-informed of some of the laws which have bearing on laboratory safety such as the “Occupational Safety and Health (Use and Standards of Exposure of Chemicals Hazardous to Health) Regulations 2000, Occupational Safety and Health (Classification, Packaging and Labeling of Hazardous Chemicals) Regulation 1997 and Environmental Quality Act, 1974 vis-à-vis the Environmental Quality (Scheduled Wastes) (Amendment) Regulations 2007”.

This paper aim to inform the employers and the laboratory worker on the relevant laws and the safety practices which is common to all laboratory operators. It is hope that this guideline should help to avoid accidents at the workplace.

**Keywords:** *safety and health, laws, general safety requirements*

## **1.0 Introduction**

All workers irrespective whether they are part time staff, contractual staff or permanent staff needs to be aware of the issues that have an effect on their health and safety at the workplace. On the same note, all workers have a right to work in the workplace where risk to their health and safety are properly controlled. The obligation to ensure these situations exist lies with the employer. However both the workers and the employers have a legal responsibility to look after health and safety at the workplace.

Workplace safety and health laws establish regulations designed primarily to eliminate personal injuries and at the same time preventing it to reoccur at the workplace. The main statute protecting health and safety of workers at the workplace in Malaysia is the Occupational Safety and Health Act 1994 (Act 514). The Act was promulgated based on the philosophy of self-regulations with the primary responsibility of ensuring safety and health at the workplace lying with those who create the risk and work with the risk.

Apart from the OSHA 1994, there is the Environmental Quality Act 1974 with its subsidiary legislation “ENVIRONMENTAL QUALITY (SCHEDULED WASTES) (AMENDMENT) REGULATIONS 2007” which deals with chemical waste disposal and waste classification. Both the employer and employees ought to focus towards all these mention laws so as to ensure the safety, health and welfare of all persons at the workplace.

## **2.0 Aim**

The objective of this paper is to:

- a. Highlight the relevant laws to ensure the safety, health and welfare of all persons at the workplace.
- b. Present and to emphasize General Safety Requirements for working in the laboratory.

## **3.0 Overview of the Paper**

The paper will discuss the topic of laboratory safety guideline by looking into the macro and micro aspect. On the macro aspect the paper will discuss on the laws at the workplace especially the Occupational Safety and Health Act 1994 and The Environmental Quality (Scheduled Waste) Regulations 2007. On the micro aspect the paper will discuss on procedures and general safety requirement for working in the laboratory.

Does working in a laboratory environment not dangerous or save? What are the hazards that are found in the laboratory? What are the relevant laws and general

safety requirement must both the employer and employee ought to be acquainted with? All these queries will be answered consequently.

#### **4.0 Profiles of the Laboratory Employees**

Laboratory Employees or are designated as Chemical Technologist and Technicians can be found in many sectors of the industries which is specified in Schedule 1 of the Occupational Safety and Health Act 1994. Some examples or designation use in industries for Laboratory Employees are chemical laboratory analyst, chemical analyst, chemical research technician, chemical technologist, chemical technician, chemical engineering technologist, chemical engineering technician, laboratory technician, chemical, laboratory technologist, chemical, geochemical technician, quality control technician, chemical processing, biochemistry technologist, quality control technician, food processing, laboratory technician, biochemistry, analytical technician, chemical, food technologist etcetera.

#### **4.1 Profile of Chemical Technologists**

Generally the nature of the work of a Chemical Technologist and Technicians is that they may work independently or provide technical support in chemical engineering, chemical and biochemical research and analysis, industrial chemistry, chemical quality control and environmental monitoring etcetera. They can be employed in various employment field or areas. They are employed by research and development laboratories, by quality control laboratories, by consulting engineering companies, by chemical, petrochemical, pharmaceutical and a variety of other manufacturing and processing industries, and by utilities, health, education and government establishments.

Depending on the work they embark on, generally the main duties of Chemical Technologist and Technicians is that they set up and carry out chemical experiments, tests and analyses using a variety of techniques such as chromatography, spectroscopy, physical and chemical separation techniques, and microscopy. In addition they operate and maintain laboratory equipment and apparatus which include the preparation of solutions, reagents and sample formulations. They too compile records, interpret experimental or analytical results, and develop and conduct programs of sampling and analysis to maintain quality standards of raw materials, chemical intermediates and products.

They also assist in the development of chemical engineering processes, in studies of chemical engineering procurement, construction, inspection and maintenance, and in the development of standards, procedures and health and safety measures. Further, they operate experimental chemical or petrochemical pilot plants and assist in the design and fabrication of experimental apparatus.

## **4.2 Profile of Chemical Technicians**

Chemical Technicians assist in the setting up of and conducting of chemical experiments, tests and analyses. They too operate and maintain laboratory equipment and apparatus, prepare solutions, reagents and sample formulations. They also compile records for analytical studies where it is applicable. They also assist in developing and conducting programs of sampling and analysis to maintain quality standards. Where it is applicable, they perform a limited range of other technical functions in support of chemical research, tests and analyses.

## **4.3 Working environment of Chemical Technologists and Technicians**

Both the Chemical Technologists and Technicians work under a wide variety of conditions indoors, often in laboratories, with scientific equipment, and have regular and some time work irregular hours to observe experiments that could not be finished for the duration of normal working hours. Due to the nature of work these Chemical Technologists and Technicians are exposed to hazardous conditions and toxic chemicals. Nonetheless, all the associated risk at the workplace can be control if proper safety procedures are adhere. At this juncture, in order to ensure a safety, healthy and conducive working conditions both the employer and employees ought to be well-informed of some of the laws mention beneath:

- 4.3.1 Occupational Safety and Health (Use and Standards of Exposure of Chemicals Hazardous to Health) Regulations 2000
- 4.3.2 Occupational Safety and Health (Classification, Packaging and Labeling of Hazardous Chemicals) Regulation 1997.
- 4.3.3 Environmental Quality Act, 1974 vis-à-vis the Environmental Quality (Scheduled Wastes) (Amendment) Regulations 2007.

## **5.0 Statistic of Accident at Workplace**

Statistic from SOCSO indicates that there are 578,390 registered employers with 11,155,232 registered workers or employees. However the numbers of active registered workers in are 4,882,953<sup>1</sup>.

Statistics at Table 1 from SOCSO from 2001 to 2005 indicate that there are 371,851<sup>2</sup> reported industrial accidents at the workplace. However in 2005 there are 61,182 reported accidents at the workplace. Over that period a high rate of industrial accident was said to occur in Manufacturing Sector. From this figure 587 are fatal and 17 death. The cause of an industrial accident is easy to identify which are often caused by negligence on the part of the employer or the employee. The employer may not have provided adequate worker training, or a supplier who gave the wrong information about a product, etc. while the employee does not abide to the requirement of wearing protected personal

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<sup>1</sup> PERKESO

<sup>2</sup> Statistics PERKESO 2001 – 2005

equipment provided. The high fatal accident rates emphasize the need for occupational health and safety education programmes that focus on prevention.

**Statistics of Accident at the Workplace 2001 – 2005**

INDUSTRY/YEAR	Cases Reported					
	2001	2002	2003	2004	2005	Total
1. Agriculture, Forestry and Fishing	12,424	9,456	6,947	5,644	3,734	38,250
2. Mining and Quarrying	573	545	536	533	459	2,646
3. Manufacturing.	35,642	33,523	29,780	26,690	23,350	148,985
4. Utilities – Electricity; Gas; Water; and Sanitary Services	442	516	510	496	465	2,429
5. Construction	4,593	5,015	4,654	4,445	3,948	22,655
6. Wholesale and Retail Trade	13,774	13,685	13,395	12,948	11,930	65,732
7. Transport, Storage and Communications	4,382	4,439	4,104	4,151	3,643	20,719
8. Finance, Insurance, Real Estate and Business Services	602	567	572	605	581	2,927
9. Hotels and Restaurants	5,950	5,924	5,617	5,295	4,570	27,356
10. Public Services and Statutory Authorities	7,487	8,140	7,743	8,325	8,502	40,197
Total	85,869	81,810	73,858	69,132	61,182	371,851

Table 1: Statistics of Accident at the Workplace 2001 – 2005  
Source: PERKESO

**5.1 Number of Accidents Cause by Materials, Substances and Radiations**

Number of accidents by cause for year 2005 is as shown Appendix 1. The workplace which is classified into accidents which are caused by:

- 5.2.1 Machines
- 5.2.2 Means of transport and lifting equipment
- 5.2.3 Other equipment
- 5.2.4 Materials, substances and radiations
- 5.2.5 Working environment
- 5.2.6 Other agencies not elsewhere classified

On the same note, the number of fatal accidents which the “accident agent” is “Materials, Substances and Radiations” is 4,727 reported cases as shown in Table 2. The figures indicate accidents at the workplace cause by Laboratory Employees are 7.73% “The occupational accident rate is considered small as compared to the total number of the occupational accident for the whole country.

