SAFE WORK

S SPOT THE HAZARD
A ASSESS THE RISK
F FIND A SAFER WAY
E EVERYDAY

EVERYONE'S RESPONSIBILITY

The Plan for Controlling

Chemical and Biological Hazards in the Workplace

APRIL 2005

Manitoba
Building for the Future

CHEMICAL AND BIOLOGICAL HAZARDS IN THE WORKPLACE

The Workplace Safety and Health Act requires an employer with twenty or more workers to prepare a written Safety and Health Program. One part of the Safety and Health Program content relates to chemical and biological substances. This document is intended to provide guidance on what steps should be taken to prepare a plan to control workplace exposures to these hazardous substances.

INTRODUCTION

Many substances that are present and/or used in the workplace may be hazardous. In Canada, hazardous materials are classified and regulated or controlled under the federal law known as the Hazardous Products Act (HPA). This law covers all kinds of materials and there are a number of regulations that subdivide the substances based on their particular use such as explosives, pesticides and industrial chemicals. The HPA defines prohibited, restricted and controlled products all of which are hazardous. It is vital that employees are aware of all hazardous materials they may encounter at the worksite, as well as proper procedures to handle and store these materials, as inappropriate handling may lead to injury, illness and even death. Provincial regulation of hazardous chemical and biological substances begins with W.H.M.I.S. The Workplace Hazardous Materials Information System Regulation 52/88 provides the tool to enable workplaces to develop the needed awareness and preventative programs.

This document has been developed to assist workplaces in creating and implementing a prevention plan for biological and chemical hazards present in their workplace. A prevention plan is the outline of the workplace strategy to prevent risk to workers that may arise due to the hazards present. An effective prevention plan is not only the cornerstone of a safe and healthy workplace; it is also an important element of the law under Manitoba's Workplace Safety and Health Act. Using this guideline, workers and management (with input from the safety and health committee or representative) will be able to put effective programs in place, enabling them to recognize the risks posed by these workplace hazards, and ensure appropriate actions are taken to protect against them.

Each workplace is different; therefore the prevention plan document will be unique for each workplace. Implementation of WHMIS and consideration to the possible health hazards are required wherever there are hazardous materials in a workplace. Provincial legislation requires the evaluation of each hazardous chemical and biological agent to determine whether the agent may be health hazard to workers. Employers are then required to implement control measures as may be required to prevent health risks to workers in the workplace.

IDENTIFICATION OF CONTROLLED PRODUCTS

The first step in identifying controlled products is to list all of the products in the workplace that may be hazardous. To assist in making the list as complete as possible:

a) walk through the workplace; be aware of smells and stains,
b) look for products in use and in storage, do not forget about hazardous wastes,

c) speak to workers about products used in their areas, and any concerns they may have,
d) check product labels for warning symbols or words expressing that the product may be hazardous,
e) investigate other sources of information such as invoices, batch sheets, material safety data sheets (MSDS's), purchasing department records, etc.

If this task seems overwhelming, start by concentrating your efforts in one area of your workplace; perhaps the area with which you are most familiar or an area where you suspect the most hazardous materials may be found.

Once the initial list of products in the workplace has been completed, the next step is to determine which ones are controlled products. Workplace controlled products utilize specific labels and data sheets as the primary sources for product hazard information. These products are labeled and sold under the provisions of WHMIS outlined in the Controlled Products Regulation under the HPA. Other hazardous products that are commonly found in the workplace are also available to the general public for use in private homes. These products have specific warnings on the label and manufacturers usually will offer additional information on data sheets when requested.

When identifying controlled products in the workplace it is important to remember the following:

1. Any time a new product enters the workplace, you must determine if it is a controlled product *before it is used*.

2. Watch for fugitive emissions. These occur when the use of a product in your workplace causes hazardous material to escape into the air. Examples include welding fumes, cleaning solvent vapours and combustion exhaust.

