

CHAPTER 3: EMERGENCY PREPAREDNESS AND RESPONSE

Overview

This chapter provides information and strategies to prepare for contingencies in the science classroom, laboratory, and science preparation areas. The chapter includes sections on planning emergency responses, responding to accidents and medical emergencies, and preparing accident reports.

General Safety Audit

A general safety inspection can be a good starting point for preparing to deal with emergencies that are more likely to occur in or affect science laboratories. Typically this inspection would be done as part of the larger school emergency planning process, and would include a thorough evaluation of general safety concerns such as fire prevention and response, as well as response to medical emergencies, gas leaks, and other situations. In addition, special attention would be given to areas where chemicals are stored and used, since extra precautions and equipment are involved in these locations. An inspection checklist could be developed to assist in this process and to ensure that nothing is overlooked. See [Appendix D](#) for a sample inspection checklist devised for use in assessing safety in laboratory areas.

Emergency Preparedness Planning

The *Workplace Safety and Health Act* of Manitoba specifies that employers of every workplace with 20 or more workers must develop and implement a workplace safety and health program. Such a plan establishes procedures to deal with different kinds of emergencies and is tailored to the specific design, circumstances, and nature of the hazards of the school. Procedures must also tend to students with special needs. Any emergency that threatened the safety of students or staff would then be dealt with according to this plan.

The workplace safety and health program is developed for the school as a whole, but has direct implications related to science classrooms and laboratories. Science teachers should be aware of some of the requirements of such a program, which include

- developing adequate systems to identify and control hazards
- identifying what people, resources, and procedures are needed to deal with emergencies
- preparing of statement of responsibilities for safety and health (who is responsible for what)

- scheduling regular planned inspections
- developing plans to control chemical and biological hazards
- developing training plans for workers
- developing a procedure to investigate incidents, dangerous occurrences, and refusals to work
- developing ways to involve workers in the program
- evaluating and revising the program regularly

Considerations in Emergency Preparedness Planning

Emergency plans address a number of different safety hazards and emergency situations. As a minimum, the plan would include the following:

- safety measures for fire, including prevention measures specified in the federal and provincial fire codes, as well as municipal regulations together with procedures to follow in the event of a fire in a science laboratory or elsewhere in the school
- a building floor plan showing where all toxic substances are located
- procedures for dealing with the release or spill of toxic substances
- procedures for responding to a natural gas or propane leak
- procedures for responding to accidents and medical emergencies
- plans to ensure staff receive adequate orientation and training

Creating Your Own Emergency Plan

When developing an emergency plan, you should consider the following:

- Making sure the school has the necessary people, procedures, and resources in place
- Clearly defining who is responsible for what
- Training everyone to follow procedures and use appropriate equipment

An emergency plan for your classroom could contain the following elements:

- Identifying situations (fires, spills, leaks, etc.) that will require response
- Identifying what will be done when an emergency occurs, including when a problem can be handled by an individual teacher (When conditions exceed those parameters, a school team including members of the school administration could establish control and provide direction and support to the affected area. If the problem affects the school at large, then the plan is interfaced with the divisional or the community emergency or crisis management plan.)
- A means of alerting the school administration about the onset of a crisis situation is highly recommended as a routine for quickly assembling a pre-designated crisis management team once the plan is activated
- The plan should be self-assessing (This means a checklist of questions by which you can determine if the plan meets your needs or requires updating.)

Resources

Guide for Developing a Workplace Safety and Health Program. This document provides a lot of information related to workplace safety and health plans. Available online at <http://safemanitoba.com/uploads/guidelines/developingws_hprogramjuly2010.pdf>.