## NUMBER OF ACCIDENTS CAUSE BY MATERIALS, SUBSTANCES AND RADIATIONS – 2005

<b>Laboratory Employees</b>			
<b>PARTICULARS</b>	<b>NO. OF CASES REPORTED</b>	<b>PERM. DIS CASES</b>	<b>DEATH CASES</b>
1. Explosives	13	4	2
2. Dusts, gases, liquids and chemicals excluding explosives			
a. Dusts	132	12	0
b. Gases, vapors, fumes	15	2	0
c. Liquids not elsewhere classified	92	4	1
d. Chemicals not elsewhere classified	124	22	1
e. Others	171	19	0
3. Flying fragments	478	36	7
4. Radiations			
a. Ionizing radiations	10	0	0
b. Others	5	1	0
5. Other materials and substances not elsewhere classified	3,687	487	6
Total	4,727	587	17

Table 2: Number of Accidents Cause by Materials, Substances and Radiations – 2005

The statistics indicate that the number of accidents due to Materials, Substances and Radiations are small. Although this is the prevailing situations, however with intensified actions on the part of the employers and employees, accidents cause by the aforesaid agents may further be reduce.

### **6.0 Laws at the Workplace**

There are several different laws which deal with worker at the workplace such as the Employment Act, Industrial Relation Act, SOSCO Act, Factories and Machinery Act etcetera. However, the Occupational Safety and Health Act (OSHA) 1994 endower to promote stimulate and encourage high standards of safety and health at work. While Environmental **Quality Act, 1974** vis-à-vis the Environmental Quality (Scheduled Wastes) (Amendment) Regulations 2007 deals with disposal of waste.

The OSH Act 1994 define “persons at work” to include all sectors of the industry listed in Schedule 1 of the OSHA 1994. On the other hand there is the specific regulation specific for controlling chemicals at the workplace that is “Use Standard of Exposure of Chemical Hazardous to Health (USECHH) Regulations 2000” and “The Classification, Packaging and Labeling (CPL) Regulations 1997”.

## **6.1 Use and Standard of Exposure of Chemical Hazardous to Health (USECHH) Regulations 2000**

The USECHH Regulations came into effect beginning April 4, 2000. They apply to all places of work where chemicals or preparations hazardous to health are produced, processed, handled, stored, transported, disposed and treated. The USECHH regulation includes the provision of chemical health risk assessor (CHRA), occupational health doctor (OHD) and industrial hygiene technician to perform their respective roles in assessing the health risk from chemical exposure. For further reading refer to **Appendix 2**.

## **6.2 The Classification, Packaging and Labeling (CPL) Regulations 1997.**

The CPL regulation required proper packaging and labeling of chemicals by the supplier including the label giving risk phrases. A further detail on CPL Regulation 2000 is at **Appendix 3**.

**6.3 Environmental Quality Act, 1974** vis-à-vis the Environmental Quality (Scheduled Wastes) (Amendment) Regulations 2007. The regulation require waste generator to notify the generation of scheduled waste, disposed scheduled waste. Before disposal waste generator should store scheduled waste in proper container. For further reading refer to **Appendix 3**.

## **7.0 General Safety Guideline**

“The Government has introduced guidelines for occupational safety and health in dental laboratories, outlining critical steps that need to be observed. The guidelines listed the basic facilities and equipment needed to ensure safety in dental laboratories. Dental technicians, like other healthcare professionals, were exposed to health risks and hazards at their workplace. There were about 1,048 dental technicians serving 2,392 dental practitioners in the public and private sectors. Was one dental technician for every 23,258 Malaysians, which compared less favorably with developed countries.”

(Chua Jui Meng, The Star, 8 September 2003)

In discussing on the subject matter of general safety requirement in laboratory, the practice of University Malaysia Perlis in managing its laboratories will be used as a guide. The University Malaysia Perlis, a 17<sup>th</sup> public university is located in Perlis. There are 14 programmes leading Bachelor Engineering, 6 programmes leading to Diploma and 11 postgraduate programmes leading to MSc and PhD. Laboratory intensive activities are conducted in well equipped laboratories and at School of Environmental Engineering is concerned with the application

## **7.1 Laboratory Safety Guideline**

People who work in laboratories are exposed to many kinds of hazards when involving chemicals especially. However, it should be noted that all chemical substances are hazardous in some way or another and thus must be regarded as potentially dangerous materials. This call for a procedure to be work out to ensure safety at the workplace.

## **7.2 Guideline working in the laboratory alone**

“Working alone is defined as, “those work situations where an employee is not directly supervised and, in the event of critical injury, health impairment, victimization, or other foreseeable life-threatening emergency, assistance is not readily available”. This includes work during regular business hours when the worker is in a secluded area<sup>3</sup>.”

At University Malaysia Perlis, the laboratory supervisor is responsible to assure that all laboratory workers are trained in the specific guidelines to minimize the chance of injury, loss of research materials or property damage from this circumstance. The laboratory supervisor is also responsible for determining whether the work requires special precautions, such as having two people in the same room for particular operations.

Those individuals who choose to work alone after hours must take responsibility for ensuring someone knows that they are working alone in a known location and that they know what to do in an emergency situation.

## **7.3 Before You Commence Working in the Laboratory**

Every laboratory worker should observe the following rules:

1. Identify the probable hazards and suitable safety precautions prior to commencement of work. Raise and be able to response to the following queries:
  - o What are the hazards?
  - o What are the most terrible effects that may perhaps occur?
  - o What have I to do to be geared up?
  - o What procedure, facilities or personal protective equipment are needed to reduce the risk?

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<sup>3</sup> (www.physics.uoguelph.ca/~wjt/safety/wap.pdf )

2. Be familiar with the place and how to make use of emergency equipment, including safety showers and eyewash stations.
3. Be familiar with the emergency response procedures, facility alarms and building evacuation routes.
4. Identify the types of personal protective equipment available and how to use them.
5. Report of unsafe conditions and convey them to the attention of your supervisor or lab manager immediately so that improvement can be made.
6. Prevent release of toxic fumes by following waste disposal procedures.
7. Position and clamp reaction apparatus so as to allow handling with no need to move the apparatus until the total reaction is finished

## **7.4 General Work Practices**

The safety procedure will be focus on:-

- General Rules of Safety
- Personal Hygiene
- Housekeeping
- Handling Glassware

### **7.4.1 General Rules of Safety**

1. No employee is permitted to carry out nonstandard activities such as running, jumping, or horseplay in laboratory areas.
2. No employee is to work alone in a laboratory or a chemical storage area undertaking task that is considered hazardous by the laboratory supervisor or safety officer.
3. All Spills of liquid although in quantity must be cleaned instantly to avoid contact with skin or clothing.
4. Lifting of weighty things must be carrying out in the correct manner.
6. Every one must ensure the laboratory is clean after work is completed.

### **7.4.2 Personal Hygiene**

1. Do not drink, eat, smoke, or apply cosmetics in the laboratory or chemical storage areas.
2. Never use ice from laboratory ice machines for beverages Wash quickly with a lot of water each time a chemical have makes contact with the skin.
3. Proper foot protection shoes to be worn by laboratory personnel.

4. Proper clothing which offers protection from splashes and spills, easily removable in case of accident and fire resistant should be worn in the laboratory.
5. Laboratory clothing should always be kept clean and to be replaced as and when required.
6. Lab coats, respirators, or other protective gear are not to be worn outside the laboratory and must be left in the lab areas when not in use.
7. "Sniff-testing" of chemicals should not be done.
8. Always use a bulb to pipette chemicals.

### **7.4.3 Housekeeping**

The subsequent listing of good housekeeping practices which are common sense activities should be practice in the laboratory to avoid accident:

1. The area must be kept as clean as the work allows.
2. Each laboratory employee must be responsible for maintaining the cleanliness of his/her area.
3. Reagents and equipment items must be return to their appropriate place after use.
4. Chemicals in particular liquids must not at all be store up on the floor. The materials must be stored in cabinet and large bottle should not be place above the bench top.
5. Reagents, solutions, glassware, or other apparatus should not be store up in hoods.
6. Counter tops should be kept neat and clean. Bench tops and fume hoods shall not be used for chemical storage.
7. Stored items, equipment, and glass tubing must not protrude past the front of shelf or counter limits.
8. Stored items or equipment must not obstruct access to the fire extinguisher(s), safety equipment, or other emergency items.
9. Stairways, hallways, passageways and access to emergency equipment and/or exits must not be obstructed with any equipment etc.
10. All working surfaces and floors should be cleaned regularly.
11. All containers must be labeled with as a minimum the identity of the contents and the hazards those chemicals present to users.

### **7.4.4 Handling Glassware**

1. Only glass in good condition should be used so as to avoid injury in laboratories.
2. Hand protection should be used when picking up broken glass.

3. When using glass tubing, all ends should be fire polished. Lubricate tubing with glycerin or water before inserting into rubber stoppers or rubber tubing.
4. Use leather gloves to protect hand when inserting glass tubing.
5. Do not store glassware near the edge of shelves.
6. Do not attempt to catch glassware if it is dropped or knocked over.

