INFORMATION DOCUMENT

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HEALTH AND SAFETY
IN THE TEACHING OF NATURAL SCIENCE

Québec

HEALTH AND SAFETY IN THE TEACHING OF NATURAL SCIENCE

SECONDARY

Direction générale des programmes
Direction de la formation générale

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The ministère de l'Éducation is aware that, after reading this guide concerning health and safety in the teaching of science, those involved may become aware of the problems existing in the workplace, participate in sometimes animated discussions, and even take a stand that may prove costly in terms of time and/or money. The Ministère therefore encourages those involved to proceed rationally in the implementation of any measures that may be deemed necessary.

Since this is a first attempt at producing such an informative and educational guide, the ministère de l'Éducation encourages all concerned to forward any comments to the natural science coordinator at the Direction de la formation générale.

FOREWORD

Since the early 1970s, several organizations concerned with health and safety in the teaching of science have published documents about the subject--among others, the Manitoba Department of Education (1973), L'Association des professeurs de sciences du Québec (1978), the National Science Teachers Association (United States) (1978), the New Brunswick Department of Education (1980), the Alberta Department of Education (1981) and the Ordre des chimistes du Québec (1982).

Concerned about the health and safety of the students, the ministère de l'Éducation du Québec, through its Direction générale des programmes and its Service de coordination de projets-réseaux, has prepared the present guide. Collaborators include the Association des professeurs de sciences du Québec, the Centre de toxicologie du Québec (Centre hospitalier de l'université Laval), the Commission de la santé et de la sécurité du travail, the Chomedey de Laval, Jacques-Cartier and Jérôme-LeRoyer school boards, the Chambly regional school board, Hydro-Québec, the Institut Armand Frappier, the ministère de l'Environnement du Québec and the Ordre des chimistes du Québec.

This document was put together for teachers and laboratory technicians and attendants. Educational consultants, principals and other school administrators will also find it useful.

1. PROBLEM

1.1 PRESENT SITUATION

In the teaching of science, the concern for health and safety is often limited to the chemistry laboratory and to the handling of substances considered hazardous. Several safety measures also apply to biology and physics laboratories.

The Ordre des chimistes has surveyed secondary school chemistry laboratory personnel in Québec and has uncovered several deficiencies, some of which could lead to serious accidents.

To date, there has been little concerted action regarding the identification and use of protective material and equipment for laboratory activities. There has not been enough effort to make teachers and laboratory technicians and attendants aware of health and safety needs. There have been only rare initiatives to fulfil local needs. Moreover, protection of the environment has only recently begun to preoccupy other sectors and the population in general.

The handling of animals, plants, chemicals, instruments and equipment requires a constant concern for safety. If precautions are not taken, certain operations can be hazardous to the health. The natural science programs, which encourage a problem-solving approach and which involve laboratory activities, deal only briefly with health and safety problems; hence the complementary nature of this guide with respect to the science programs.

In the past few years, some school boards have been concerned with the disposal of old, used or useless chemicals without damage to the environment. There are still, however, large quantities of these chemicals on the shelves. Substances harmful to the environment also find their way into the sink or the garbage.

The Commission de la santé et de la sécurité du travail du Québec spent $897 million in 1984 on occupational injuries in Quebec.[1] From 1978 to 1981, workers between the ages of 18 and 24 suffered almost 30% of all occupational injuries although they represented less than 22% of the labour force.

1.2 IDEAL SITUATION

Laboratory work must be performed in rooms containing adequate and functional protective material and equipment.

In order to work in a laboratory in safety and without detriment to their health, teachers and students must be aware of the dangers and the appropriate preventive measures. They must know and follow the rules of safety and the recommended handling techniques for potentially dangerous objects or substances.

It must also be established who is responsible for personal and environmental protection.

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[1] Commission de la santé et de la sécurité du travail, **1984 Annual Report**, p. 74.

2. ORIENTATION

2.1 PREFERRED SOLUTION: PREVENTION TRAINING

Teachers and laboratory technicians and attendants must be better trained in health and safety in the workplace. They must develop attitudes, learn techniques and acquire knowledge that will lead them to adopt preventive behaviour in their classroom and laboratory activities and help their students do the same.

2.2 PREFERRED VALUES

The goal of the health and safety guide, like that of the natural science programs, is to contribute to the achievement of the objectives set out in **The Schools of Québec**. Notably, it favours values such as respect for life, respect for oneself and others, respect for the environment, autonomy and responsibility, and pride in one's work and the sense of duty.[1]

2.3 OBJECTIVES

The health and safety guide is an educational and informative document. Its goal is to encourage teachers, laboratory technicians and attendants, and students to:

- acquire knowledge regarding potential dangers, preventive measures and elements of first aid;
- learn work techniques that minimize the risk of accident;
- develop a positive attitude toward prevention and behaviour likely to protect their health and that of others in a laboratory, contribute to the elimination of dangers at the source and preserve the environment.

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[1] Québec, ministère de l'Éducation, **The Schools of Quebec--Policy Statement and Plan of Action**, 49-1070A (Québec: ministère de L'Éducation, 1979), p. 28.

