How to Work Safely with – Very Toxic Materials – Fact Sheet

WHY SHOULD I WORK SAFELY WITH VERY TOXIC MATERIALS?

Very Toxic materials are substances that may cause serious harm to an individual if it enters the body. This document provides guidance on safe handling and storage practices and how to work safely with very toxic materials. Under WHMIS 1988 classification, very toxic materials are labelled as class D1A (Materials Causing Immediate and Serious Toxic Effects) or D2A (Materials Causing Other Toxic Effects).

Why should I substitute with a less hazardous material where possible?

Whenever possible, it is always best to avoid using a very toxic material either by eliminating its use (by changing the method or process for example) or by substituting the very toxic material with a less hazardous material. Unfortunately, it is not always possible to find a non-toxic (or less toxic) substitute that still does the job effectively and safely.

When considering substitution, the first step is to obtain the Material Safety Data Sheets (MSDSs) for all possible substitute materials. Find out about all of the hazards (health, fire, chemical reactivity) of these materials before making any changes. Caution must be exercised so as to avoid introducing a potentially more hazardous situation. Choose the least hazardous materials that can do the job effectively and safely. Learn how to work safely with them, too.

Why should I use good ventilation whenever working with very toxic materials?

To prevent exposure to a very toxic material, strict control measures are required. Ventilation is a very important control measure for very toxic materials. Well-designed and well-maintained ventilation systems remove the very toxic vapours, fumes, mists or airborne dusts from the workplace before workers are exposed.

When considering exposure control measures such as ventilation, there are many considerations, including:

- Toxicity (e.g. LD50, LC50) – this is particularly important for very toxic materials as exposure to VERY small amounts can be harmful or fatal.

- Physical state of the toxic material (e.g. is it a paste? a powder?, a liquid?).
- Chemical properties (e.g. vapour pressure, boiling point, odour threshold, etc.).
- Other potential health effects (e.g. eye or skin irritation?, sensitizer?).
- Potential routes of exposure (inhalation? skin absorption?).
- Quantity used.
- Frequency of use (Once a day? Every day?).
- The job requirements (e.g. how the material is handled).
- Size and layout of the work area.

An assessment of the specific ways that a very toxic material is stored, handled, used, and disposed of is the best way to find out if existing ventilation controls (and other hazard control methods) are adequate.

Generally, with very toxic materials, general (dilution) ventilation does not provide sufficient protection. To prevent a very toxic material from entering the workplace, local exhaust systems are usually required. For larger scale operations, this may require designing the process so that the very toxic material is completely enclosed or isolated from the workplace environment. In other situations, where smaller amounts are used, glovebox isolation units or local exhaust systems are used. Leak detection systems with alarms may be desirable for some situations.

For any of these ventilation systems, particularly ones that deal with very toxic materials, it is important to ensure that:

- Contaminated air does NOT recirculate back into the workspace.
- There is some means of indicating if there is a failure of the system (e.g., alarm system if airflow is compromised).
- Users know how to respond during an emergency or ventilation system failure.
- The protective systems (e.g. ventilation, alarms, etc.) are regularly inspected and maintained by trained individuals who understand the potential hazards and are suitably protected.

How should I store containers of very toxic materials?

For the storage of very toxic materials, ensure that the storage area is clearly identified with warning signs, is clear of obstructions and is accessible only to trained and authorized personnel.

Before storing very toxic materials, inspect all incoming containers to ensure that the containers are undamaged and are properly labelled. Do not accept delivery of defective containers. Also, be sure to store very toxic materials in the type of containers recommended by the manufacturer or supplier.

Some other important points for storage of very toxic materials include:

- Keep the amount of very toxic material in storage as small as possible (generally no more than 3 months worth).
- Inspect storage areas and containers regularly for any deficiencies, including leaking or damaged containers, expired shelf-life or poor housekeeping. Correct all deficiencies immediately.
- Ensure that containers are tightly closed when not in use and when empty.