## **7.5 Chemical Storage**

For achieving employee safety, the proper chemical storage guidelines are as follows:

1. Every chemical in the laboratory must have a definite storage place and should be returned to that location after each use.
2. Storage must also take into consideration of chemical compatibility and must be stored separately.
3. Adequate containment for spills and accidental releases must be provided.
4. Hazardous chemicals should never be stored on the floor.
5. Utilize a suitable container for experiments, stored chemicals and collected wastes.
6. Containers storing chemical waste must be inspected regularly for any sign of chemical leakage.
7. Caps and covers for containers must be firmly in place whenever the container is not in immediate use.
8. Labeling must appear on cabinets and room doors at approximately waist level or lower to allow adequate visualizations.
10. All containers used for storage must be labeled.
11. Flammable liquids must not be stored in laboratory.
13. Storage locations must be identified on an emergency floor plan posted in each work area and should be equipped with a fire extinguisher, spill kit, eye wash, first aid kit, and telephone or other communication system to allow for adequate emergency notification.
14. Small quantities of chemicals can be held at individual work stations if this quantity is to be promptly used in a test and does not compromise acceptable ambient organic vapor levels or procedures for spill control and fire safety. These containers must be properly labeled.
15. Out-of-date chemicals must be disposed of on a periodic basis.

## **7.6 Chemical Disposal**

There are a number of requirements to be full filled in the disposal of chemical substances, whether contaminated or excess stocks or experimental residues. It is the duty of every individual to ensure that their chemicals are disposed in

accordance with the Environmental Quality Act 1974 with its subsidiary legislation “Environmental Quality (Scheduled Wastes) Regulations 2007”

According to First Scheduled Environmental Quality (Schedule Waste) Regulation 2007) (**Appendix 4**), 77 categories of toxic and hazardous wastes have been classified as ‘scheduled wastes’. Examples of scheduled wastes are spent acid and alkaline, lubricating oil, printing ink, batteries, solvents, benzene, cyanide waste, pesticides, chromate waste, etc. The law requires the treating and disposing off at facilities approved by the authorities. Kualiti Alam Sdn. Bhd. is designated by the government to provide an off-site facility for treatment and disposal of scheduled wastes in Peninsular Malaysia.

At University Malaysia Perlis, Safety and Health Unit is responsible for coordinating with Kualiti Alam Sdn. Bhd. according to the pickup of waste chemical substances from generating departments to Kualiti Alam Sdn. Bhd. The following procedures apply to any chemical substances generated from University operations (including laboratories, administrative units, and physical plant operations) that are classified as hazardous based on the criteria described below.

#### **7.6.1 Packaging of Chemical Waste Containers**

1. Place hazardous waste in sealable containers.
2. The container should not react with the waste being stored (e.g. no hydrofluoric acid in glass). Similar wastes may be mixed if they are compatible (e.g. non-halogenated solvents).
3. Whenever possible, *wastes from incompatible hazard classes should not be mixed* (e.g. organic solvents with oxidizers). Certain metals also cause disposal problems when mixed with flammable liquids or other organic liquids (see Fourth Schedule Environmental Quality (Schedule Waste) Regulation 2007)
4. Containers must be kept closed except during actual transfers. Do not leave a hazardous waste container with a funnel in it

#### **7.6.2 Labeling of Chemical Waste Containers**

1. Containers containing hazardous waste must be labeled with the words **HAZARDOUS WASTE** along with the names of the principal chemical constituents.
2. Do not use chemical formulas, chemical symbols, chemical equations or abbreviations.
3. Indicate the physical and/or health hazards of the substance, if known.
4. Remove or obliterate any other labels or wordings not related to the current substance.

- Do not allow the creation of "UNKNOWNs" through lack of secure readable labeling.

### 7.6.3 Storage

Waste chemicals must be stored in the same manner and using the same procedures as other chemicals. It may be advantageous to further segregate chemical waste. A typical segregation of waste chemicals should be:

Typical Segregation Of Waste Chemicals
<ul style="list-style-type: none"> <li>acids</li> <li>caustics</li> <li>chlorinated solvents</li> <li>non-chlorinated solvents</li> <li>mercury wastes</li> <li>oxidizing agents</li> <li>PCB wastes</li> <li>reactive chemicals</li> <li>waste oil</li> <li>wastes with heavy metal contamination</li> </ul>

Table 3: Typical Segregation Of Waste Chemicals

These chemicals must be accumulated in separate containers and need to be isolated from one another to some degree, at least to the extent that spills or leaks would remain isolated from other containers. This is particularly true of acids, bases, and solvents.

### 7.6.4 Disposal Procedure

- At Universiti Malaysia Perlis, all department has to complete the Waste Disposal Request Form and send to the Safety and Health Unit for pick-up arrangement of the chemical waste by Kualiti Alam Sdn. Bhd. (See Appendix 5)

**PACKAGING AND LABELLING GUIDE**

ILLUSTRATION OF PACKAGING, MARKING & LABELLING OF DRUM

WARNING LABEL: 10cm x 10cm diamond shape. Paste label as in the Third Schedule of Environment Quality (Scheduled Wastes) Regulations 2002.

Side View of 4 drums on Pallet: 0.9m x 1.2m. Clamps used to secure drums.

Top View of 4 drums on pallet: 1.2m x 1.2m. Plastic/steel tape or band to secure the drums.

NOTE:  
X : KA WASTE GROUP  
N 151 : SCHEDULED WASTE CODE  
123456 : CONSIGNMENT NOTE NUMBER

**WARNING LABELS**

Warning labels	EQSWR 3rd Schedule	ADR equivalent	Warning labels	EQSWR 3rd Schedule	ADR equivalent
	<b>LABEL 1 EXPLOSIVE SUBSTANCES (WASTE)</b> Symbol (flaming bomb) black; Background: light orange	COVERING ADR CLASS 1 EXPLOSIVE		<b>LABEL 6 EXPLOSIVE SUBSTANCES (WASTE)</b> Flame over symbol black; Background: white	COVERING ADR CLASS 5.1 EXPLOSIVE COMPOUNDS
	<b>LABEL 2 INFLAMMABLE LIQUID (WASTE)</b> Symbol (flame) black or white; Background: red	COVERING ADR CLASS 3 FLAMMABLE LIQUID		<b>LABEL 7 ORGANIC PEROXIDES (WASTE)</b> Symbol (flame over circle) black; Background: white	COVERING ADR CLASS 5.2 ORGANIC PEROXIDES
	<b>LABEL 3 INFLAMMABLE SOLID (WASTE)</b> Symbol (flame) black; Background: white with vertical red stripes	COVERING ADR CLASS 4.1 FLAMMABLE SOLID		<b>LABEL 8 TOXIC SUBSTANCES (Acute/Chronic Toxic)</b> Symbol (skull and crossbones) black; Background: white	COVERING ADR CLASS 6.1 TOXIC COMPOUNDS
	<b>LABEL 4 SOLID ORGANICALLY SOLUBLE (WASTE)</b> Substances liable to spontaneous combustion; Symbol (flame) black; Background: white with red border	COVERING ADR CLASS 4.2 SELF-HEATING COMPOUNDS		<b>LABEL 9 INFECTIOUS SUBSTANCES</b> Symbol (three exclamation marks) black; Background: white	COVERING ADR CLASS 6.2 INFECTIOUS & DISSEMINATING ACTING COMPOUNDS
	<b>LABEL 5 OXIDIZING (WASTE)</b> Substances which, in contact with water, emit highly flammable gases; Symbol (flame) black or white; Background: blue	COVERING ADR CLASS 4.2		<b>LABEL 10 CORROSIVE LIQUIDS</b> Symbol (square with liquid dripping from two sides) black; Background: white	COVERING ADR CLASS 8 CORROSIVE COMPOUNDS
	<b>LABEL 5 OXIDIZING (WASTE)</b> Substances which, in contact with water, emit highly flammable gases; Symbol (flame) black or white; Background: blue	COVERING ADR CLASS 4.2		<b>LABEL 11 MISCELLANEOUS DANGEROUS (WASTE)</b> Symbol (X) black; Background: white with black border	COVERING ADR CLASS 9 MISCELLANEOUS DANGEROUS COMPOUNDS

2. The chemical wastes must have the proper packaging and labeling according to the guideline standard as mention aforesaid provided by Kualiti Alam Sdn. Bhd.
3. Safety and Health Unit (SHU) will inform the detail of date and time of pick-up after received the confirmation from Kualiti Alam Sdn. Bhd. to the relevant school or laboratory.

## 7.7 Personal Protective Equipment (PPE)

PPE should be worn by laboratory worker. As a guide the PPE for protection required for protection required against hazardous materials can be addressed based on the risk and parts of the body to be protected or where contact can take place viz the head protection, face or eye protection, respiratory system protection, body protection, hand protection and leg/feet protection. The risk and the suggested PPE associated with hazardous materials to be worn are summarized at Table 1<sup>4</sup>.