Evaluating Your Emergency Planning

To evaluate whether your emergency preparedness planning is adequate, consider whether your plan is realistic, comprehensive, and appropriate for the workplace, and whether it includes measures for implementation. With effective emergency planning,

- all potential emergencies are mentioned in the plan but it is the most probable events as determined by the hazard analysis and risk assessment that are developed into contingency arrangements
- the required supplies and equipment (e.g., fire extinguishers, first aid kits) are available and in good condition
- there is an effective process to announce the emergency to all staff members, students, and visitors
- drills are periodically carried out to test response to one incident at a time
- records and evaluation of drills indicate that the plan is feasible
- staff members understand the plan
- staff members are aware of their roles if there is an incident or if an evacuation is necessary; staff and their back-ups are sufficiently trained to carry out these roles
- the required number of staff are trained in emergency and standard-level first aid
- all staff members are trained and prepared so that they know how to declare an emergency and initiate the alarm, as well as how to determine the required level of response (e.g., standby, escalation, evacuation, or take cover)

Responding to Fire

Fire has always been one of the attendant hazards of laboratory operation. Laboratories make use of flammable materials including solids, liquids, and gases. A response procedure for a school fire would address the following elements:

- When to sound the local fire alarm
- When and how to evacuate the school

- Who is responsible for notifying the fire department and school superintendent
- Under what circumstances staff members may attempt to extinguish the fire, and procedures for doing so
- When and how to permit people to re-enter the building, or to carry out further evacuation procedures if staff and/or students will be unable to return
- Procedures for securing utilities
- Responsibilities and procedures for filing written reports with the supervisor of schools and the fire marshal

Responding to Toxic Substance Leaks and Spills

The response plan should include procedures for emergency response to leaks and spills of toxic, caustic, and reactive substances, particularly those that pose an immediate danger due to the quantity and location of the spill. The emergency plan should include the following:

- When and how to evacuate
- Who is responsible for requesting emergency services and informing appropriate school officials
- Procedures and responsibilities for providing the appropriate MSDS to the emergency responder, hospital, or physician
- Procedures and responsibilities for reporting the leak or spill and completing any follow-up investigation

For spills of small quantities of less dangerous substances, a full emergency response may not be required. See [Chapter 8](#) for clean-up procedures.

Responding to a Natural Gas or Propane Leak

Natural gas and propane are flammable gases that are used as fuels in science laboratories. Both are delivered under pressure. Any leakage of gas from pipes or fittings creates a risk of fire and/or explosion, particularly if the leakage is in a confined area, and especially if it remains undetected for some time. A slow continuous leak can lead to migration of gas through a room or building until it reaches a source of ignition, resulting in an explosive flashback to the source. A fire near the source of a leak may also cause the gas container or pipe to explode.

Emergency planning should address the following elements for natural gas or propane leaks that cannot be immediately stopped:

- When and how to evacuate the area
- Who will alert the fire department and school district officials

- Under what circumstances staff members may attempt to localize and/or dissipate the leaking gas, and procedures for doing so

Responding to Accidents and Medical Emergencies

To handle medical emergencies and serious injuries, each school is required by the *Workplace Safety and Health Act* to have staff with emergency or standard-level first aid training. These individuals would have the expertise to administer the Heimlich manoeuvre, mouth-to-mouth breathing, and cardiopulmonary resuscitation (CPR).

This section outlines first aid for both minor and major injuries that could occur in the science laboratory or classroom. Included are the first steps to alleviate damage and to treat the injury, as well as when to engage local emergency services. School divisions may have additional procedures or regulations for responding to medical emergencies.

Notes

In each of the following cases, the school administration must be alerted immediately.

Corrosive Chemical on the Skin

The current MSDS should be present during the demonstration or laboratory experiment and must be reviewed prior to the activity being started to ensure that the appropriate first aid procedures are ready. Some controlled products may react with water, so it is critical that the correct initial first aid response is applied. In most cases, the general rule is to wash the area immediately and thoroughly with cool water or soap and water. The recommended time for this washing is 15–20 minutes. Remove contaminated clothing. If significant harm is detected or suspected, seek medical assistance.

According to the Canadian Centre for Occupational Health and Safety:

“Most standard sources recommend that water flushing following skin or eye contact with a chemical should continue for 15 or 20 minutes. However, all chemicals do not cause the same degree of effects (some are non-irritants while others can cause severe corrosive injury). Therefore, it makes sense to tailor the duration of flushing to the known effects of the chemical or product, as follows:

- five minutes for non-irritants or mild irritants
- 15–20 minutes for moderate to severe irritants and chemicals that cause acute toxicity if absorbed through the skin
- 30 minutes for most corrosives
- 60 minutes for strong alkalis (e.g. sodium, potassium or calcium hydroxide)

It is very important that water flushing start immediately following skin or eye contact with a chemical. It is better if complete water flushing occurs onsite. However, moving the victim to an emergency care facility earlier may be necessary, depending on the victim’s condition (e.g., compromised airways, breathing, or circulation) and/or the availability of a suitable water supply. If it is necessary to transport the victim before completing flushing onsite, flushing should continue during emergency transport, taking proper precautions to protect emergency services personnel.”