Keep empty containers in a separate storage area. Assume empty containers contain hazardous toxic residue and keep tightly closed.
- Store containers at a convenient height for handling, below eye level if possible. High shelving increases the risk of dropping containers and the severity of damage, injury and/or exposure if a fall occurs.
- Store material within the temperature range recommended by the chemical manufacturer/supplier.
- To contain spills or leaks, store containers of very toxic materials in trays made of compatible materials. For larger containers such as drums or barrels, provide dikes around the storage area and sills or ramps at door openings. Storage tanks should be above ground and surrounded with a dike capable of holding the entire contents.

Where should very toxic materials be stored?

Very toxic materials must be stored in an appropriate storage area and location. In general, the storage area for very toxic materials should have the following characteristics. Many of these recommendations apply for safe chemical storage in general.

- Ensure that the storage area is well-ventilated and out of direct sunlight.
- Store very toxics separately, away from processing and handling areas, eating areas and protective equipment storage. Separate storage reduces the amount of damage and/or injury caused in case of fires, spills or leaks. If totally separate storage is not possible, use physical separation to keep very toxics away from incompatible materials.
- The storage area should be fire-resistant and constructed from non-combustible materials.
- Ensure that emergency eyewash/shower stations are readily available nearby and are tested regularly.
- Ensure that suitable fire extinguishers and spill clean-up equipment are available.

How do I handle very toxic materials safely?

Safe handling and work procedures are crucial for workplaces where individuals use very toxic materials. It is vital that people working with hazardous materials such as very toxics are properly trained regarding the potential hazards. Remember, if, at any time an individual is unsure or has questions about working with a very toxic material, they should always talk with the supervisor.

This section refers to general safe handling practices for very toxic materials. Instructions and training for the specific handling of a particular very toxic material used a workplace is the responsibility of the supervisor (employer).

In general, when handling very toxic materials:

- Before handling, it is extremely important that engineering controls are operating properly and that required protective equipment requirements and personal hygiene measures are being followed.
- Consider using a closed handling system for processes involving a very toxic material. If a closed handling system is not possible, use the smallest possible amounts in a well-ventilated area separate from the storage area.

- Prevent the release of very toxic vapours, dusts, mists or gases into the workplace air.
- Maintenance and emergency personnel need to be advised of potential hazards.
- Immediately report any leaks, spills or failures of the engineering controls.
- Wear appropriate personal protective equipment to avoid exposure (eye, respiratory or skin) or contact with contaminated equipment/surfaces.
- Never work alone with very toxic materials. Another person must be in view at all times and must be equipped and trained to rescue. Alternatively, precautions such as regular visual checks made by another person or a telephone call-in procedure should be set up to ensure the continued safety of lone workers or workers in remote locations.
- Be alert to the typical symptoms of poisoning and first aid procedures. Report any signs of illness or overexposure immediately to the supervisor. Depending on the material, medical attention for an exposure may be required even if the exposure did not seem excessive. With some materials, symptoms of a severe exposure can be delayed.
- Do not return contaminated or unused material to the original container.
- Ensure containers are clearly labeled and inspect containers for leaks or damage before handling.
- Keep containers tightly closed when not in use.
- To prevent spillage, use proper tools to open containers and to transfer material.
- Pour very toxic liquids carefully from the container to avoid splashing and spurting.
- Maintain good housekeeping (e.g. clean surfaces, no accumulation of dust).
- Avoid any welding, cutting, soldering or other hot work on an empty container or piping until all very toxic liquid and vapours have been cleared.
- For large-scale storage of this material consider the installation of a leak detection system with an alarm.
- Ensure suitable emergency equipment for fires, spills and leaks are readily available.
- In the event of a spill or leak of a very toxic material, evacuate the work space.
- Ensure emergency eyewash/shower stations are readily available and are tested regularly.

How do I dispose of very toxic waste material safely?

Very toxic waste material must be disposed of properly. Careless disposal of any hazardous waste presents a potential hazard to many individuals who may not be trained or equipped to deal with unexpected hazardous materials (e.g. caretaking staff, garbage collectors, plumbers, water treatment plant workers, firefighters, etc.). Careless disposal can also cause significant damage to the environment.

The following are some general recommendations for disposal of very toxic waste materials:

- Always review federal, provincial and local (municipal) government requirements prior to disposal of very toxic materials. In some cases, disposal by controlled incineration or secure landfill may be acceptable.