Area of Exposure	Risks	Examples of Protection
Head	Splashes, chemical burns, skin absorption	Helmet, bump cap, face shield
Face/Eyes	Chemical burns, splashes, irritation, skin or eye absorption	Face shield, goggles, and safety spectacles.
Respiratory System	Breathing in atmospheric contaminant. Respiratory irritation. asphyxiation	Air purifying respirator. Supplied Air Respirator
Body	Chemical burns, dermatitis, Skin absorption	Hazardous chemical suit, apron, long sleeve shirt
Hands	Chemical burns, dermatitis, skin absorption	Chemical resistance gloves
Legs and Feet	Chemical burns, skin absorption	Safety footwear, leggings

**Table 1. Risks Associated With Hazardous Materials**

## 7.8 Laboratories Environment

In conclusion laboratories should be design to provide a favorable working environment for the laboratory employees. The basic laboratory must take into considerations the following:

1. Good lighting with emergency lighting as well.
2. Ensuring floor plan (floors, stairways, aisles) that is efficient, convenient and safe.

<sup>4</sup> Guideline on the Use of Personal Protective Equipment Against Chemical Hazard, Department of Occupational Safety and Health, Ministry of Human Resources, 2005 Page 14

3. Egress
4. Ventilation, Indoor Air Quality, Heating and Cooling
5. Chemical Storage
6. Safety showers and Eyewash fountains
7. Sinks
8. Sanitation facilities, lunch and break areas
9. Telephone
10. Fire Protection

## 8.0 Recommendations for Improvements

Based on the discussion aforesaid, to enhance the safe and healthy workplace the following measures are suggested:

- a. Intensification of drive to enhance awareness and education programs on safety and health at workplace by the employer towards employees.
- b. Intensification of drive to propagate and instill awareness on laws at workplace, chemical hazards through Special training courses for employees at workplace.
- c. Establishment of a close cooperation with universities and other related agencies in not only chemical safety but in other areas. . The following officers of the office of the Occupational Safety and Health Unit, University Malaysia Perlis can be contact for further discussion:

Name of Officers	Contact Numbers	Address
Lt Kol (B) Azuddin bin Bahari	012 4335060	Unit Keselamatan dan Kesihatan Pekerjaan (UKKP), Unitversiti Malaysia Perlis, Jalan Bukit Lagi, 01000 Kangar, Perlis
Cik Hanum bt Hassan	04-9798450	
En Norazam bin Abd Rashid	04-9798411	
Puan Faridah bt Wahab	04-9798354	
Puan Rusnani bt Omar	04-9798347	

## 9.0 Conclusions

In virtually every manufacturing industry, workers are exposed to chemical hazards. Chemicals hazards are there in the work process from raw materials to products or by products and waste or in various activities such as transfer, storage, handling and use in the workplace and waste disposal. The likely hazards related with these chemicals are flammable, explosive or toxic properties etcetera.

Hazard related to the handling of chemicals can be eliminated or minimized through a comprehensive chemical safety programmes. Workers have to be

trained and well-informed on various aspects for example on the first-aid and emergency procedures, the use and care of personal protective equipment, effects of exposure to contaminants, the ways to preventing or minimizing exposure to hazards and etc.

In conclusion, I and my colleague from the Occupational Safety and Health Unit, University Malaysia Perlis hopes to have a more closer liaison and cooperation with the industries and to share its knowledge with the industries and other institutions in not only chemical safety but in other areas as well

Reference:

1. Occupational Safety and Health (Use and Standards of Exposure of Chemicals Hazardous to Health) Regulations 2000.
2. Occupational Safety and Health (Classification, Packaging and Labeling of Hazardous Chemicals) Regulations 1997
3. Guideline on the Use of Personal Protective Equipment Against Chemical Hazard, Department of Occupational Safety and Health, Ministry of Human Resources, 2005
4. Environmental Quality (Scheduled Waste) Regulations 2007
5. The Star, 8 September 2003
6. [www.physics.uoguelph.ca/~wjt/safety/wap.pdf](http://www.physics.uoguelph.ca/~wjt/safety/wap.pdf)

## NUMBER OF ACCIDENTS BY CAUSE OF ACCIDENTS – 2005

ACCIDENT AGENT	NO. OF CASES REPORTED	PERMANENT DISABILITY CASES	DEATH CASES
<b>A. MACHINES</b>			
<b>1. Prime-mowers, except electrical motors</b>			
a. Steam engines	7	1	0
b. Internal combustion engines	6	1	1
c. Others	652	113	1
<b>2. Transmission machinery</b>			
a. Transmission shafts	8	0	0
b. Transmission belts, cables, pulleys, pinions, chains, gears	38	13	1
c. Others	137	16	0
<b>3. Metalworking machines</b>			
a. Power presses	121	31	0
b. Lathes	25	7	0
c. Milling machines	28	17	0
d. Abrasive wheels	14	4	0
e. Mechanical shears	85	16	0
f. Forging machines	28	3	1
g. Rolling-mills	148	33	0
h. Others	2773	488	2
<b>4. Wood and assimilated machines</b>			
a. Circular saws	107	30	1
b. Other saws	97	23	0
c. Molding machines	159	36	0
d. Overhand planes	10	0	0
e. Others	1201	136	2
<b>5. Agricultural machines</b>			
a. Reapers (including combine reapers)	75	2	0
b. Threshers	2	1	0
c. Others	403	32	1
<b>6. Mining machinery</b>			
a. Under-cutters	94	7	0
b. Others	265	49	2
<b>7. Other machines not elsewhere classified</b>			
a. Earth-moving machines, excavating and scraping machines, except means of transport	20	4	1
b. Spinning, weaving and other textile machines	148	6	0

c. Machines for the manufacture of foodstuffs and beverages	92	23	0
d. Machines for the manufacture of paper	61	9	1
e. Printing machines	25	5	0
f. Others	1519	336	4
<b>B. MEANS OF TRANSPORT AND LIFTING EQUIPMENT</b>			
<b>1. Lifting machines and appliances</b>			
a. Cranes	43	11	0
b. Lifts and elevators	6	1	2
c. Winches	4	1	0
d. Pulley blocks	15	3	0
e. Others	155	47	0
<b>2. Means of rail transport</b>			
a. Inter-urban railways	4	0	0
b. Rail transport in mines, tunnels, quarries, industrial establishments, docks, etc.	1	0	0
c. Others	126	19	1
<b>3. Other wheeled means of transport, excluding rail transport</b>			
a. Tractors	11	21	6
b. Lorries	1256	199	31
c. Trucks	27	3	1
d. Motor vehicles, not elsewhere classified	14132	3125	456
e. Animal-drawn vehicles	46	4	1
f. Hand-drawn vehicles	30	7	0
g. Others	2006	362	34
<b>4. Means of air transport</b>			
<b>5. Means of water transport</b>			
a. Motorized means of water transport	400	106	14
b. Non-motorized means of water transport	5	1	0
<b>6. Other means of transport</b>			
a. Cable-cars	0	1	0
b. Mechanical conveyors, except cable-cars	38	6	0
c. Others	66	15	1
<b>C. OTHER EQUIPMENT</b>			
<b>1. Pressure vessels</b>			
a. Boilers	32	2	0
b. Pressurized container	7	2	0
c. Pressurized piping and accessories	27	1	0
d. Gas cylinders	17	1	0

e. Caissons, diving equipment	1	0	0
f. Others	177	26	0
<b>2. Furnaces, ovens, kilns</b>			
a. Blast furnaces	4	1	0
b. Refining furnaces	0	0	0
c. Other furnaces	13	3	0
d. Kilns	7	1	0
e. Ovens	6	1	0
<b>3. Refrigerating plants</b>	164	5	3
<b>4. Refrigerating installations, including electric motors, but excluding electric hand tool</b>			
a. Rotating machines	16	2	0
b. Conductors	1	0	0
c. Transformers	1	0	0
d. Control apparatus	1	0	0
e. Others	18	1	0
<b>5. Electric hand tools</b>	39	11	4
<b>6. Tools, implements and appliances, except electric hand tools</b>			
a. Power-driven hand tools, except electric hand tools	54	11	0
b. Hand tools, not power-driven	447	35	0
c. Others	1643	185	2
<b>7. Ladders, mobile ramps</b>	270	50	1
<b>8. Scaffolding</b>	10	10	0
<b>9. Other equipment, not elsewhere classified</b>	1551	150	21
<b>D. MATERIALS, SUBSTANCES AND RADIATIONS</b>			
<b>1. Explosives</b>	13	4	2
<b>2. Dusts, gases, liquids and chemicals, excluding explosives</b>			
a. Dusts	132	12	0
b. Gases, vapors, fumes	15	2	0
c. Liquids not elsewhere classified	92	4	1
d. Chemicals not elsewhere classified	124	22	1
e. Others	171	19	0
<b>3. Flying fragments</b>	478	36	7
<b>4. Radiations</b>			
a. Ionizing radiations	10	0	0
b. Others	5	1	0
<b>5. Other materials and substances not elsewhere classified</b>	3687	487	6
<b>E. WORKING ENVIRONMENT</b>			
<b>1. Outdoor</b>			
a. Weather	11	0	1
b. Traffic and working surfaces	2816	406	31

c. Water	41	1	0
d. Others	2288	345	11
<b>2. Indoor</b>			
a. Floors	1037	122	1
b. Confined quarters	24	12	0
c. Stairs	546	67	1
d. Other traffic and working surfaces	4339	289	4
e. Floor openings and wall openings	107	19	1
f. Environmental factors (lighting, ventilation, temperature, noise, etc.)	105	21	0
g. Others	9387	1340	26
<b>3. Underground</b>			
a. Roofs and faces of mine roads and tunnels, etc.	12	2	0
b. Floors of mine roads and tunnels, etc.	12	2	0
c. Working faces of mines, tunnels, etc.	144	43	1
d. Mine shafts	2	0	0
e. Fire	20	2	0
f. Water	13	0	0
g. Others	35	4	0
<b>F. OTHER AGENCIES, NOT ELSEWHERE CLASSIFIED</b>			
<b>1. Animals</b>			
a. Live animals	217	17	1
b. Animal products	6	0	0
<b>2. Other agencies, not elsewhere classified</b>	1711	213	12
<b>G. AGENCIES NOT CLASSIFIED FOR LACK OF SUFFICIENT DATA</b>	2357	141	4
<b>TOTAL</b>	<b>61185</b>	<b>9507</b>	<b>710</b>