EVALUATION OF THE HAZARDS

Evaluating the health hazards of the listed controlled products is the next step in developing a prevention plan for the workplace. This step involves looking at the product or substance itself in terms of its toxicology (health effects on the body). Equally important are where the product is located, how it is used, stored and disposed of, and the types of exposure that may occur. This evaluation must include consideration of the measures currently being used to control exposure under normal and emergency circumstances. The conditions found in the workplace are compared with recommendations found in the reference information to determine if measures are adequate.

DETERMINING PRODUCT USE

When looking at how a controlled product is used, both routine and non-routine uses must be considered. For example, toluene may be routinely used to for the purpose of thinning paint or cleaning spray equipment. It is important to consider how much of the product is used for a particular activity and how frequently that activity takes place. Be aware that different uses may

result in different risks for exposure and so each use must be evaluated independently.

Chemical process sheets and inventories are a good source of information. It is important to talk to the workers who use the controlled products. They are the best source of information on how a product is used, including uses that may not be documented in the standard operation procedures. To continue the above example, the workers may use toluene to clean their hands which is not a recommended practice since skin absorption is a potential route of entry or exposure.

DETERMINING POTENTIAL EXPOSURES

To determine what exposures may be taking place first look at the form of the controlled product:

a) Is it a liquid, solid, or gas?
b) Is a mist or fume created?
c) Is it a dust or will it form vapours?
d) Can it get into the air?
e) Is there the possibility of it getting on the skin?
f) Could it get into the eye?
g) What are the exposure possibilities if there is a spill or an accidental release?

The best way to determine how exposure occurs is to observe the activities in which the product is used and talk with workers who normally use it. For some chemicals, it may be important to conduct air monitoring to determine the concentration of the controlled product in the air. Air monitoring should be repeated after control improvements are made, and the before and after values compared to determine if the changes have reduced the airborne exposure risk.

TOXICOLOGY

The next step is to consider the toxicology of the controlled product, or the ways it can enter the body and cause harm:

a) Can it be inhaled?
b) Will it be absorbed through the skin?
c) Is it damaging if it lands on the skin or enters the eye?
d) Will it be harmful if swallowed?

The specific health effects need to be looked at for each potential exposure route.

a) What are the chronic (long term) and acute (short term) health effects?
b) What are the consequences of acute exposure? Chronic exposure?
c) How toxic is this product?

Some product components have exposure limits which should never be exceeded. Exposure to some of these products may have serious health effects even if a worker is exposed for a very short time. Exposures may result in health effects that can remain undetected for a long time period before a disease condition develops. It is important to include these controlled

products on the inventory list at the workplace along with the exposure limits. Exposure to chemicals known or suspected to cause cancer, developmental or reproductive effects (also known as designated materials) should be kept as close to zero as possible. Some of these designated materials are listed in Manitoba's Health Hazard Regulation 53/88 and may also be specifically indicated on the hazardous material's label or documentation. Access to these designated materials in the workplace must be carefully controlled and protocols for their safe use and disposal developed.

The ideal source of this toxicological information is the product MATERIAL SAFETY DATA SHEET (MSDS). Unfortunately, not all MSDS's will have all of the information needed to complete the required evaluation. Some of the hazardous products in the workplace are exempt from the requirement for the provision of the MSDS. Therefore, for additional details regarding the chemical ingredients of a product, or to obtain answers to other questions about the product, the manufacturer should be contacted.

ACTION PLAN

An action plan is the list of steps taken to ensure prevention of worker exposure to controlled products. The content of the action plan will depend on the results of the hazard evaluation. Remember, each workplace as well as each controlled product is different, so the steps required will be unique to each workplace.

CONTROL PRINCIPLES

It is important to apply principles of hazard control in the workplace. In order for a hazard to result in harm to a body, there must be exposure or contact with a person. A hazard may be controlled at the source, along the path or at the worker.

