1.0 Introduction and scope

Carcinogenic substances are any substance that can cause cancer in living tissue. It is a broad term covering a wide variety of chemicals. There are various classifications of carcinogens, including the International Agency for Research on Cancer (IARC) and the American Conference of Governmental Industrial Hygienists (ACGIH). Regardless of the classification system used, it is important to protect employees from these substances and limit exposure as much as possible.

2.0 Requirements

The main requirement when handling carcinogenic material is to keep worker exposure to levels to a minimum, following a principle known as “as low as reasonably achievable” (ALARA). By following this principle, we can be confident that the use of a substance will not have long-term health effects for our employees. In order to achieve this, we should follow the hierarchy of controls to identify which will best protect our employees.

**Elimination/Substitution**

If possible, consider the following questions:
- Is this substance absolutely required for the process/experiment?
- If it is required, is there a suitable substitute substance that is non-carcinogenic?

**Engineering Controls**

If we must use the product, our best line of defense is to prevent exposure with engineering controls. Engineering controls include systems or barriers that prevent the substance from reaching the employee, or minimize the amount of the substance in the employee’s breathing zone. When looking at engineering controls, consider the 4 routes of exposure:

**Inhalation** – This is the most common route for chemical substances to enter the body. When handling a product in a powder form, a liquid/mixture that can be aerosolized, or as a gas/vapour, these substances can enter the body through the lungs. The two main engineering controls to prevent this include containment and ventilation. At the very minimum, if there is a chance to inhale a carcinogen, it must be handled inside a fume hood or by using similar ventilation controls.

**Ingestion/Skin Absorption/Injection** – Ingestion is the chemical substance entering your body through your digestive system. Typically, this does not involve drinking or eating the substance directly, but it does include inadvertently ingestion after the substance has come in contact with your hands or face. Skin absorption is limited to a specific number of chemicals that can enter your body through the skin. Injection includes entering through a break in the skin, either through mechanical injection or a wound that is already present. Engineering controls to prevent this include containment or a barrier to prevent contact with your hands, face and skin.
**Administrative Controls**

Administrative controls include any sort of practice, process, or other non-tangible control that will help protect employees. When handling carcinogens, employees must be trained in the health hazards and how to protect themselves from those hazards. Other good administrative controls should include written safe work procedures/practices specific to your operation, signage to warn others if applicable, and have a proper plan in place to handle a spill or incident with the chemical.

**Personal Protective Equipment**

Personal Protective Equipment (PPE) is considered the last line of defense. This is because it should only be used in two scenarios.

1) As a precaution to protect the employee when the engineering and administrative controls fail, thereby reducing exposure to the chemical.
2) When the other controls do not provide sufficient protection to employees. Often PPE is combined with engineering and administrative controls to offer a higher level of protection.

PPE that is commonly used to protect employees from exposure to carcinogens includes respirators, gloves, lab coat and other skin protection, and safety glasses/goggles. For more information on PPE selection, including choosing the right gloves or respiratory protection, see the EHS Webpage.

Since the goal when handling carcinogens is to follow the ALARA principle, PPE should always be used as an extra precautionary measure. If the substance is fully contained, such as in a glove box, a lab coat, safety glasses/goggles, and the gloves of the glove box will offer extra protection should the glove box fail. When handling it inside a fume hood, respiratory protection should be added to protect employees in the case that the fume hood fails, or there is another incident where exposure may occur.

**3.0 Responsibility**

It is the lab managers, principal investigators, supervisors, and employees' responsibility to identify carcinogens and protect employees from exposure. For additional information, see the Hazard Management Assignment of Accountabilities and the Hazard Management Procedure available on UAPPOL.

Environment, Health and Safety is available as a resource to assist/advise in meeting this requirement.
4.0 Standard process

When completing a hazard assessment, carcinogenicity must be considered to identify both the risk to employees and controls to protect them. In order to determine if a product is a carcinogen, be sure to check the Safety Data Sheet (SDS). If no information is available and you are unsure, there are other resources to determine if a substance is a confirmed carcinogen. For more information on these resources, contact the Department Of Environment, Health and Safety.

When determining the risk of a carcinogenic material, consider how employees may be exposed to the substance. This needs to be specific to your process/experiment, as there can be a number of variables that will affect the potential for an employee to be exposed to the substance. Some questions to consider include:

- What is the potential for this to be inhaled? (i.e. Powder is more likely to be inhaled than a solid pellet.)
- Is there a potential for ingestion, injections, or skin absorption?
- Could an employee be exposed during a spill or other incident?
- What is the amount of product being used? (a small amount (micrograms) is typically a lower hazard than a large quantity (kilograms)).
- How is the product being used?
- What controls can we put in place to keep these exposures to ALARA levels?

5.0 Related Policies and Procedures

- Environment, Health and Safety (EHS) Policy
- Hazard Management Assignment of Accountabilities
- Hazard Identification, Assessment and Control Procedure
- Chemical Safety Program
- Respiratory Code of Practice

6.0 Frequency of Review

This document will be reviewed and updated as required by the release of new information, legislation, or change of practice.

7.0 Version Control

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