**OCCUPATIONAL SAFETY AND HEALTH  
ACT 1994**  
THE OCCUPATIONAL SAFETY AND HEALTH (USE AND STANDARDS OF EXPOSURE OF  
CHEMICALS HAZARDOUS TO HEALTH) REGULATIONS 2000

**INTRODUCTION**

The Occupational Safety and Health (Use and Standards of Exposure of Chemicals Hazardous to Health) Regulations 2000 is the sixth set of regulations made under the Occupational Safety and Health Act 1994 (ACT 514).

The purpose of the Regulations is to provide a legal framework for the employer to control chemicals which are hazardous to health with respect to their use and to set workplace exposure standards so as to protect the health of employees and other persons at the place of work.

The Regulations clearly stipulate the responsibility of the employer (including the self-employed person), in respect of his employees and any other persons, so far as is practicable to protect their safety and health from being affected by chemicals hazardous to health.

The duties of the employer stipulated under these Regulations are:

- ◆ *Identification of chemicals hazardous to health*
- ◆ *Complying with the permissible exposure limits.*
- ◆ *Conducting chemical health risk assessment.*
- ◆ *Taking action to control hazardous exposure.*
- ◆ *Labeling and relabeling chemicals hazardous to health.*
- ◆ *Providing information, instruction and training.*
- ◆ *Monitoring employee exposure at the place of work.*
- ◆ *Conducting health surveillance.*
- ◆ *Posting of warning signs*
- ◆ *Record keeping*

**APPLICATION**

These Regulations shall apply to all places of work (which are within the jurisdiction of the Act) where chemicals hazardous to health are used, except chemicals that are:

- ◆ *Defined as radioactive materials under the Atomic Energy Licensing Act 1984.*
- ◆ *Foodstuffs.*
- ◆ *Hazardous to health solely by virtue of their explosive or flammable properties, or solely because they are at a high or low temperature or a high pressure.*
- ◆ *Pharmaceutical products.*

**A CHEMICAL HAZARDOUS TO HEALTH**

A chemical hazardous to health is a chemical that:

- ◆ *Is listed in schedule I or II to these regulations.*
- ◆ *Possesses any of the properties categorized in part B of Schedule I of the CPL Regulation. (P.U. (A) 143/97).*
- ◆ *Comes within the definition of "pesticide" under the Pesticides Act 1974.*
- ◆ *Is listed in the First Schedule of the Environment Quality (Schedule Wastes) Regulations, 1989.*

## **IDENTIFICATION OF CHEMICALS HAZARDOUS TO HEALTH**

All chemicals used at the place of work shall be identified and recorded in a register by the employer. The register shall be accessible to all employees at the place of work who may be affected by the chemicals.

The chemical register shall contain:

- ◆ *A list of all chemicals hazardous to health used.*
- ◆ *Health used.*
- ◆ *A current CSDS for each of the chemical.*
- ◆ *The following information.*
- ◆ *Average quantity used, produced or stored per month or per year for each chemical.*
  - a) *The process and work area where the chemical is used.*
  - b) *Name and address of supplier of each chemical.*

## **PERMISSIBLE EXPOSURE LIMIT**

Employer shall ensure that no person is exposed or likely to be exposed to any chemical hazardous to health:

- ◆ *above the ceiling limit at any time; or*
- ◆ *above the eight-hour time-weighted average airborne concentration.*

Specified for that chemical in schedule 1 of the Regulations, or *above the maximum exposure limit during the work shift.*

## **ASSESSMENT OF RISK TO HEALTH**

Assessment of risk to health shall be carried out by a register assessor. The assessment shall contain the following;

- ◆ *The potential risk to an employee as a result of exposure to chemicals hazardous to health.*
- ◆ *The methods and procedure adopted in the use of chemicals hazardous to health.*
- ◆ *The nature of the hazard to health.*
- ◆ *The degree of exposure to such chemicals.*
- ◆ *The risk to health created by their use and their release from work processes.*
- ◆ *Measures and procedures required to control the exposure of an employee to chemicals hazardous to health.*
- ◆ *The measures, procedures, and equipment necessary to control any accidental emission of a chemical hazardous to health as a result of leakage, spillage, or process or equipment failure.*
- ◆ *The necessity for an employee exposure monitoring programme.*
- ◆ *The necessity for a health surveillance program.*
- ◆ *The necessity for a health surveillance programme.*
- ◆ *The requirement for training and retraining of employees.*

## **ACTION TO CONTROL EXPOSURE**

Within 1 (one) month of receiving the assessment report from the assessor, the employer shall take action to control exposure as recommended by the assessor. This may include changes in work processes, practices, procedures, or plant or engineering control equipment to reduce the exposure level to the lowest practicable level.

## **LABELLING AND RELABELLING**

Every employer must ensure that all hazardous chemicals supplied or purchased and all containers in use at the place of work are properly labeled.

### **INFORMATION, INSTRUCTION AND TRAINING**

The employer shall provide information, instruction and training to all employees who may be exposed or is likely to be exposed to a hazardous chemical. From the information, instruction and training given, the employee should be able to know:

- ◆ *The risk to health created by such exposure.*
- ◆ *The precaution that should be taken.*

### **MONITORING OF EXPOSURE AT THE PLACE OF WORK**

Employer shall ensure the monitoring of employee exposure to chemicals hazardous to health is conducted by a registered hygiene technician when:

- ◆ *An assessment of risk to health indicate that monitoring is required; or*
- ◆ *The monitoring is required to ensure the maintenance of adequate control of exposure.*

### **HEALTH SURVEILLANCE**

The employer shall carry out a health surveillance programme of employees exposed or likely to be exposed to chemicals hazardous to health.

### **MEDICAL REMOVAL PROTECTION**

The employer shall not permit an employee to be engaged in and shall remove him or her from any work if:

- ◆ *The employee has a detected medical condition that places him at increased risk of material impairment to health from exposure to chemicals hazardous to health.*
- ◆ *The employee becomes pregnant*
- ◆ *The employee is breast feeding a child.*

### **WARNING SIGN**

When a chemical hazardous to health is used in any area in any manner that is hazardous to the health of any person who may be in that area or who may be or is likely to be at risk of being affected by the chemical hazardous to health, the employer shall ensure that:

- ◆ *Warning signs are posted at a conspicuous place at every entrance of the area to warn persons entering the area of the hazards.*
- ◆ *Other relevant information are given to persons who may be or are likely to be at risk of being affected by the chemical hazardous to health.*

### **PENALTY**

Any person who contravenes any provision of these regulations shall be guilty of an offence and, on conviction, be liable to a fine not exceeding RM10,000 (ten thousand ringgit) or to imprisonment for a term not exceeding one year or to both, and in the case of a continuing offence, to a fine not exceeding RM1000 (one thousand ringgit) for each day or part of a day during which the offence continues after conviction.