2.4 RELATIONSHIP BETWEEN THE GUIDE AND THE SCIENCE PROGRAMS

The guide is a complement to the natural science programs and curriculum guides. It offers information, advice and guidelines so that students can perform the learning activities necessary to attain the programs' objectives while minimizing risks and protecting the environment. It is the teachers' duty to set an example by integrating this information into their courses and by adopting an appropriate instructional approach.

2.5 RELATIONSHIP BETWEEN THE GUIDE AND EXISTING LAWS

This guide is in keeping with the goals of the following laws:

- **An Act respecting industrial accidents and occupational diseases** (assented to on May 28, 1985; R.S.Q., c. A-3.001)
- **Environment Quality Act** (R.S.Q., c. Q-2)
- **Public Buildings Safety Act** (R.S.Q., c. S-3)
- **An Act respecting occupational health and safety** (R.S.Q., c. S-2.1)

The goal of the **Act respecting occupational health and safety** "is the elimination, at the source, of the dangers to the health, safety and physical well-being of workers" (Section 2).[1] Students, as future employees or employers, will learn about the principal elements of this law in the **Personal and Social Education** program.[2]

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[1] Except in the case of in-service training, this law does not apply to students.

[2] Québec, ministère de l'Éducation, **Personal and Social Education**, Code 16-3707A (Québec: ministère de l'Éducation, 1989), p. 357.

3. METHODS OF IMPLEMENTATION

3.1 MAIN RESPONSIBILITIES

3.1.1 School Board

The school board must ensure the safety and protection of all students and personnel in its schools.

The school board must establish policy statements and measures in compliance with the **Act respecting occupational health and safety**, the **Public Buildings Safety Act** and the **Environment Quality Act** as well as the generally admitted health and safety guidelines. In particular, it must ensure that equipment, the layout and occupation of premises, and safety materials are in accordance with the standards and regulations. To accomplish this task, the school board can use the suggested checklist found in Appendix 6.1, adapting it to its needs.

The school board must also establish a first-aid procedure and ensure the training of its personnel in prevention geared specifically to schools.

It must eliminate hazardous waste, as stipulated in the **Environment Quality Act.** To this end, it must formulate an elimination procedure.

3.1.2 School Administration

According to the law and the policy statements and measures established by the school board, the school administration sees to the implementation of measures likely to ensure the health and safety of personnel and students as well as the preservation of the environment.

3.1.3 Teachers

The teachers ensure the health and safety of the students. To this end, they must identify any potential dangers, implement preventive measures and establish a procedure to follow in the case of an accident. They must also help the students develop preventive attitudes.

3.1.4 Laboratory Technicians and Attendants

As part of their duties, laboratory technicians and attendants must join teachers in applying the general health and safety guidelines in the laboratory.

3.1.5 Students

The students must become aware of the health and safety guidelines presented to them and apply the necessary measures to avoid endangering their health, safety and physical well-being or that of others around them. Students should be encouraged to sign a Voluntary Ethical Agreement such as the one suggested in Appendix 6.3.

3.2 GENERAL HEALTH AND SAFETY GUIDELINES

There should never be more students in the laboratory than there are lab stations available. When appropriate and possible, it would be preferable to reduce the number of students during laboratory experiments in order to minimize risks.

3.2.1 Guidelines for Teachers and Laboratory Technicians and Attendants

Teachers and laboratory technicians and attendants must apply the general guidelines specified in this section as well as those in Chapter 4, which are specific to laboratory experiments they are likely to conduct.

1. According to the established procedure, inform the administration of the presence of a potential danger in the classroom or the laboratory. File a report for every accident.

2. At the beginning of the school year, inform the students of the health and safety guidelines that concern them. Hand out the written guidelines and post a copy in the laboratory.

3. Never tolerate roughhousing.

4. No laboratory work should be done in the absence of the supervisor and without his or her authorization.

5. Inform the students of the potential danger involved in conducting a particular experiment. Remind them of the rules in Chapter 4 pertaining specifically to that experiment as well as the procedure to follow in the case of an accident.

6. During a demonstration in which a risk is involved, make sure the students are safe from any flying objects, flashes or toxic fumes. To identify possible dangers, perform the experiment before the demonstration, if necessary. Everyone present should be protected by a shield, a visor or safety goggles. To demonstrate spontaneous reactions, use only the necessary amount of the substance in question.

7. Carefully check all devices or equipment brought into the school by the students before allowing them to be used.

8. Ensure that the laboratory's main gas valve is shut off after each use.

9. Be particularly careful with cylinders of compressed gas. Never change the adaptor valves from one type of gas to another. Large cylinders must be secured when in use and even when stored. Never move a cylinder of compressed gas without its cap plug in place.

10. Throw away all broken glass items. See to it that there is a stoneware container or one made of inert matter in each laboratory for broken glass and insoluble waste. This container must be well identified and must not be used for paper or other ordinary combustible waste.

11. Make sure that there is also a wastebasket.

12. Make sure that no one is in the path of a rotating object. Always rotate the object vertically, first making sure that it is quite solid and that it contains nothing that might fly loose.