Source: www.ccohs.ca/oshanswers/chemicals/firstaid.html

Splashes into the Eyes

Using the nearest eyewash station, immediately flood the eye(s) with a gentle stream of cool water for 15–20 minutes, holding the eye(s) open if necessary. After flushing, close the eyelid and cover with a loose, moist dressing. Proceed to get medical help to assess the condition of the eye(s) and ensure no further damage occurs. Alkalis produce more serious burns than acids, but flushing should be done immediately, regardless of the substance.

Foreign Object in the Eye

Seek emergency medical help.

To help someone with a foreign object in the eye, first, keep the person from touching it. Then, wash your hands, seat the person in a well-lit area, and try to locate the object in the eye visually. Examine the eye by gently pulling the lower lid downward and instructing the person to look upward.

Reverse the procedure for the upper lid. Hold the upper lid and examine the eye while the person looks downward.

If the object is on the surface of the eye, you may be able to flush it out or remove it manually. While holding the upper or lower lid open, use a

moistened tissue or the corner of a clean cloth to remove the object by lightly touching it. Once removed, flush the eye with a saline solution or lukewarm water. If you cannot remove the object easily, cover the eye with a soft cloth and seek emergency medical assistance.

If the object is embedded in the eye, do not remove the object. Apply a dressing over the eye in such a way that it does not make direct contact with the eye surface. Cover the dressing with a cup or ring pad, and seek emergency medical assistance.

If pain, vision problems, or redness persist, seek emergency medical help.

Cuts

Put on disposable gloves to minimize risk of infection from the blood. If necessary, wash minor cuts with cool water to remove any foreign material. Dry the area and cover with a bandage. In the case of major cuts with severe blood loss, apply a large compress and then apply direct pressure with the heel of your hand and transport to the hospital. If a piece of glass or other sharp object is embedded in the wound, tent dress the area and add padding around the injury until it is higher than the embedded object. Secure padding with a wrapping of gauze and seek medical help. For major cuts with minor bleeding, cover with a gauze pad, and then transport the victim to hospital for further medical help. If glass or any other sharp object may still be in the wound, do not attempt to remove it. Be careful not to put undue pressure on the gauze while transporting the victim, since circulation may be cut off completely.

Ingestion of Chemicals

The primary source of information in Manitoba on prescribed treatment for ingested chemicals is the Manitoba Poison Centre at 1-855-7POISON (1-855-776-4766). This centre operates 24 hours a day, seven days a week. It provides specialized information and treatment recommendations related to chemical, biological, pharmaceutical, and environmental poisoning and exposure. If ingestion of a chemical occurs, they should be called immediately before proceeding with any treatment. Another source of information on treatment would be found on the MSDS on file for the chemical.

Manitoba Poison Centre: 1-855-7POISON (1-855-776-4766).

Burns

Treatment of minor burns is basically a three-step process. Cool the burned area for about 15 minutes by running cool water over it, immersing it in cool water, or cooling it with a cold compress. Do not use ice, as this may freeze the area of treatment. Apply a triple-antibiotic ointment or a moisturizer to

prevent drying. Loosely wrap the burned area with a sterile gauze bandage, avoiding excess pressure on the burned skin. If the burn is severe, cool the area as described above, wrap loosely with a moist dressing, and transport the person to a hospital for medical assistance. Seek medical assessment and/or treatment.

Burning Clothing

Rapid action in extinguishing burning clothing is critical to minimizing exposure of the victim and minimizing harm that may result. Several approaches are sometimes used and your local fire department or school district policy may recommend one of these as the preferred response. The “Stop, Drop, and Roll” method is commonly recommended by fire departments. In conjunction with this technique, other heavy clothing or a fire blanket may be used to smother the flames. Fire blankets are not a fire code requirement and are not recommended by all fire departments. **If a blanket is used, it must be removed immediately after the fire is out to minimize the trapping of heat and sparks against the victim’s skin.** Other options for extinguishing burning clothes include using an ABC dry-chemical fire extinguisher, spraying the victim with water, or using an emergency shower, if available. Selection of any one of these options may be circumstantial. The use of the fire extinguisher, for example, may not be practical from a safety perspective if the fire is near the face and chemical spray will get into the victim’s eyes.