Specific requirements may vary depending on the jurisdiction.
- Very toxic chemical waste must NOT be flushed down sewer or sanitary drains as a method of disposal. This practice is illegal and unsafe.
- Do not mix hazardous waste materials with regular garbage destined for a landfill.
- Ensure that the waste container used is compatible with the waste material.
- Always ensure that the waste container is properly and accurately labelled.
- To avoid potential explosions, fires or spills, do not mix incompatible mixtures in a single waste container.
- Do not overfill liquid waste containers. Liquid waste containers should only be filled to about three-quarters capacity to allow for vapour expansion and to reduce the potential for spills occurring from moving overfilled containers.
- In general, store waste material in the same manner as the non-waste material. Always consult the MSDS for any specific storage and disposal recommendations from the manufacturer/supplier.
- Assume that empty containers contain very toxic residues. Do not reuse the containers. Treat the container as hazardous waste unless the containers can be decontaminated safely and properly.

Why is good housekeeping important when working with very toxic materials?

Good housekeeping is a very important way to prevent exposure to very toxic materials. A clean and orderly workplace is safer for everyone.

When working with very toxic materials:

- Use work surfaces that can be easily decontaminated or cover the work surfaces with compatible, resistant and/or disposable material for easier containment and clean-up of spills.
- Have appropriate spill control equipment and procedures. Clean up any spills and build-ups of very toxic materials promptly and safely using this equipment and procedures. Additional guidance may be available on the MSDS or from the supplier/manufacturer.
- Avoid dry sweeping of solid materials. Use a pre-wetting technique or vacuum equipped with high efficiency filter(s) instead.
- Properly dispose of unlabelled or contaminated chemicals.
- Ensure that all waste containers are compatible with the toxic material and that the containers are properly labeled and stored.

Why is personal cleanliness important when working with very toxic materials?

Personal cleanliness when working with very toxic materials provides protection not only for you but protects others as well (such as co-workers and family members).

- Maintain good personal hygiene. Wash hands before eating, drinking, smoking or going to the toilet. When handling on a large scale, a double locker-shower set-up may be necessary.
- Remove contaminated clothing and leather shoes or boots. Wash contaminated items immediately and thoroughly in water before re-wearing or discarding.
- Store food and tobacco products in uncontaminated areas.
- Avoid touching yourself (e.g. scratching your nose or rubbing your eyes) with contaminated hands.
- Do not chew gum when working with very toxic materials.

- Wash thoroughly at the end of the workday even though you have done everything mentioned above.

When should I wear proper personal protective equipment?

Control measures such as ventilation, enclosure and work practices are examples of the preferred methods of protecting workers. If these measures are not feasible or unable to provide appropriate worker protection, then personal protective equipment may be required.

Choosing the right PPE for a particular job is essential. MSDSs should provide general guidance. Also obtain help from a qualified professional who knows how to evaluate the hazards of a specific job, especially those related to very toxic materials, and how to select the proper PPE.

Before a very toxic material is brought into the building and used:

- The appropriate PPE should be selected and be available.
- Workers should know where the PPE is and be trained to use it for emergencies as well as for normal operations.
- It is important to understand the limits of PPE, not just its capabilities.

It is crucial that any required PPE be worn when specified for a job. PPE can be very effective but not if you don’t wear it.

Avoiding Skin Contact with Very Toxic Materials

Some very toxic materials can be harmful through skin contact. In these instances, it may be necessary to wear protective equipment such as gloves, aprons, boots, hoods or other clothing, depending on the risk of skin contact. Choose clothing made of materials that resist permeation, penetration or damage by the chemical.

Protecting The Eyes and Face from Very Toxic Materials

Eye protection is important when working with very toxic materials. Selection of the most appropriate type depends on factors such as how the material is used, physical characteristics (e.g. fine powder, liquid, vapour, etc.) and potential health effects (e.g. eye irritant, skin irritant, toxicity through skin absorption, etc.). In some cases, it may be necessary to wear a face shield (with safety glasses or goggles) to protect the face from splashes.

Avoid Breathing Very Toxic Dusts, Mists or Vapours

Proper selection and fitting of respiratory protection can be quite complex and any time it is used in a workplace, it must be carefully monitored and controlled to ensure worker safety.