13. Explain and demonstrate the correct way to lift heavy objects.

14. Forbid all eating, drinking and smoking in the laboratory.

15. Never assume that the flow of gas or electricity is cut. Carefully check the main and work station controls.

16. In case of fire, imminent danger of explosion or uncontrollable toxic fumes, evacuate the students immediately and ring the alarm.

17. Become familiar and help the students become familiar with the use of all safety equipment (see checklist, Appendix 6.1).

18. Ozonizers should not be used in secondary schools.

19. Discharge tubes and x-ray tubes should not be used in secondary schools.

20. Rules concerning mercury:
    a) Allow the students to become aware of the harmful effects of this substance.
    b) Avoid the experiment in which mercury is produced from its oxide.

21. Inform the principal of the presence of exposed asbestos in the devices or equipment used in the laboratory. Dispose of cloths, tongs or torn gloves that might shed asbestos fibres.

22. Bring a first-aid kit on field trips.

23. Be aware of the procedures to follow in the case of an accident as well as of the first-aid guidelines in force in the school.

24. Make sure that used, missing or expired first-aid materials are replaced immediately.

25. In the case of an accident, file a report (see Appendix 6.2) with the administration.

3.2.2 Guidelines for Students

The following rules should be explained and posted.

1. Always remain calm during laboratory sessions. Never work hurriedly. When moving around, always be prepared to stop immediately. Avoid games and roughhousing.

2. Never carry hot material or hazardous substances when walking around the laboratory.

3. Immediately inform the supervisor of any accident or injury, even if it seems trivial.

4. Know where the fire alarm is located and do not hesitate to use it in the case of fire or uncontrollable escape of toxic fumes. Once the alarm has been set off, turn off the gas burners and leave the premises.

5. If your clothes catch fire, use the safety shower or immediately roll yourself up in a fire blanket.

6. Never try an experiment not authorized by the supervisor.

7. Learn the correct way to light a burner. Always keep your head away from the burner when lighting it.

8. If your hair is long, tie it back. Remove all jewellery (e.g. rings, chains, necklaces, watches) before going to the laboratory.

9. Wear inexpensive clothes. Avoid loose clothing with wide sleeves or fringes that could get caught or catch fire. Smocks or aprons are obligatory.

10. To disconnect an electrical appliance, always grasp the plug and pull, never pull the cord. Report any defective cord or appliance to the supervisor. Do not try to repair it yourself. Make sure your hands and feet are dry when you use an electrical appliance.

11. Report all containers, prisms, mirrors, and glass and metal sheets with sharp edges to the supervisor. He or she will decide whether the edges can be smoothed with emery paper or otherwise, or if the article in question should be thrown out.

12. Never assume that the gas valve is shut off or that the electrical system is on. Check twice if necessary.

13. Never enter the chemical storage room without the supervisor's authorization.

4. SPECIFIC SAFETY MEASURES AND BEHAVIOUR

The specific safety measures for laboratories should be explained to the students and then posted.

4.1 ANIMALS

Most students are fascinated by animals. Several of them undoubtedly have pets at home. The observation of animals in the classroom can therefore contribute favourably to both the development of attitudes regarding the preservation of living things and the acquisition of knowledge. However, animal experimentation is unadvisable at the secondary level and, at this time, no program requires the dissection of live animals.

When animals are brought into a classroom for observation, certain safety measures must nevertheless be adopted in order to ensure the protection of the students, the teachers and the animals themselves. Handling animals can involve certain risks. They can be carriers of pathogens dangerous to humans. They can also cause different types of skin-related and respiratory allergies. Finally, animals sometimes have a tendency to bite or scratch when they feel threatened.

1. Before allowing any animal into the laboratory, check its health. If it is a wild animal, exercise extreme caution.

2. It is essential to ensure the animal's comfort. It must be kept in a clean cage and fed adequately and regularly. It is also important to make the necessary arrangements for the animal to receive adequate care on weekends and holidays.

3. Animals should be bought from a reputable supplier. Do not buy a sluggish animal. This particular behaviour is often a sign of illness.

4. As a general rule, avoid having the students bring their pets to school. If it is allowed in an exceptional case, only the animal's owner should handle it. Make the necessary arrangements so that the animal has fresh water and can rest near its owner while it is at school.

5. When observing an animal, do not touch it. Allow the animal to become familiar with its new environment first.

6. Never tease the animal or poke a finger, hand or any other object between the bars of the cage.

7. In the case of a bite or scratch, disinfect the wound and consult a nurse or doctor if necessary. Keep the animal in a secure place so that it can be examined by a veterinarian if necessary.

8. Books dealing with techniques for handling various species of animals are easy to find. When in doubt, ask a veterinarian about the appropriate way to handle a particular species. The following are some techniques:

   a) Pick a rabbit up by the scruff of its neck while supporting its hindquarters. Avoid picking it up by the ears or the abdomen.

   b) Lift rats and mice first by the base of the tail, then hold the tail while you lay them in the palm of your hand. Avoid squeezing. It might make them aggressive.

   c) Carry hamsters in the palm of your hand. Avoid waking them. Knock lightly on the cage and scoop the animal up with both hands.

   d) Pick a guinea pig up by the thorax, while supporting its hindquarters.

