A STUDY OF THE WORKING ENVIRONMENT OF CHEMICAL TECHNOLOGISTS: UNIVERSITI MALAYSIA PERLIS PERSPECTIVE

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Abstract

Laboratory workplace must be safe and conducive for all workers to work. Workers in chemical laboratories are exposed to lots of hazards. In some the hazards are well recognized. Where hazards are recognized, precautionary measures can be taken. 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 Act 1994 and the Environmental Quality Act, 1974 vis-à-vis the Environmental Quality (Scheduled Wastes) (Amendment) Regulations 2005". 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 2005" 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 aim of this paper is to:

a. Appraise the working environment of Chemical Technologist and to propose Occupational Safety and Health Programmes at the workplace in accordance to the employee's requirement.

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

3.0 PROFILE OF CHEMICAL TECHNOLOGIST

Chemical technologists and technicians provide technical support and services or may work independently in chemical engineering, chemical and biochemical research and analysis, industrial chemistry, chemical quality control and environmental protection. They are employed by research and development and quality control laboratories, consulting engineering companies and a variety of other manufacturing and processing industries, and by utilities, health, and education and government establishments[1]. Some examples or designation use in industries are chemical laboratory analyst, chemical analyst, chemical research technician, chemical technologist etcetera.

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. 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

[1] http://en.wikipedia.org/wiki/Chemical_Technologist

experimental or analytical results, and develop and conduct programs of sampling and analysis.

4.0 CURRENT SITUATION

Statistics from SOCSO for year 2005 indicate that there are 61,185[2] reported industrial accidents at the workplace. The workplace accidents are classified into accidents which are caused by machines, means of transport and lifting equipment, other equipment, materials, substances and radiations, working environment and 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 1. 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.

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.

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

[2] Statistics PERKESO 2001 – 2005

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

PARTICULARS	Laboratory Employees NO. OF CASES REPORTED	PERM. DIS CASES	DEATH CASES
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 5.1: Number of Accidents Cause by Materials, Substances and Radiations – 2005

5.0 EVALUATE THE WORKING ENVIRONMENT OF CHEMICAL TECHNOLOGIST

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. It should be noted that all chemical substances are hazardous in some way or another and thus must be regarded as potentially dangerous materials.

5.1 Research Survey

A quick random survey is made on 100 selected employees who are working as chemical technologist in laboratory. The objective of the survey is to ascertain the safety awareness among laboratory technologists and the working environment of chemical technologist in at the workplace. Simple frequency distribution was used to analyze the data collected.

5.1.1 Result of the Survey

To ascertain the safety awareness among the laboratory technologist, 10 questions were posed. From the survey, the respondents indicate that hazard prevails at the workplace whereby 31 percent specify Chemical hazard, 26 percent specify Physical hazard, 25 percent specify Ergonomic hazard, and 9 percent specify Biological hazard and Psychological hazard.

On the question as to whether employers provide safety, health and welfare training, the survey indicates a positive answer whereby 70 percent of the respondents give an affirmative answer.

The employers also made available to the laboratory technologists the contact numbers of the specific persons and all other contact numbers of the person to be contacted in case of emergency. This was confirmed by 81 percent of the respondents.

The laboratory technologists i.e. 87 percents indicate that their employer carry out Risk Assessments at workplace. On the same note, 89 percents of the respondents indicate that the in-house training provided by their employer is sufficient for them to undertake their jobs. The respondents indicate on the type of OSH programmes the preferred to be implemented in the workplace are as follows;

a. Setting up Health and Safety Committee – 20 percent
b. Safety and health training including:
    i. General safety training - 26 percent
    ii. Emergency preparedness - 22 percent
    iii. Hazardous material and waste disposal - 20 percent
c. Hazard identification and risk control - 12 percent

The respondents also indicate on their preference on the OSH Programmes to be disseminated at their workplace. Their preferences are as follows:

a. In-house training - 28 percent
b. Seminars - 27 percent
c. Workshops - 25 percent
d. Group discussion - 20 percent

On the reaction of the respondents on the questions of whether they will attend seminars, workshop or any other form of OSH Programmes conducted **at UniMAP,** 94 percent give an affirmative answer if they are invited. The affirmative answer, 94 percent of the respondents said that they will attend seminars, workshop etc conducted by UniMAP **at their workplace**.