## Appendix 3

### Summary of Occupational Safety & Health (Classification, Packaging and labelling of Hazardous Chemicals) Regulations 1997

1. CPL (Classification, Packaging and Labelling) of Hazardous Chemicals Regulations 1997 came in force 15th April 1997
2. "Supplier" is a person who includes a formulator, a manufacturer, an importer or a distributor
3. A chemical is hazardous based on:
  - Physicochemical properties (part A of scheduled I) i.e. explosive, oxidizing, extremely flammable, highly flammable or flammable or
  - Its health effects (Part B of scheduled I) i.e. harmful, corrosive, irritant, carcinogenic, teratogenic or mutagenic.
4. The regulation applies to all chemicals except chemicals:
  - Defined as radioactive material under the Atomic Energy Licensing Act 1984;
  - Defined as a pesticide under the Pesticides Act 1974;
  - Listed as poisons under the Poisons List Order 1993, except for chemicals classified as industrial and laboratory poisons;
  - Defined as a drug under the Sales of Drugs Act 1952;
  - Listed as scheduled waste in First Schedule of Environmental Quality (Schedules Waste) Regulations 1989;
  - Foodstuff
5. Regulations shall not apply to:
  - Transportation by rail, road, inland waterway, sea, air etc.;
  - Chemicals in transit which are stored in bonded warehouse.
6. Duty of supplier to classify the chemicals according to the specific nature of risk involve based on hazard at the scheduled I
7. Packaging requirement of chemicals shall have the following requirements:
  - If packaging is a container, container shall be such that contents cannot escape;
  - Material of packaging and fastenings are suitable and not susceptible to attack by the chemical;
  - Packaging and fastenings are suitable for normal handling;
  - Containers with replaceable fastening devices are designed that it can be repeatedly fastened
8. The supplier must ensure that the packages are to be initially closed with a seal
9. Labelling that every package is labelled with:
  - Name of hazardous chemical;
  - Name, address, telephone number of supplier;
  - Danger symbol and indication of danger;- scheduled II
  - Nature of special risk and safety precautions - scheduled III
10. Dimension of label is specified in the regulations in scheduled V basically it shall be firmly affixed able to be read horizontally when package is set down in its normal positions or must be tagged when not practical to label hazardous chemical.
11. Supplier to furnish up to-date Chemical Safety Data Sheet both in English and in Bahasa Malaysia to the customer
12. In cases where the name of the chemical and the concentration of ingredients are confidential information, the information may be omitted from the CSDS but the information shall be disclosed to:
  - An occupational health doctor;
  - Any person who uses or handles the chemical

## Appendix 4

### ENVIRONMENTAL QUALITY (SCHEDULED WASTES) (AMENDMENT) REGULATIONS 2007

#### Regulation 1. Citation and commencement

(1) These regulations may be cited as the **Environmental Quality (Scheduled Wastes) (Amendment) Regulations 2005** come into operation on 13 Apr 2007

#### Regulation 2. Interpretation

"scheduled wastes" means any waste falling within the categories of waste listed in the First Schedule;

"incompatible scheduled wastes" means scheduled wastes specified in the Fourth Schedule which, when mixed, will produce hazardous situations through heat generation, fires, explosions or the release of toxic substances;

"on-site treatment facility" means a facility, other than a scheduled wastes incinerator or a land treatment facility, located on a waste generator's site and that is used solely to deal with scheduled wastes produced on that site;

"contractor" means any person licensed by the Director General of Environmental Quality under subsection 18(1A) of the Act;

"waste generator" means any person who generates scheduled wastes;

"prescribed premises" means premises prescribed by the Environmental Quality (Prescribed Premises) (Scheduled Wastes Treatment and Disposal Facilities) Order 1989 [P.U. (A) 140/1989].

(2) Words and expressions which are not defined in these Regulations shall have the same meaning as assigned to them in the Act and in the Environmental Quality (Prescribed Premises) (Scheduled Wastes Treatment and Disposal Facilities) Order 1989.

#### Aspects that will be discussed:

**Regulation 3. Notification of the generation of scheduled wastes.** Every waste generator must within 30 days from the date of generation of scheduled wastes, notify the Director General of the new categories and quantities of scheduled wastes which are generated. The information as per Second Schedule

**Regulation 4. Disposal of scheduled wastes.** Scheduled wastes shall be disposed of at prescribed premises only and as far as is practicable, be rendered innocuous prior to disposal.

**Regulation 5. Treatment of scheduled wastes.** Scheduled wastes shall be treated at prescribed premises or at on-site treatment facilities only. Residuals from treatment of scheduled wastes shall be treated or disposed of at prescribed premises.

**Regulation 6. Recovery of material or product from scheduled wastes.** Recovery of material or product from scheduled wastes shall be done at prescribed premises or at onsite recovery facilities. Residuals from recovery of material or product from scheduled wastes shall be treated or disposed of at prescribed premises.

**Regulation 7. Application for special management of scheduled wastes**  
A waste generator may apply to the Director General in writing to have the scheduled wastes generated from their particular facility or process excluded from being treated, disposed of or recovered in premises or facilities other than at the prescribed premises or on-site treatment or recovery facilities. the Director General may grant a written approval either with or without conditions.

**Regulation 8. Responsibility of waste generator.**

Every waste generator shall ensure that scheduled wastes generated by him are properly stored, treated on-site, recovered on-site for material or product from such scheduled wastes or delivered to and received at prescribed premises for treatment, disposal or recovery of material or product from scheduled wastes. Scheduled wastes that are subjected to movement or transfer be packaged, labelled and transported in accordance with the guidelines prescribed by the Director General.

**Regulation 9. Storage of scheduled wastes. (1)**

Scheduled wastes shall be stored in containers which are compatible with the scheduled wastes to be stored, durable and which are able to prevent spillage or leakage of the scheduled wastes into the environment. A waste generator may apply to the Director General in writing to store more than 20 metric tonnes of scheduled wastes. Any person may store scheduled wastes generated by him for 180 days or less after its generation provided that—

- (a) the quantity of scheduled wastes accumulated on site shall not exceed 20 metric tonnes; and
- (b) the Director General may at any time, direct the waste generator to send any scheduled wastes for treatment, disposal or recovery of material or product from the scheduled wastes up to such quantity as he deems necessary.

**Regulation 10. Labelling of scheduled wastes**

The date when the scheduled wastes are first generated, name, address and telephone number of the waste generator shall be clearly labelled on the containers that are used to store the scheduled wastes. Containers of scheduled wastes shall be clearly labelled in accordance with the types applicable to them as specified in the Third Schedule and marked with the scheduled waste code as specified in the First Schedule for identification and warning purposes.

**Regulation 11. Waste generator shall keep an inventory of scheduled wastes.**

A waste generator shall keep accurate and up-to-date inventory in accordance with the Fifth Schedule of the categories and quantities of scheduled wastes being generated, treated and disposed of and of materials or product recovered from such scheduled wastes for a period up to three years from the date the scheduled wastes was generated.

**Regulation 12. Information to be provided by waste generator, contractor and occupier of prescribed premises.**

A waste generator, contractor and occupier of the prescribed premises shall provide information in accordance with the Sixth Schedule in the manner provided in this regulation or Director General shall determine other method as he thinks fit. A waste generator shall complete Part I of the Sixth Schedule in six copies and hand over the six copies of the Schedule to the contractor when the scheduled wastes are delivered to him. The contractor shall, upon receiving scheduled wastes from a waste generator, complete Part II of the Sixth Schedule in the six copies given to him by the waste generator and shall thereafter immediately hand over two copies of the Schedule to the waste generator who in turn shall submit a copy to the Director General within 30 days from the date of transportation of the scheduled wastes. The contractor shall within 10 days from the date of receipt of the scheduled wastes deliver the scheduled wastes to the occupier of any prescribed premises and hand over the remaining four copies of the Sixth Schedule to the occupier. The occupier of any prescribed premises shall, upon receiving scheduled wastes from the contractor, complete Part III of all the remaining four copies of the Sixth Schedule handed over to him by the contractor and shall, upon completion, retain one copy and return a copy each to the contractor, the waste generator and the Director General, within 20 days from the date of receipt of the scheduled wastes. If the waste generator fails to receive his copy of the Sixth Schedule from the occupier of the prescribed premises referred to in subregulation (5) within 30 days from the date of delivery of the scheduled wastes to the contractor referred to in subregulation (2), he shall notify the Director General immediately and shall investigate and inform the Director General of the result of his investigation. The waste generator, contractor or occupier of the prescribed premises shall each keep a signed copy of the Sixth Schedule which shall be retained as a record for at least three years from the date the scheduled wastes are received by the occupier of the prescribed premises.

**Regulation 13. Scheduled wastes transported outside waste generator's premises to be accompanied by information**

- (1) Every waste generator shall provide information in accordance with the Seventh Schedule in respect of each category of scheduled wastes to be delivered to the contractor and shall give the Schedule to the contractor upon delivery of the waste to him.
- (2) The waste generator shall inform the contractor of the purpose and use of the Seventh Schedule.
- (3) The contractor shall carry with him the Seventh Schedule for each category of scheduled wastes being transported and shall observe and comply with the instructions contained therein.
- (4) The contractor shall, in the selection of transportation routes, as far as possible avoid densely populated areas, water catchment areas and other environmentally sensitive areas.
- (5) The contractor shall ensure that all his employees that are involved in the handling, transportation and storage of scheduled wastes attend training programmes.
- (6) The contractor shall ensure that during the training programme each employee is well informed of the purpose and use of the Seventh Schedule.

**Regulation 14. Spill or accidental discharge**

- (1) In the event of any spill or accidental discharge of any scheduled wastes, the contractor responsible for the waste shall immediately inform the Director General of the occurrence.
- (2) The contractor shall do everything that is practicable to contain, cleanse or abate the spill or accidental discharge and to recover substances involved in the spill or accidental discharge.
- (3) The waste generator shall provide technical expertise and supporting assistance in any clean-up operation referred to in subregulation (2).
- (4) The contractor shall undertake studies to determine the impact of the spillage or accidental discharge on the environment over a period of time to be determined by the Director General.

**Regulation 15. Conduct of training**

Every waste generator shall ensure that all his employees involved in the identification, handling, labelling, transportation, storage and spillage or discharge response of scheduled wastes attend training programmes.