9. Do not needlessly disturb a female who is taking care of her young. She might become aggressive and bite you or, in some cases, eat her young.

10. When an animal seems aggressive, use gloves to handle it.

11. When an animal displays any kind of abnormal behaviour, call a veterinarian to find out what to do. It is important to check for the following symptoms:

    a) lack of reaction to external stimuli
    b) unusually aggressive behaviour
    c) loss of appetite
    d) runny nose or eyes
    e) high mortality rate or cannibalism
    f) respiratory difficulty

4.2 PLANTS

Many plants, including fungi, are health hazards. The following guidelines will help eliminate these dangers. A list of mildly toxic and highly toxic plants with which the students are likely to come into contact at home as well as at school or on field trips can be found in Appendix 6.8. A list of symptoms to look for in case of contact or ingestion as well as the appropriate first-aid treatment is included.

1. Be aware of the names of plants (scientific names if possible) around you. A few of the books mentioned in Section 5.1 can help.

2. Bring a plant identification book on field trips.

3. Never eat wild plants unless you are absolutely sure of what they are and what effects they can have on humans.

4. In the case of an accident, bring a complete sample (branch with leaves, flowers or fruits) of the plant for identification.

5. Keep the phone number of the nearest emergency room handy as well as that of Poison Control Centre Québec (1-800-463-5060).

4.3 CHEMICALS

All chemicals must be considered potentially hazardous. Such an attitude will prevent many accidents. The following table provides information about various substances.

Properties of Different Categories[1] of Chemicals and Preventive Measures		
Substances	**Properties[2]**	**Preventive Measures**
Toxic substances	Substances[3] that, through contact, ingestion or inhalation, can cause injury, illness or even death.	·Inform students of the danger. ·Ensure that containers are tightly sealed after use. ·Ensure adequate ventilation, handle substance under the fume hood. ·Avoid inhaling fumes. ·Wear protective equipment (e.g. visor, gloves, apron). ·Avoid all contact with the body; wash hands each time a chemical is handled. ·Dispose of contaminated clothing. ·Keep the appropriate antidote handy.
Corrosive substances	Substances that, through contact, burn living tissue. They are generally irritants, particularly for the eyes and respiratory system.	·Inform students of the danger. ·Wear protective equipment (e.g. visor or goggles, mask, gloves); avoid fumes and dust. ·Ensure good ventilation. ·In case of contact, flush the skin immediately with large quantities of water. If the body has been touched in several places, use the safety shower. ·If the eyes are affected, rinse them for at least 20 minutes with eyelids open. See a doctor at once.

[1] Limited to categories likely to be used in secondary schools.

[2] The properties of the different categories of chemicals are more precisely defined in the **Hazardous Waste Regulation**, Decree 1000-85, May 29, 1985.

[3] Including plants.

Properties of Different Categories of Chemicals and Preventive Measures (Cont.)		
Substances	**Properties**	**Preventive Measures**
Flammable substances	Substances, especially liquids, that ignite easily or whose fumes ignite. Three elements must be present for combustion to occur: 1. a combustible, 2. oxygen or air, 3. a source of ignition.	·Inform students of the danger. ·Place any flame, source of sparks or other form of energy at a distance. ·Avoid plugging in or turning on an electrical appliance likely to produce sparks. ·Handle substances under the fume hood. ·Keep the least possible amount of the substance at the work station. ·Store in a fireproof place. ·Dispose of useless substances appropriately. ·After an experiment, rigorously clean and ventilate the room. ·In case of an emergency, evacuate the students, turn off all sources of heat, close the doors and ring the alarm.
Reactive or unstable substances	Two categories: 1. Substances that may explode after shock or heating; 2. Substances that react violently when mixed with other substances.	·Inform students of the danger. ·Study the properties of the chemicals, read the instructions and warnings on the labels. ·Test the stability of the substances. ·Handle with care. ·For any reaction suspected of being dangerous, use very small quantities and work under the fume hood. ·At the first sign of danger, evacuate the students immediately.

Appendix 6.4 contains a list of incompatible substances. It is strongly suggested that this list be consulted before conducting an experiment using chemicals. Appendix 6.5 contains a list of the corrosive and flammable substances most widely used in laboratories. Appendix 6.6 deals with the harmful effects of inhaling some gases used or produced in laboratories.

4.3.1 Handling Chemicals

The following guidelines are aimed mainly at students.

1. Never use a chemical without knowing its properties and the risks involved. When necessary, consult the toxicological index published by the Commission de la santé et de la sécurité du travail (CSST). This index can also be accessed by computer in the regional offices of the CSST. The locations of these offices can be found in Appendix 6.9.

2. Do not work with hazardous substances without the direct supervision of the person in charge.

3. Do not walk around with hazardous substances such as acids and concentrated hydroxides.

4. Conduct all experiments producing toxic or corrosive fumes under the fume hood.

5. Use volatile and flammable liquids far from any open flame. Handle such substances under the hood whenever possible.

6. Regarding the disposal of waste, see Section 4.3.3.

7. Dispose of any contaminated, surplus, undesirable or unidentified chemicals appropriately (see Section 4.3.3).

8. Wear gloves when handling glass wool or steel wool.

9. Use a specially designed rubber syringe or micropump to fill a pipette. Never suck out the air with your mouth.

10. Do not wear contact lenses when conducting experiments likely to produce toxic or corrosive fumes. These fumes can dissolve in tears and get caught between the eye and the lens, thus causing irreparable damage.