To ascertain the working environment in the laboratory of 10 questions were posed to the Chemical Technologist. The results of the survey indicate that a safe and conducive work environment prevails at the workplace.

On the question first aid kits at the workplace, its availability, noticeable location, know how to contact a first aider in emergency, list and contact numbers of first aider

a. 98 percents of the respondents indicate first aids kits are available in the workplace.
b. 98 percents of the respondents indicate location is noticeable
c. 92 percents of the respondents indicate know how to contact a first aide in emergency
d. 92 percents of the respondents indicate list and contact numbers of first aides accessible to all

On Housekeeping aspects that is on the cleanliness, chemical storage, cleaning up of spills, free of obstructions and tripping hazards in aisles or corridors and food consumption in the laboratory areas, the respondents also indicate the following:

a. 94 percent of the respondents indicate the workplace or the laboratory is clean, neat and orderly
b. 94 percent of the respondents indicate that Chemicals are stored in designated storage locations.
c. 94 percent of the respondents indicate that Spills on lab benches and floors cleaned up immediately.
d. 93 percent of the respondents indicate that Aisles and corridors are free of obstruction and tripping hazards.
e. 82 percent of the respondents indicate that they do not consume food and beverages at the workplace.

On the question of whether the Machinery & Equipment at the laboratory are fitted with guards and safe to use, adequate training on the use of

machinery/equipment is cater for, know how to stop and confident about using the machinery/equipment, the respondents also indicate the following:

a. 89 percent of the respondents indicate that all necessary equipments fitted with guards and safe to use.
b. 92 percent of the respondents indicate that they have adequate training on the use of machinery/equipment.
c. 91 percent of the respondents indicate that they know how to stop all machinery/equipment in use.
d. 91 percent of the respondents indicate that they are confident about using the machinery/equipment at the workplace.

On the aspect of electrical equipments, 90 percent of the respondents indicate that electrical equipment and extension cords are in good condition and proper, 90 percent of the respondents indicate that all electrical apparatuses meet the requirements of an approved testing laboratory or the national electrical code, 82 percent of the respondents indicate that the wiring is not frayed or worn, 92 percent of the respondents indicate that all electrical equipment inspected before use, 89 percent of the respondents indicate that there is no trailing cables and stretched across the floor and 94 percent of the respondents indicate that all electrical equipment switched after job completed.

On the aspect of Hazardous Substances, 92 percent of the respondents indicate that they are aware of the substances used at the workplace, 92 percent of the respondents indicate that they are trained in the use of the substances, 92 percent of the respondents indicate that Safety Data Sheets are available and that 92 percent of the respondents indicate that they are informed as to the risks of substances in use and

92 percent of the respondents indicate that they are being brief on the procedures in the event of serious and imminent danger.

On the aspect of Safety Equipment, 94 percent of the respondents indicate that drench shower, eyewash stations available at the workplace, 93 percent of the respondents indicate that all the safety equipments kept free from obstacles, 93 percent of the respondents indicate that Fume hoods available at the workplace and 93 percent of the respondents indicate that the fume hoods is operational and being checked annually by the appropriate contractor.

On the questions of availability and the appropriateness of fire extinguisher at the workplace, 97 percent of the respondents indicate that fire extinguisher are available and operational and that the proper type of fire extinguishers been strategically placed at the workplace.

On the question as to whether Chemical Safety issues are taken into considerations at the workplace the results of the survey indicate the following:

a. 96 percent of the respondents indicate that all chemical containers are properly labeled.
b. 97 percent of the respondents indicate that all chemicals stored based on their compatibility and not in alphabetical order.
c. 95 percent of the respondents indicate that the Storage areas well ventilated
d. 98 percent of the respondents indicate that Chemicals should not be stored on the floor, on bench tops or inside fume hoods.
e. 96 percent of the respondents indicate that Odiferous chemicals should be stored in cabinets or underneath fume hoods.

f. 96 percent of the respondents indicate that Reactive chemicals should be stored in air tight containers or at very low temperatures.

g. 95 percent of the respondents indicate that Flammable liquid storage is kept to an absolute minimum in approved flammable storage cabinets or refrigerators.

h. 99 percent of the respondents indicate that all hazardous, toxic, and odiferous chemicals are used in approved fume hoods.

On the aspect of whether Personal Protective Equipment (PPE) is provided by the employer and the need to wear PPE the results of the survey indicate that 95 percent of the respondents indicate that a proper PPE is provided by the employer and 94 percent of the respondents indicate that all laboratory occupants must wear appropriate PPE for protection.