Once the fire is extinguished, loose clothing can be removed if necessary, **but any clothing adhering to the burned skin should not be removed.** After the fire is out, follow the procedures for responding to burns described above.

Shock and Fainting

Lie the victim down if she is in shock and elevate her feet higher than her head. Loosen tight clothing, cover her with a blanket, and talk to her reassuringly. Do not give her anything to drink. If the person has fainted, place her in the *recovery position* (i.e., on her side with her head tilted back to keep the airway open). Ensure that the airway is clear and that she is breathing. Make her head comfortable, cover her with a blanket, and leave her lying down. If there is a chance of injury due to the collapse, avoid moving her if she is breathing until you can communicate with her to confirm no injury was sustained. However, if the airway is blocked and/or the victim is not breathing, her head may have to be tilted back or she may have to be laid on her back to begin artificial resuscitation or CPR. If other injuries are present or any symptoms persist, seek emergency medical assessment and/or treatment. If the casualty must be left alone, always place the victim in the recovery position and ensure the airway is open.

Inhalation of Toxic Fumes

Immediately call 911 to receive assistance from the local fire department whose response teams are trained in resuscitation measures and emergency first aid. They also have self-contained breathing apparatus in case the toxic fumes are persistent.

If available on-site, summon trained personnel who can administer oxygen and other medical procedures, as necessary.

Other Medical Emergencies

Being prepared to deal effectively with emergencies involving serious existing medical conditions such as asthma, anaphylactic shock, diabetes, or epilepsy requires open communication among school administration, counsellors, and parents. Teachers need to know if students have these conditions, as well as what to look for and what to do if the student becomes symptomatic. Basic training could be provided to assist teachers in dealing with, for example, seizures or insulin shock. If in doubt, seek medical assessment and/or treatment.

Accident Reporting

An *accident* is an undesired event that causes or may cause harm to individuals, property, or the environment. When an accident occurs, the first concern is the injured. Priority can then be placed on systematic investigation and proper reporting of the accident.

By law, certain work-related accidents must be reported as soon as possible to Manitoba Workplace Safety and Health. The act requires employers to

- report certain injuries or accidents, including any injury or accident that results in a fatality or in a worker being admitted to hospital
- report any unplanned or uncontrolled explosion, fire, or flood that causes (or could cause) a serious injury
- conduct an investigation whenever a serious injury or accident occurs, and prepare a report that is available for inspection

Manitoba Workplace Safety and Health may choose to investigate the accident.

Schools can improve safety and show compliance with accident-reporting requirements by ensuring that

- staff receive appropriate orientation and training, and that they understand their responsibilities
- all accidents and injuries are recorded, reported, and investigated, as appropriate

- staff know when and how to report accidents, including where to access reporting forms and instructions
- all required information is gathered and provided by supervisors for staff compensation claims
- general pre-planning has been done regarding accident investigation and reporting
- the underlying causes of accidents are determined
- measures are taken to prevent accidents from reoccurring

See [Appendix E](#) for a sample Accident/Incident Report Form. This sample shows the type of information that is required in an accident report, as well as who is required to complete the report.

Near-Miss Reporting

A near-miss is an event that could, but does not, result in an accident. Near-misses are also referred to as incidents or potential accidents.

Like accidents, near-misses are caused by unsafe acts or conditions. Examples of unsafe acts include handling of materials by someone without proper training, and failure to use personal protective equipment such as safety glasses. Examples of unsafe conditions include poor lighting, excessive noise, and poor housekeeping.

Documentation of near-miss situations, although not required by law, should be done internally with information about the incident shared with colleagues. In this way, near-miss reporting is a proactive means of improving safety awareness, identifying and tracking potential hazards, and ultimately preventing accidents. Whenever a near-miss is recorded, it is important to identify, as far as possible, the unsafe acts and conditions that contributed to the incident. Actions can then be taken to reduce the risk of a similar incident or accident occurring in the future.