11. Wear a visor or safety goggles in the laboratory. The following operations require particular eye protection:

    a) use of sources of heat or materials whose temperature exceeds 60°C, except light bulbs screwed into an appropriate socket;

    b) handling of any liquid other than water, including aqueous solutions with a concentration higher than 5% of the solution's mass;

    c) handling of powders or solids whose particles have an average volume of less than 1 mm^3 (except food particles) or any other solid constituting any danger whatsoever;

    d) use of flammable gases or fumes;

    e) certain situations or actions that might trigger the rapid projection of an object such as the use of a container under pressures other than atmospheric pressure.

12. Beware of what seems to be water on the counter or on the floor. It could be a corrosive liquid. Pour large quantities of water on the spill and mop up with a cloth or absorbent paper.

13. In the case of spilled substances, proceed as in Section 4.3.3.4 and pour large quantities of water on the areas that have come into contact with acids, bases or other corrosive chemicals. If the skin or eyes have come into contact with the chemical, flush continuously with water for at least 20 minutes.

14. If a chemical is accidentally spilled into the sink, rinse with generous amounts of water to avoid accumulations in the sewer pipes, which could be hazardous to the health and safety of users.

15. Dispose of insoluble residues in an appropriate container. Never throw them into the sink.

16. Never return an unused chemical to its original container without consulting the supervisor.

17. Learn how to pour a bottled substance. Grasp the cap between the index and middle fingers, palm side up, so as to hold the bottle with the same hand.

18. When pouring a liquid out of a beaker, use a glass rod to direct the flow.

19. Handle organic solvents with care. Several are highly flammable and some are toxic. Some of these substances should be handled only under the fume hood.

20. Never mix chemicals whose properties are not entirely known to you "just to see what happens."

21. Never make explosives. The **Act respecting explosives** (R.S. 1977, c. E-22) considers the unauthorized production of explosives illegal. If you find an abandoned explosive, a detonator for example, inform the police immediately. Above all, do not touch it.

22. Never taste a chemical. Never drink from a beaker or any other laboratory container.

23. To check the odour of a chemical, bring the fumes to your nostrils by waving your hand over the container like a fan. Never breathe in fumes directly.

24. Wash your hands whenever you handle a chemical.

25. To dissolve hydroxides or strong acids (see Appendix 6.5: Corrosive Substances) in water, always use a borosilicate glass container. Add the solute to the water; never add water to the solute. Pour the water into the container and slowly add the solute, stirring constantly with a glass rod.

26. Guidelines regarding mercury:

    a) Never touch mercury with your hands. Liquid mercury and its fumes are extremely toxic. The danger resides in the fact that its harmful effects do not appear immediately.

    b) In all experiments using mercury, place a glass or plastic tray under the apparatus to catch accidentally spilled mercury.

c) If mercury is spilled, pick it up immediately with the appropriate equipment. If this is not possible, pick most of it up with a rubber syringe connected to a fine dropper. The remaining droplets of mercury can be absorbed by amalgamation on a piece of copper previously cleaned with concentrated nitric acid. The surface on which the mercury was spilled can then be sprinkled with sulphur. This will produce mercury sulphide, which is less volatile.

d) Do not have the students conduct metal amalgamation experiments. Continuous handling of amalgams can be harmful.

27. There are three methods of producing oxygen in the laboratory. Each of these methods, however, involves certain risks that must be taken into consideration:

a) Decomposition of potassium chlorate.

1. Potassium chlorate and manganese dioxide must be mixed with considerable caution, carefully avoiding contamination with any organic or combustible substance (especially powdered carbon, which resembles manganese dioxide) (see Appendix 6.4).

2. Potassium chlorate can explode if it is crushed with a mortar and pestle. If the substance is in chunks, it should be crushed with a large rubber stopper.

b) Decomposition of a peroxide (sodium peroxide, hydrogen peroxide).

1. Peroxide is corrosive on contact with the skin. The residue left in the container after a reaction is also corrosive.

2. Make sure that the sodium peroxide does not come into contact with paper or any other oxidizable compound (see Appendix 6.4).

c) Electrolysis of water.

1. This method of producing oxygen releases hydrogen, which can burst violently into flames.

2. Make sure, when using this technique, that there are no open flames.

4.3.2 Storage

Before storing chemicals, they must be classified and identified (name and date). This will make future disposal of unused or expired substances easier. The manufacturer's suggestions can also be referred to.

1. Each container must be properly labelled (see Appendix 6.7). All unidentified chemicals must be stored in an appropriate place until they can be disposed of correctly (see Section 4.3.3).

2. Avoid storing incompatible chemicals together. The following categories of chemicals must not be stored in the same cabinet:

a) flammable liquids
b) chlorates and permanganates
c) acids (except nitric acid)
d) ammonium nitrates (must be stored alone)
e) peroxides and nitric acids

3. The chemical storage room must be well ventilated. It must have an independent ventilation system and the air must always be cool and dry. The storage room should be locked at all times.