On Laboratory Waste issues 97 percent of the respondents indicate that all hazardous waste location in a properly identified, 97 percent of the respondents indicate that the hazardous waste is clearly label, 98 percent of the respondents indicate that the hazardous waste containers well closed and in good condition 97 percent of the respondents indicate that proper inspection of hazardous waste being carryout and documented and 93 percent of the respondents indicate that the laboratory wastes are dispose according to the law in practice.

5.1.2 Analysis of the Survey

It is identified that hazards prevail at the workplace. The Chemical Technologists are aware of the hazards at their workplace. The substitution to this situation is that all the associated risk at the workplace should be control. This can be undertaken by proper safety procedures and adherence to the relevant laws.

This call for a procedure to be work out to by the employer to ensure safety of the Chemical Technologist at the workplace. One form is a “General Safety Guideline” while working in the laboratory. The Laboratory Safety Guideline is explained beneath.

At the same time, employers are also to conduct OSH programmes at the workplace. Some of the programmes that can be implemented are safety and health training, Hazard Identification Risk Assessment and Risk Control and setting up of Safety and Health Committee, if the employer has not done so. All these programmes can be conduct either as in house training, seminars and workshop or group discussion. On the same note, UniMAP is ready to provide assistance if needed.

Nonetheless, additional to this, 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:

a. Occupational Safety and Health (Use and Standards of Exposure of Chemicals Hazardous to Health) Regulations 2000

b. Occupational Safety and Health (Classification, Packaging and Labeling of Hazardous Chemicals) Regulation 1997.

c. Environmental Quality Act, 1974 vis-à-vis the Environmental Quality (Scheduled Wastes) (Amendment) Regulations 2005.

5.2 General Safety Guideline Focusing on Laboratory Safety

In discussing on the subject matter of general safety requirement in laboratory, the practice of University Malaysia Perlis in managing it laboratories will be used as a guide. 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 working 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. The Laboratory Safety Guideline is explained under the subject:

a. Before You Commence Working in the Laboratory

b. General Work Practices which include General Rules of Safety, Personal Hygiene, Housekeeping and Handling Glassware

c. Chemical Safety which include the aspect on Chemical Storage Chemical Disposal,

d. Personal Protective Equipment (PPE)

5.2.1 Before You Commence Working in the Laboratory

Every laboratory worker should observe the following rules:

i. Identify the probable hazards and suitable safety precautions prior to commencement of work. Raise and be able to response to the following queries:

   a. What are the hazards?

   b. What are the most terrible effects that may perhaps occur?

   c. What have I to do to be geared up?

d. What procedure, facilities or personal protective equipment are needed to reduce the risk?

ii. Be familiar with the place and how to make use of emergency equipment, including safety showers and eyewash stations.

iii. Be familiar with the emergency response procedures, facility alarms and building evacuation routes.

iv. Identify the types of personal protective equipment available and how to use them.

v. Report of unsafe conditions and convey them to the attention of your supervisor or lab manager immediately so that improvement can be made.

vi. Prevent release of toxic fumes by following waste disposal procedures.

vii. Position and clamp reaction apparatus so as to allow handling with no need to move the apparatus until the total reaction is finished

5.2.2 General Work Practices

The safety procedure will be focus on the following aspects that is General Rules of Safety, Personal Hygiene, Housekeeping and Handling Glassware

5.2.2.1 General Rules of Safety

i. No employee is permitted to carry out nonstandard activities such as running, jumping, or horseplay in laboratory areas.

ii. 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.

iii. All spills of liquid although in small quantity must be cleaned instantly to avoid contact with skin or clothing.

iv. Lifting of weighty things must be carrying out in the correct manner.

v. Every one must ensure the laboratory is clean after work is completed.

5.2.2.2 Personal Hygiene

i. Do not drink, eat, smoke, or apply cosmetics in the laboratory or chemical storage areas.

ii. 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.

iii. Proper foot protection shoes to be worn by laboratory personnel.

iv. Proper clothing which offers protection from splashes and spills, easily removable in case of accident and fire resistant should be worn in the laboratory.

v. Laboratory clothing should always be kept clean and to be replaced as and when required.

vi. 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.

vii. "Sniff-testing" of chemicals should not be done.

viii. Always use a bulb to pipette chemicals.