If respiratory protection is required in the workplace, a respiratory protection program must be developed, written and maintained as described in the Respirator Selection OSH Answers. Further guidance for developing a program can be found in the current CSA Standard Z94.4 “Selection, Care, and Use of Respirators.” Follow all legal requirements for respirator use and approvals. These may vary between jurisdictions in Canada.

Careful selection of the appropriate respirator style and cartridges is an

important component of any respiratory protection program. Respiratory equipment must be properly sized and the user must know how to fit-test, clean, maintain and store the equipment. Users must also know how often to change the cartridges. NEVER assume that “smelling” the very toxic material will indicate when to change the cartridge.

What should I do in an emergency?

The time to figure out what to do during an emergency is BEFORE it happens. Be ready to handle emergencies such as fire, leaks or spills quickly and safely.

In the event of an emergency involving a very toxic material:

- In the event of a spill or release of a very toxic material, immediately put on a suitable respirator and leave the area until the severity of the problem is determined. Escape-type respiratory protective equipment should be readily available in the work area.
- Report any leaks, spills or ventilation failures immediately. Restrict access to the affected area.
- Obtain first aid if you have been exposed to the very toxic material.
- Ensure emergency eyewash stations and safety showers are present wherever accidental exposure to very toxic materials might occur.
- In the event of skin or eye contact, the first aid response usually involves flooding the contaminated area with large amounts of water. The specific first aid recommendations can vary from one very toxic material to another, however, depending on the nature (properties and hazards) of the material.
- The MSDS and container label for a particular very toxic material should give specific first aid instructions in case of exposure by skin or eye contact, inhalation, or swallowing.
- Time is crucial if an individual is exposed to a very toxic material. Ensure that an appropriate emergency medical response is planned and prepared in advance – this may include stocking the antidote or drugs required for treatment, having written procedures (and MSDS) as well as cautions available for the emergency personnel.
- Only specially trained people, equipped with the proper tools and protective equipment, should handle the emergency. Nobody else should go near the area until it is declared safe.
- Planning, training and practicing for emergencies are important so that everyone knows what they must do.
- It may be necessary to notify government environmental agencies if there is a release of very toxic material into the environment.

The MSDSs for the materials being used on the job are a good starting point for creating an emergency plan. MSDSs have specific sections on toxicity, fire and explosion hazards, including suitable fire extinguishing equipment and methods, spill clean-up procedures and first aid instructions. If the directions in each MSDS section are not clear or seem incomplete, contact the material’s manufacturer or supplier for help. You can obtain help in developing emergency plans from many other sources too. Local fire departments can assist with fire emergency plans and training.

What are the basic safety procedures concerning very toxic materials?

Following these basic safe practices will help protect you from the hazards of

very toxic materials:

- Know which materials you work with are very toxic. In addition, be aware of ALL of the hazards (e.g. fire/explosion, corrosivity, chemical reactivity) of the materials used in your work.
- Read the MSDSs for all of the materials used in your work. Know how to use these materials safely and be able to protect yourself and your co-workers.
- Follow the work practices specified by your employer. Your employer must provide specific training on how to work safely with these materials at your worksite.
- Store, handle and use very toxic materials only in well-ventilated areas.
- Ensure that engineering controls (e.g. ventilation) are operating. Closed handling systems may be necessary to prevent the release of the material (dust, mist, vapour, gas) into the workplace.
- Report ventilation failures, leaks or spills to your supervisor immediately.
- Wear the appropriate personal protective equipment that your employer specifies for the job. This equipment may include respiratory protection, goggles, face shield, and chemical protective clothing, such as an apron and gloves made from materials that protect against the chemicals being handled.
- Be aware of the typical symptoms of an overexposure and appropriate first aid procedures. Report any signs of illness immediately to your supervisor.
- Keep containers tightly closed when not in use.
- Keep only the smallest amounts possible (not more than one day’s supply) in the work area.
- Do not return contaminated or unused material back to the original container.
- Practice good housekeeping, personal cleanliness and proper equipment maintenance.
- Handle and dispose of very toxic wastes safely.
- Know how to handle emergencies (fires, spills, personal injury) involving the very toxic materials you work with.
- Follow the health and safety rules that apply to your job.