**Regulation 16. Compounding of offences**

- (1) Every offence which consists of any omission or neglect to comply with, or any act done or attempted to be done contrary to these Regulations may be compounded under section 45 of the Act.
- (2) The compounding of offences referred to in subregulation (1) shall be in accordance with the procedure prescribed in the Environmental Quality (Compounding of Offences) Rules 1978 [P.U. (A) 281/1978].

## **SCHEDULE - FIRST SCHEDULE (Regulation 2)**

### **SW 1 Metal and metal-bearing wastes**

- SW 101 Waste containing arsenic or its compound
- SW 102 Waste of lead acid batteries in whole or crushed form
- SW 103 Waste of batteries containing cadmium and nickel or mercury or lithium
- SW 104 Dust, slag, dross or ash containing aluminium, arsenic, mercury, lead, cadmium, chromium, nickel, copper, vanadium, beryllium, antimony, tellurium, thallium or selenium excluding slag from iron and steel factory
- SW 105 Galvanic sludges
- SW 106 Residues from recovery of acid pickling liquor
- SW 107 Slags from copper processing for further processing or refining containing arsenic, lead or cadmium
- SW 108 Leaching residues from zinc processing in dust and sludges form
- SW 109 Waste containing mercury or its compound
- SW 110 Waste from electrical and electronic assemblies containing components such as accumulators, mercury-switches, glass from cathode-ray tubes and other activated glass or polychlorinated biphenylcapacitors, or contaminated with cadmium, mercury, lead, nickel, chromium, copper, lithium, silver, manganese or polychlorinated biphenyl

### **SW 2 Wastes containing principally inorganic constituents which may contain metals and organic materials**

- SW 201 Asbestos wastes in sludges, dust or fibre forms
- SW 202 Waste catalysts
- SW 203 Immobilized scheduled wastes including chemically fixed, encapsulated, solidified or stabilized sludges
- SW 204 Sludges containing one or several metals including chromium, copper, nickel, zinc, lead, cadmium, aluminium, tin, vanadium and beryllium
- SW 205 Waste gypsum arising from chemical industry or power plant
- SW 206 Spent inorganic acids
- SW 207 Sludges containing fluoride

### **SW 3 Wastes containing principally organic constituents which may contain metals and inorganic materials**

- SW 301 Spent organic acids with pH less or equal to 2 which are corrosive or hazardous
- SW 302 Flux waste containing mixture of organic acids, solvents or compounds of ammonium chloride
- SW 303 Adhesive or glue waste containing organic solvents excluding solid polymeric materials
- SW 304 Press cake from pretreatment of glycerol soap lye
- SW 305 Spent lubricating oil
- SW 306 Spent hydraulic oil
- SW 307 Spent mineral oil-water emulsion
- SW 308 Oil tanker sludges
- SW 309 Oil-water mixture such as ballast water
- SW 310 Sludge from mineral oil storage tank
- SW 311 Waste of oil or oily sludge
- SW 312 Oily residue from automotive workshop, service station oil or grease interceptor
- SW 313 Oil contaminated earth from re-refining of used lubricating oil
- SW 314 Oil or sludge from oil refinery plant maintenance operation
- SW 315 Tar or tarry residues from oil refinery or petrochemical plant
- SW 316 Acid sludge
- SW 317 Spent organometallic compounds including tetraethyl lead, tetramethyl lead and organotin compounds
- SW 318 Waste, substances and articles containing or contaminated with polychlorinated biphenyls (PCB) or polychlorinated triphenyls (PCT)

SW 319 Waste of phenols or phenol compounds including chlorophenol in the form of liquids or sludges  
SW 320 Waste containing formaldehyde  
SW 321 Rubber or latex wastes or sludges containing organic solvents or heavy metals  
SW 322 Waste of non-halogenated organic solvents  
SW 323 Waste of halogenated organic solvents  
SW 324 Waste of halogenated or unhalogenated non-aqueous distillation residues arising from organic solvents recovery process  
SW 325 Uncured resin waste containing organic solvents or heavy metals including epoxy resin and phenolic resin  
SW 326 Waste of organic phosphorus compound  
SW 327 Waste of thermal fluids (heat transfer) such as ethylene glycol

#### **SW 4 Wastes which may contain either inorganic or organic constituents**

SW 401 Spent alkalis containing heavy metals  
SW 402 Spent alkalis with pH more or equal to 11.5 which are corrosive or hazardous  
SW 403 Discarded drugs containing psychotropic substances or containing substances that are toxic, harmful, carcinogenic, mutagenic or teratogenic  
SW 404 Pathogenic wastes, clinical wastes or quarantined materials  
SW 405 Waste arising from the preparation and production of pharmaceutical product  
SW 406 Clinker, slag and ashes from scheduled wastes incinerator  
SW 407 Waste containing dioxins or furans  
SW 408 Contaminated soil, debris or matter resulting from cleaning-up of a spill of chemical, mineral oil or scheduled wastes  
SW 409 Disposed containers, bags or equipment contaminated with chemicals, pesticides, mineral oil or scheduled wastes  
SW 410 Rags, plastics, papers or filters contaminated with scheduled wastes  
SW 411 Spent activated carbon excluding carbon from the treatment of potable water and processes of the food industry and vitamin production  
SW 412 Sludges containing cyanide  
SW 413 Spent salt containing cyanide  
SW 414 Spent aqueous alkaline solution containing cyanide  
SW 415 Spent quenching oils containing cyanides  
SW 416 Sludges of inks, paints, pigments, lacquer, dye or varnish  
SW 417 Waste of inks, paints, pigments, lacquer, dye or varnish  
SW 418 Discarded or off-specification inks, paints, pigments, lacquer, dye or varnish products containing organic solvent  
SW 419 Spent di-isocyanates and residues of isocyanate compounds excluding solid polymeric material from foam manufacturing process  
SW 420 Leachate from scheduled waste landfill  
SW 421 A mixture of scheduled wastes  
SW 422 A mixture of scheduled and non-scheduled wastes  
SW 423 Spent processing solution, discarded photographic chemicals or discarded photographic Wastes  
SW 424 Spent oxidizing agent  
SW 425 Wastes from the production, formulation, trade or use of pesticides, herbicides or biocides  
SW 426 Off-specification products from the production, formulation, trade or use of pesticides, herbicides or biocides  
SW 427 Mineral sludges including calcium hydroxide sludges, phosphating sludges, calcium sulphite sludges and carbonates sludges  
SW 428 Wastes from wood preserving operation using inorganic salts containing copper, chromium or arsenic of fluoride compounds or using compound containing chlorinated phenol or creosote  
SW 429 Chemicals that are discarded or off-specification  
SW 430 Obsolete laboratory chemicals  
SW 431 Waste from manufacturing or processing or use of explosives  
SW 432 Waste containing, consisting of or contaminated with peroxides

#### **SW 5 Other wastes**

SW 501 Any residues from treatment or recovery of scheduled wastes

**SECOND SCHEDULE**  
**(Regulation 3)**  
**NOTIFICATION OF SCHEDULED WASTES**  
 (Two copies to be completed)

For office use only  
 File Reference No: .....

**1. IDENTIFICATION**

Waste Generator Code:

State Code:

(i) Name and Address of Premise:

.....  
 .....  
 .....

Tel. No: ..... Fax No: ..... Telex No:.....

(ii) Owner of Premise:.....

Designation: .....

**2. PRODUCTION DATA**

List of raw materials/chemicals and quantities used per month\*

Raw Material/Chemicals Quantity (Metric Tonnes)

**3. WASTE DATA**

Scheduled wastes generated per month\*\*

Waste Category	Waste Source 1	Name of Waste	Waste Component 2	Quantity (Tonnes/Month) 3

Code

Note:

1 Unit Operation in the process/plant

2 Name the elements, compound or material

3 Guide to conversion (only data in metric tonnes/month is acceptable)

\* Use additional sheet if required

\*\* Estimates

I certify that the information provided is true and correct to the best of my knowledge.

.....

Signature of Reporting Officer \*\*\*

Name: .....

Designation: .....

Date: .....