4. Bottles and containers must always be tightly sealed, unless otherwise specified for certain substances. All rusted or corroded containers must be stored in an appropriate place until they can be disposed of correctly.

5. No substance, except water, should be stored in containers larger than 5 litres.

6. Containers holding 4 litres or more must be made of metal or plastic.

7. Buy small amounts of chemicals: enough for a year or two. Some substances, such as ethers, become dangerous when stored over long periods.

8. The ideal method for the elimination of surplus chemicals is to re-use them. Methods of waste disposal must comply with the **Environment Quality Act** (see Section 4.3.3).

9. Store glass tubes horizontally, so that they are supported over their entire length.

10. Corrosive substances such as concentrated acids and bases should be placed on the lower shelves, preferably on the floor, away from traffic.

11. Highly flammable liquids such as alcohols, carbon disulphide, acetone, ether and organic solvents must be stored in a specially constructed metal cabinet. Burners and spark-producing apparatuses should not be used near this cabinet.

12. The shelves should have a rim to stop containers from accidentally slipping and falling.

13. Keep cylinders of compressed gas in a dry, cool, ventilated and fireproof place. Fasten the cylinders to an appropriate frame or cart. Replace the safety jacket when the bottles are moved or stored.

14. Store phosphorus in a lined metal container. White and yellow phosphorous should always be kept in water in a dark, cool place. There should be no white phosphorous in secondary school laboratories.

15. Store sodium in kerosene or mineral oil. The metal must always be submerged and kept in a cool, dark place. There should be no potassium in secondary school laboratories.

16. Store calcium carbide in a tightly sealed container in a dry place.

4.3.3 Disposal of Hazardous Waste

The teacher should help the students develop attitudes and adopt behaviours compatible with the preservation of the environment. Laboratory experiments are an excellent opportunity to get the

students used to re-using or recovering waste. The teacher must also make sure that the students learn not to throw everything into the sink. Only chemicals considered environmentally safe should be thrown into the sink. It is also recommended that the water be left to run so that these substances do not accumulate in the drainage pipes.

4.3.3.1 Acids and Bases

It is forbidden to pour strong acids or bases (see Appendix 6.5.1: Corrosive Substances) directly into the sink unless they have been treated in a way approved by the ministère de l'Environnement.

4.3.3.2 Organic Solvents

- All organic solvents must be collected and stored for recycling or disposal in an authorized centre.

- Safety containers must be used to collect and store organic solvents.

- The solvents must be sorted in order to avoid placing incompatible substances in the same container (see Appendix 6.4).

4.3.3.3 Substances Insoluble in Water

- Be careful not to place incompatible substances together (see Appendix 6.4).

- Store the substances in an appropriate place until they can be disposed of in an authorized centre.

4.3.3.4 Spillage

When a chemical is spilled, clean the contaminated area rapidly and effectively, moving continuously to avoid prolonged contact. Wear gloves, a smock and safety goggles (or a visor). If the spilled substance gives off fumes, ventilate the room and avoid inhaling the fumes. Extinguish all flames and sparks. In case of serious danger, call the fire department. The following methods are suggested for certain types of substances:

a) Inorganic Acids

- Cover with an equal mixture of sodium carbonate (NA_2CO_3, H_2O) and slaked lime ($Ca(OH)_2$).
- Mix and add water if necessary to form a paste.
- Collect and store the paste in an appropriate container until it can be disposed of in an authorized centre.

b) Organic Acids

- Cover with sodium carbonate (Na_2CO_3, H_2O).
- Mix and add water to form a paste.
- Test with a strip of litmus paper. Add more sodium carbonate (Na_2CO_3, H_2O) if necessary.

- Collect and store the paste in an appropriate container until it can be disposed of in an authorized centre.

- Wash the contaminated area with soapy water.

c) **Alkalis and Alkali Metals**

- Cover with anhydrous sodium carbonate (Na_2CO_3) and mix.

- Collect in an appropriate container.

- Store correctly until it can be disposed of in an authorized centre.

d) **Aldehydes**

- Cover with sodium bisulphite ($NaHSO_3$).

- Add a little water and mix.

- Collect in a large beaker.

- Store in an appropriate container until it can be disposed of in an authorized centre.

- Wash the contaminated area with soapy water.

e) **Aqua Ammonia**

- Neutralize with a 1 mol/dm^3 solution of hydrochloric acid (HCl) and then sponge.

- Store correctly until it can be disposed of in an authorized centre.

f) Carbon Disulphide

- Mop up with absorbent paper.

g) Oxidizing Agents

- Cover with sodium bisulphite ($NaHSO_3$).

- Mix with water.

- Collect in a container and neutralize with sodium carbonate (Na_2CO_3, H_2O).

- Store in an appropriate place until it can be disposed of in an authorized centre.

- Wash the contaminated area with soapy water to which has been added a little sodium bisulphite ($NaHSO_3$).

h) Peroxides

- Cover with large amounts of a mixture of nine parts sand and one part sodium carbonate (Na_2CO_3, H_2O).