1. Control at the source means the hazard is eliminated from the workplace altogether or isolated from the worker to eliminate the risk. Elimination of the product is the best measure if there is another method or product suitable to the task that will not introduce a new or perhaps greater hazard. A good example of control at the source is an enclosed process such as an automated system for mixing or spraying to replace manual operations.

2. Control along the path between the source of the hazard and the worker is considered when control at the source is not possible, or in addition to control at the source. Control along the path may include but is not limited to actions such as local exhaust ventilation, general dilution ventilation, shielding and remote handling devices.

3. Control at the worker is the least desirable method because of the hardship and responsibility it may place on workers. Additionally, this control measure should be considered as the last line of defense for the body, and may not offer adequate protection if used alone. Rules to ban eating, and job rotation are examples of the administrative type of control at the level of the worker. Examples of physical control at the worker include personal

protective equipment (PPE) such as rubber gloves, respirators, barrier creams and specialized clothing. It is specified in the law that PPE shall not be required unless no other method of control is reasonably practicable. A program of selection, fitting, training and education by a qualified person must be part of the use of PPE. This is particularly true of hearing and breathing protection for which there are standards developed by the Canadian Standards Association (CSA).

Control at the worker is often expensive and is usually the least effective of the control options.

CONTROL MEASURES

It is important to look at the control measures currently in place and evaluate whether they are providing the protection needed from the controlled product.

a) Is there a ventilation system providing air movement in the work area?
b) Does the air move away from the worker and the source of the contaminant?
c) What is located downwind?
d) Are there any local exhaust ventilation systems in place for specific jobs, for example, a spray paint booth? Local exhaust systems remove airborne contaminants near the source before they can spread out and contaminate other areas.

Personal protective equipment is commonly used, however it is important to ensure that the appropriate equipment is chosen and that it is being used effectively, for instance:

a) Are workers wearing the correct gloves, safety glasses, and/or respirators?
b) Have workers been properly fitted for their equipment and trained on how to use the protective equipment correctly?
c) Is the equipment cleaned and inspected regularly?
d) Are the correct cartridges being used on the respirator and are they properly stored between periods of use?

DOCUMENTATION (Writing the Plan)

The Workplace Health Hazard Regulation requires that the prevention plan be in written form and contain the following information:

a) Name of the workplace,
b) A detailed account of the steps taken to ensure that no worker is exposed to a designated material in excess of the occupational exposure limit (OEL) for that material over the next 12 month period,
c) A detailed account of the steps taken to ensure that no worker is exposed to a health hazard of any controlled product in excess of the occupational exposure limit (OEL) for that product over the next 12 month period, and
d) The completion date of the prevention plan, and the name(s) of those who completed it.

While the prevention plan is a stand alone document, many of the steps may be detailed in other documents such as the WHMIS training program and the

product/process evaluations. In such cases, the prevention plan may refer to the appropriate program or documents rather than repeating the information.

CONTENT OF THE PLAN

Consider a situation where the controlled product arrives in a package and the workplace ships these containers out to customers. In this case, the prevention plan should address the following:

a) How to handle the product,
b) Where to store it,
c) How to recognize an emergency situation,
d) What the emergency response procedure would be in the case of spills,
e) The equipment required in the case of a spill is present, and
f) Ensuring employees are trained in the proper use of that equipment.

On the other hand, if the workplace is using the controlled product, the prevention plan will consider all the above elements, plus:

a) An assessment of what the worker exposure is (a general idea based on observation, perhaps area measurements for airborne products),
b) The concentration limit of the exposure, if a controlled product is airborne then a limit must be established (OEL or action level),
c) Whether the controlled products are designated materials (aim for zero exposure to designated materials),
d) Consideration to how many controlled products a worker may be exposed to at one time,
e) How long in any one-day period the exposure lasts, and
f) What actions can be taken to reduce worker exposure.