5.2.2.3 Housekeeping

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

i. The area must be kept as clean as the work allows.

ii. Each laboratory employee must be responsible for maintaining the cleanliness of his/her area.

iii. Reagents and equipment items must be return to their appropriate place after use.

iv. 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.

v. Reagents, solutions, glassware, or other apparatus should not be store up in hoods.

vi. Counter tops should be kept neat and clean. Bench tops and fume hoods shall not be used for chemical storage.

vii. Stored items, equipment, and glass tubing must not protrude past the front of shelf or counter limits.

viii. Stored items or equipment must not obstruct access to the fire extinguisher(s), safety equipment, or other emergency items.

ix. Stairways, hallways, passageways and access to emergency equipment and/or exits must not be obstructed with any equipment etc.

x. All working surfaces and floors should be cleaned regularly.

xi. All containers must be labeled with as a minimum the identity of the contents and the hazards those chemicals present to users.

5.2.2.4 Handling Glassware

i. Only glass in good condition should be used so as to avoid injury in laboratories.

ii. Hand protection should be used when picking up broken glass.

iii. When using glass tubing, all ends should be fire polished. Lubricate tubing with glycerin or water before inserting into rubber stoppers or rubber tubing.

iv. Use leather gloves to protect hand when inserting glass tubing.

v. Do not store glassware near the edge of shelves.

vi. Do not attempt to catch glassware if it is dropped or knocked over.

5.2.3 Chemical Safety

The chemical safety will focus only on the following aspects including Chemical Storage and Chemical Disposal.

5.2.3.1 Chemical Storage

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

i. Every chemical in the laboratory must have a definite storage place and should be returned to that location after each use.

ii. Storage must also take into consideration of chemical compatibility and must be stored separately.

iii. Adequate containment for spills and accidental releases must be provided.

iv. Hazardous chemicals should never be stored on the floor.

v. Utilize a suitable container for experiments, stored chemicals and collected wastes.

vi. Containers storing chemical waste must be inspected regularly for any sign of chemical leakage.

vii. Caps and covers for containers must be firmly in place whenever the container is not in immediate use.

viii. Labeling must appear on cabinets and room doors at approximately waist level or lower to allow adequate visualizations.

ix. All containers used for storage must be labeled.

x. Flammable liquids must not be stored in laboratory.

xi. 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.

xii. 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.

xiii. Out-of-date chemicals must be disposed of on a periodic basis.

5.2.3.2 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" 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. 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 that is ;

i. All departments have 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.

ii. The chemical wastes must have the proper packaging and labeling according to the guideline standard as provided by Kualiti Alam Sdn. Bhd.

iii. 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.

5.2.4 Personal Protective Equipment (PPE)

PPE should be worm 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 2[3].

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 2: Risks Associated With Hazardous Materials

5.3 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 THE OCCUPATIONAL SAFETY AND HEALTH ACT 1994 (USE

[3] Guideline on the Use of Personal Protective Equipment Against Chemical Hazard, Department of Occupational Safety and Health, Ministry of Human Resources, 2005 Page 14

AND STANDARDS OF EXPOSURE OF CHEMICALS HAZARDOUS TO HEALTH) REGULATIONS 2000

5.4 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. For further reading refer to THE OCCUPATIONAL SAFETY AND HEALTH ACT 1994 (CLASSIFICATION, PACKAGING AND LABELING OF HAZARDOUS CHEMICALS) REGULATION 1997.

5.5 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 the aforesaid Act.

6.0 CONCLUSIONS

Chemical technologists are employed by research and development and quality control laboratories, consulting engineering companies and a variety of other manufacturing and processing industries, and by utilities, health, and education and government establishments. The Chemical Technologist is aware of the hazards at their workplace. The substitution to this situation is that all the associated risk at the workplace must be control by proper safety procedures and adherence to the relevant laws. A quick random survey is made on 100 selected employees who are working as chemical technologist in laboratory. The survey identifies the hazards that prevail

at the workplace. This necessitate a procedure to be work out to by the employer to ensure safety of the Chemical Technologist at the workplace. Additional to this, both the employer and employees ought to be well-informed on the various laws with regard to safety and health that is the Occupational Safety and Health Act 1994 (Act 514) and also 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. .

7.0 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 as well. The following officers of the office of the Occupational Safety and Health Unit, University Malaysia Perlis can be contact for further discussion:

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