- Collect with a plastic spatula and transfer a little at a time to a large plastic container containing a solution of sodium sulphite (Na_2SO_3), stirring frequently.

- Neutralize with a diluted solution of sulphuric acid (H_2SO_4) and let stand.

- Pour the sulphated solution into an appropriate container and store until it can be disposed of in an authorized centre.

- The sand and residues must be recovered and disposed of correctly.

i) Salts

- Collect in a large beaker and add large amounts of water.

- Add sodium carbonate (Na_2CO_3, H_2O) and mix.

- If it is a fluoride, add slaked lime ($Ca(OH)_2$).

- Pour into an appropriate container and store until it can be disposed of in an authorized centre.

j) Sulphur

- Add a solution of ferric chloride ($FeCl_3$).

- Mix until iron sulphide (FeS) is formed.

- Add a little more than an equal amount of sodium carbonate (Na_2CO_3, H_2O).

- Pour into an appropriate container and store until it can be disposed of in an authorized centre.

- Wash the contaminated area with soapy water.

N.B.: It is forbidden to mix or dilute hazardous wastes in water, including rainwater and liquid waste.

4.3.3.5 Recovery of Spilled Substances

It is good to have a specific, well-identified area where certain items, substances and prepared mixtures can be kept for recovery purposes in the event of a spill (Section 4.3.3.4).

a) Miscellaneous Items

- absorbent paper
- litmus paper
- sand
- soap
- plastic spatula
- iron sheet
- vermiculite

b) Chemicals

- sodium bisulphite ($NaHSO_3$)
- anhydrous sodium carbonate (Na_2CO_3)
- slaked lime ($Ca(OH)_2$)
- Solutions:
  - hydrochloric acid (HCl), 1 mol/dm^3
  - ferric chloride ($FeCl_3$)
  - ammonium hydroxide (NH_4OH), 1 mol/dm^3
  - sodium sulphite (Na_2SO_3)

c) Mixtures

- sodium carbonate (Na_2CO_3, H_2O) and slaked lime ($Ca(OH)_2$), 1:1
- sodium carbonate (Na_2CO_3, H_2O) and sand, 1:9

4.3.3.6 Procedure to Follow for the Disposal of Hazardous Waste

Disposal centres for hazardous waste can be found in and around the city of Montréal. People working in other regions must store their hazardous waste and have it carried to the disposal centres. Therefore, it would be advantageous for school boards, CEGEPs and universities in a given region to have their hazardous waste stored and transported collectively.

A list of carriers for each region can be obtained at the offices of the ministère de l'Environnement (see Appendix 6.9).

- Supply the disposal centre with a list of the hazardous waste to be disposed of. The centre will confirm if it can handle such waste. If so, it will issue a transportation number (see Appendix 6.10).

- Choose a carrier authorized to handle hazardous waste.

- Fill out the manifest required by the ministère de l'Environnement (see Appendix 6.10).

- To minimize the cost of disposal, follow the disposal centre's recommendations concerning the sorting of hazardous waste.[1]

4.3.3.7 Chemicals and the Environment

Many chemicals can have harmful effects on the environment and their residual effect is often long-lasting.

The following is a partial list of highly toxic chemicals likely to be used in secondary schools. These substances should never be introduced into the sewer system.

- chromium chloride (II and III).....$CrCl_2$, $CrCl_3$
- mercury and compounds.....Hg...
- chromium nitrate..... $Cr(NO_3)_3$
- lead and compounds.....Pb...
- potassium and chromium sulphate.....$KCr(SO_4)_2$

4.4 GLASS

The following guidelines are aimed mainly at students.

- Use stout glass flasks whenever an experiment calls for low pressure (e.g. the ammonia fountain).

- When using a conical flask (Florence or Erlenmeyer flask) place it on a piece of wire gauze supported by a ring clamp and attach it firmly to the universal stand with a clamp.

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[1] Storage of more than 5 kg of most hazardous waste requires a certificate issued by the ministère de l'Environnement. As for the storage of highly toxic waste, a certificate is required even for amounts less than 5 kg.

- Never use glass tubes whose edges are chipped or not flamed.

- Dispose of broken glass in the proper container, taking care to avoid injury. Do not throw it in the wastebasket. The janitor could be injured. Do not leave pieces of broken glass on stools, counters or in sinks.

- Use borosilicate glass if glass is to be heated. Never use measuring cylinders or volumetric flasks for chemical reactions. Never heat a measuring cylinder.

- Sand sharp edges of all glass or metal equipment with emery paper. Flame the edges of small-diameter glass tubes. Do not cut large-diameter glass tubes. Let the supervisor do it. The supervisor will use an appropriate glass cutter and will polish the edges of the tubes with emery paper.

- Do not try to remove a glass stopper that is fused to a bottle. Let the supervisor do it. The supervisor will use an appropriate tool.

- To cut a small-diameter glass tube, use a new saw file to make an initial cut. Wrap the tube in a paper towel and, with your thumbs, bend the tube away from you. Flame the edges over a burner.

- To insert a glass tube or a thermometer into a stopper, either:

  a) - Wear gloves or wrap the tube in a piece of cloth.