There are a limited number of ways to reduce worker exposure once it has been identified:

a) Substitute for a less hazardous product,
b) Build local exhaust ventilation systems,
c) Isolate the process, and
d) Isolate the worker.

Regardless of what action is chosen to control worker exposure, there are additional elements of a prevention plan which must be considered:

a) The worker must be trained on the application of any prevention action he or she is responsible for,
b) Records of the prevention plan must be available to the workers and kept on file,
c) The prevention plan must be re-evaluated each time a new controlled product is introduced into a workplace, and
d) The workplace safety and health committee has the right to be involved in writing and managing the plan.

PREVENTION PLAN EVALUATION

As with any plan of action, it is important to determine if the actions actually brought about the desired results. Therefore, the prevention plan evaluation needs to answer the following questions:

1. Did implementation of the action plan reduce workers' exposure
   - (to controlled products) to below the OEL?
   - (to designated materials) as close to zero as reasonably practicable?
2. If not, what was the result of the action?
3. Does new equipment work properly?
4. Have workers received the proper training to use the new equipment correctly?
5. Was the plan carried out as written? If not, why?

There are several ways to evaluate prevention. Depending on the work environment, one, some, or all of the following may be appropriate methods:

1. Exposure Levels - Compare air concentration of controlled products before and after the changes. Did the concentration go down? Is it below the action level?

2. Performance Standards - Is the system design adequate for the desired results? Are ventilation systems working as designed? Are the actual air flows for a local exhaust hood the same as the design values?

3. Check List – A check list is a good tool for workers and/or health and safety committee members to complete on a periodic basis. How frequently this is done depends on the activity and the workplace. A check list can include many things, such as: availability of the proper personal protective equipment required by the prevention plan; worker training; proper use of equipment; and maintenance of all written records.

APPENDIX

DEFINITIONS RE: PREVENTION PLAN

ACGIH stands for the American Conference of Governmental Industrial Hygienists. This group annually publishes a booklet of values (TLVs and BEIs) that are referenced in the Manitoba Workplace Health Hazard Regulation 53/88.

Action level is the concentration of an airborne controlled product equal to one half of the established occupational exposure limit (OEL). It is at this point that consideration must be given to the control options to ensure the OEL will not be exceeded.

Air monitoring is the continuous or periodic sampling of air to measure the concentration of air contaminants, such as solvents, carbon monoxide, lead, asbestos, and dusts.

Batch sheet is an ingredient list with instructions for mixing a specific batch of product.

Controlled product means any product, material, substance, fugitive emission or hazardous waste that is flammable or combustible, poisonous or infectious, corrosive, reactive, oxidizing, or a compressed gas. The federal Controlled Products Regulations define these classes of controlled products under the authority of the Hazardous Products Act. Any product, material or substance that has been tested and meets the conditions for at least one class is included.

Designated material means any controlled product listed in Schedule "B" of the Workplace Health Hazard Regulation. Designated materials are included on this list because of their potential to cause cancer or have sexual or developmental repercussions.

Fugitive emission means a gas, liquid, solid, vapour, fume, mist, fog or dust containing a controlled product that escapes from process equipment, emission control equipment, a product or a device in the workplace or from any facility which constitutes a workplace or part of a workplace.

Occupational exposure limit (OEL) means the workplace established maximum air concentration of an airborne contaminant to which a worker can be exposed as averaged over the work day. In the Manitoba Workplace Health Hazard Regulation, OEL refers to an airborne controlled product or an airborne ingredient in a controlled product and the OEL established is not to exceed the ACGIH reported TLV values.

TLV-TWA stands for threshold limit value – time weighted average. This value is an average concentration given for a period of eight hours (length of a typical work day) and requires a 40-hour work week to be valid. This concentration of substance is considered to be tolerable by most of the average, healthy population for repeated exposure without adverse health effects.

Toxicology is the study of the effects of toxic or poisonous substances on living organisms.