**THIRD SCHEDULE  
(Regulation 10)  
LABELLING REQUIREMENT FOR SCHEDULED WASTES**



---

**EXPLOSIVE SUBSTANCES  
(WASTE)**  
Symbol (exploding bomb): black; Background: light orange  
**Label 1**



---

**INFLAMMABLE LIQUIDS  
(WASTE)**  
Symbol (flame): black or white; Background: red  
**Label 2**



**INFLAMMABLE SOLIDS  
(WASTE)**  
Symbol (flame): black; Background: white with vertical red stripes  
**Label 3**



**SOLID: SPONTANEOUSLY COMBUSTIBLE  
(WASTE)**

Substance liable to spontaneous combustion

Symbol (flame): black;

Background: upper half white, lower half red

**Label 4**



**SOLID: DANGEROUS WHEN WET  
(WASTE)**

Substances which, if in contact with water, emit inflammable gases

Symbol (flame): black or white; Background: blue

**Label 5**



**OXIDIZING SUBSTANCES  
(WASTE)**

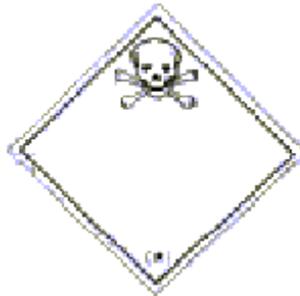
Symbol (flame over circle): black; Background: yellow

**Label 6**



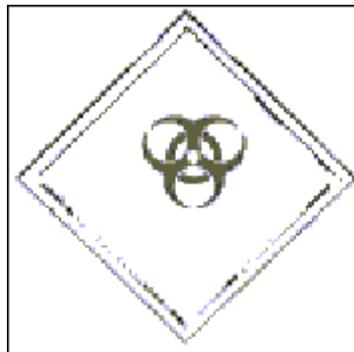
ORGANIC PEROXIDES  
(WASTE)

Symbol (flame over circle): black; Background: yellow  
**Label 7**



TOXIC SUBSTANCES  
(WASTE)

Poisonous (toxic) substances  
Symbol (skull over crossbones): black; Background: white  
**Label 8**



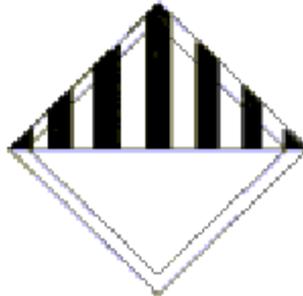
INFECTIOUS SUBSTANCES  
(WASTE)

Symbol (three crescents superimposed on a circle): black;  
Background: white  
**Label 9**



CORROSIVE SUBSTANCES  
(WASTE)

Symbol (liquids spilling from two glass vessels and attacking a hand and a metal): black;  
Background: upper half white, lower half black  
**Label 10**



MIXTURE OF MISCELLANEOUS DANGEROUS SUBSTANCES  
(WASTE)

Symbol (nil); Background: white with upper half vertical black stripes  
**Label 11**

## PARTICULARS OF LABELS

1. The label shall be a square set at an angle of 45 degrees. The dimension of the label shall not be less than 10 cm by 10 cm except where the size of the container or package warrants for a label of smaller size.
2. The colours used on the labels 1 to 11 shall be in accordance with British Standard BS 381 C, "Colours for specific purposes".

Colour	Reference No.
French blue .. . . .	166
Canary yellow .. . . .	309
Signal red .. . . .	537
Light orange .. . . .	557

3. The labels shall be divided into halves, the upper half of the label shall be reserved for the pictorial symbol and the lower half for text printed in block capitals.
4. The text shall be printed in black on all labels except when the background of the label is black, red or blue, the text shall be in white.
5. The labels may be of the following types:
  - (a) stick-on;
  - (b) metal plates; or
  - (c) stencilled or printed on the container or package.
6. All labels shall be able to withstand open weather exposure without a substantial reduction in effectiveness.
7. Label shall be placed on a background of contrasting colour.
8. In the case of waste capable of causing two or more hazards, all the hazards must be clearly identified and the waste shall be labelled accordingly.

## FOURTH SCHEDULE (Regulation 2) SCHEDULED WASTES OF POTENTIAL INCOMPATIBILITY

The mixing of a waste in Group A with a waste in Group B may have the following potential consequences:

<i>Group 1-A</i>	<i>Group 1-B</i>
Alkaline caustic liquids	Acid sludge
Alkaline cleaner	Chemical cleaners
Alkaline corrosive liquid	Electrolyte, acid
Caustic wastewater	Etching acid, liquid or solvent
Lime sludge and other corrosive alkalis	Pickling liquor and other corrosive acid
	Spent acid
	Spent mixed acid

Potential consequences: Heat generation, violent reaction.

<i>Group 2-A</i>	<i>Group 2-B</i>
Asbestos	Solvents
Beryllium	Explosives
Unrinsed pesticide containers	Petroleum
Pesticides	Oil and other flammable wastes

Potential consequences: Release of toxic substances in case of fire or explosion.

<i>Group 3-A</i>	<i>Group 3-B</i>
Aluminium	Any waste in Group 1-A or 1-B
Beryllium	
Calcium	

Lithium  
Magnesium  
Potassium  
Sodium  
Zinc powder and other reactive  
metals and metal hydrides

Potential consequences: Fire or explosion; generation of flammable hydrogen gas.

*Group 4-A*

Alcohols

*Group 4-B*

Any concentrated waste in Group 1-A or 1-B

Calcium

Lithium

Metal hydrides

Potassium

Sodium

Water reactive wastes

Potential consequences: Fire, explosion or heat generation; generation of flammable toxic gases.

*Group 5-A*

Alcohols

Aldehydes

Halogenated hydrocarbons

Nitrated hydrocarbons and other  
reactive organic compounds and solvents

Unsaturated hydrocarbons

*Group 5-B*

Concentrated Group 1-A or 1-B wastes

Group 3-A wastes

Potential consequences: Fire, explosion or violent reaction.

*Group 6-A*

Spent cyanide and sulphide solution

*Group 6-B*

Group 1-B wastes

Potential consequences: Generation of toxic hydrogen cyanide or hydrogen sulphide gas.

*Group 7-A*

Chlorates and other strong oxidizers

Chlorites

Chromic acid

Hypochlorites

Nitrates

Nitric acid

Perchlorates

Permanganates

Peroxides

. Potential consequences: Fire, explosion or violent reaction

*Group 7-B*

Organic acids

Group 2-B wastes

Group 3-B wastes

Group 5-A wastes and other  
flammable and combustible wastes

FIFTH SCHEDULE  
(Regulation 11)

INVENTORY OF SCHEDULED WASTES AS AT: .....

Date	Waste Category Code	Name of Waste	Quantity Generated (Metric Tonnes)	Waste Handling		
				Method	Quantity in Metric Tonnes	Placec

I hereby declare that all information given in this form is to the best of my knowledge and belief true and correct in all respect.

Name of Reporting Officer:

.....

Designation: .....

Signature: ..... Date: .....

I.C. Number: .....

SIXTH SCHEDULE  
(Regulation 12)

CONSIGNMENT NOTE FOR SCHEDULED WASTES

For office use only  
File Reference No:

1 WASTE GENERATOR

.....  
Waste Generator Code:

State Code:

Name of Waste Generator:

.....  
Address:

.....  
Name of Responsible Person:

.....  
Tel. No.: ..... Fax No.: ..... Telex No.: .....

Name of Waste:

Waste Category Code:

Waste Component: .....

Waste Origin: .....

Waste Origin Code:

Type of Waste:

	Solid	Sludge	Liquid
Waste Packaging:	Pallet Container	Canister	55 gallon Drum
Other (specify) .....			

Quantity:  
and if possible:  
Metric Tonnes m3

Cost of Treatment and Disposal RM ...../ Metric Tonne

Name and Address of Final Destination:

.....  
Delivery Date: .....

Signature of Responsible Person

Delivery Time: .....

For office use only

II CONTRACTOR

Contractor Code:

State Code:

Name of Contractor:

.....  
Address:

.....  
Name of Responsible Person:

.....  
Tel. No.: ..... Fax No.: ..... Telex No.: .....

Vehicle Registration No.:

.....  
Name of Driver:

.....  
Temporary Storage: No Yes, Address:

.....  
Date Received: ..... Signature of Driver: .....

Time Received: .....

III STORAGE/TREATMENT/  
RECOVERY/DISPOSAL/  
FACILITY OPERATOR

Facility Code:

State Code:

Name of Facility:

.....  
Address of Facility:

.....  
Name of Responsible Person:

.....  
Tel. No.: ..... Fax No.: ..... Telex No.: .....

Type of Operation:

Storage Regrouping Recovery Landfill Secure Landfill

Physical/Chemical Treatment Incinerator Other (specify)

.....  
Quantity of Waste:

and if possible:

Metric Tonnes m3

Date Received: ..... Signature:.....

Time Received: .....



# BORANG PERMOHONAN PELUPUSAN BUANGAN TERJADUAL

UNIT KESELAMATAN DAN KESIHATAN PEKERJAAN  
UNIVERSITI MALAYSIA PERLIS

Tingkat 2 Bangunan KIK, Lorong Meranti Paya, Off Jln Bukit Lagi 01000 Kangar Perlis

Tel : 04-979 8354/8346/8347/8349/8411 Faks: 04-979 8351

Tarikh :		Pegawai yang dihubungi :			Lokasi Bahan Buangan :	
Jabatan :		Telefon / Faks :			Nama Makmal :	
Pegawai bertanggungjawab :		Alamat :				
Kegunaan UKKP	Keterangan Bahan Buangan	Bentuk Fizikal	Bilangan, saiz dan jenis bekas	Isipadu @ berat di dalam bekas	pH	Hazad
Nota Khas atau Arahan Pengendalian :						
Pengesahan : Saya mengesahkan bahawa setiap keterangan tentang bahan buangan di atas adalah tepat dan lengkap berdasarkan kepada pengetahuan saya						
(Tandatangan Ketua Jabatan) :		Tarikh :				

\* Hanya satu pengesahan untuk setiap pelupusan