     - Wet the glass and stopper with glycerine, grease or vaseline. Avoid these substances if you will be using nitric acid in the apparatus.

     - Insert the tube into the stopper and screw in, applying a slight pressure. (If there is too much resistance, enlarge the hole or use another stopper).

b) - Insert a cork-bore whose interior diameter will hold the tube.

- Insert the tube into the cork-bore. Holding the tube in the stopper, remove the cork-bore.

- Remove the thermometer or the glass tube from the stopper as soon as the experiment is finished so that they do not fuse. If the glass fuses, cut the stopper with a sharp blade or use a cork-bore.

4.5 ELECTRICITY

Given the frequent use of electricity in laboratories, it is important that care be taken to minimize the risk of electrical shock. Electrocution can be caused by any voltage with which the body comes into contact.

It is the amount of current passing through the body and not the voltage that determines the effect. For more information, consult **Safety on the Line**, a booklet published by Hydro-Québec.

To reduce the risk of accident during an activity requiring 110 volts or more, take the following precautions:

a) Do not allow electrical current to pass through the body.

b) Make sure that even if electrical current does accidentally pass through the body, the current's intensity will have no harmful effects.

Follow these guidelines when conducting an experiment using electricity.

1. Always plug portable electrical appliances into grounded sockets.

2. Before handling an electrical circuit, make sure your hands are dry. Electrical equipment should be used only in rooms where the floor is non-metallic, rubberized or covered with a special carpet.

3. Do not use extension cords.

4. Make sure the appliances are not short-circuited. Any equipment making an unusual noise should be removed and repaired.

5. All electrical equipment must be repaired by a competent person. Make sure that the appliance has been unplugged.

6. Inspect the wires of 110-volt electrical appliances regularly in order to correct any connection or insulation defects.

7. In electrical experiments, limit the voltage to 30 V if the main power unit does not have an adequate safety mechanism. For experiments requiring an alternate current of 110 V, use a safety transformer[1] if the system is not already protected. Use only fuses of recommended amperage.

8. Connect the electrical apparatus to the electrical source last. When dismantling, cut the circuit at the source first. Whenever possible, perform these actions with one hand.

4.6 HEATING AND BURNERS

1. Never heat a closed container. Make sure that curved glass tubes are not clogged before using for experiments involving the emission of gases.

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1 There are now electrical sockets with mass detectors, which guarantee the same level of safety as a safety transformer.

2. Never leave a lit burner unattended. Turn it off if you must leave the work station.

3. To obtain the complete evaporation of a solution contained in an evaporation capsule, place a beaker over the capsule to protect yourself from bursting crystals. Use a hot plate with a temperature control or an infra-red lamp rather than a Bunsen burner.

4. To heat a substance in a test tube, hold the test tube with tongs. Never point the test tube toward anyone. Hold it at an angle and heat the contents, starting at the top. Keep the test tube moving when it is in the fire. For liquids, use a beaker rather than a test tube whenever possible.

5. Always check whether objects that have been heated are cool enough to handle. The best way to do this is to approach the object with the back of your hand without touching it.

6. Some experiments require fabricating apparatuses for the preparation of gases. In these cases, it is a matter of heating one or more substances that will then release the desired gas. Generally, the gas must go through a by-pass. It is collected through the displacement of water. Make sure that the by-pass is completely clear and that the gas is circulating freely. When the necessary amount of gas has been collected, remove the by-pass and immediately turn off the burner.

7. Use the appropriate tongs to handle hot crucibles and beakers. Place hot crucibles on a square of neoprene or on the base of a ring stand. Never place a hot object on a table covered with laminated plastic such as arborite or formica.

4.7 BLOOD AND TISSUE SAMPLES

1. A buccal epithelium sample is taken by scraping the internal surface of the cheek with a wooden spatula. Make sure that the spatula is dull. Wear gloves. Throw out the gloves and spatula after using once. Take all precautions to avoid transmitting germs or even viruses from one organism to another.

2. Taking blood samples for different analyses must be done aseptically. Sterilize the donor's finger with a cotton ball dipped in 70% per volume alcohol before and after taking the sample. Use sterilized lancets and throw them away after using once. The person taking the blood sample must wear gloves that will be thrown out after using once. Take all precautions to avoid transmitting germs or even viruses from one organism to another.

4.8 LASERS

When using a laser, follow these rules:

a) use a low-power laser (i.e. around 0.5 mW.);

b) avoid letting the ray touch the eye, directly or through reflection, of anyone present;

c) never use a laser in the absence of the supervisor;

d) keep the laboratory well lit while the laser is on. That way, the pupil of the eye will be relatively contracted, reducing the chances of the retina being injured if accidentally exposed.

5. RESOURCE MATERIAL

5.1 PUBLICATIONS

Alberta. Department of Education. **Potentially Hazardous Chemicals Information Guide**. Alberta, 1981.

Association des professeurs de sciences du Québec. "Sécurité au labo." **Spectre**, No. 2 (1978).

Association pour la santé et la sécurité du travail, Secteur des affaires sociales. **Guide d'identification des agresseurs chimiques**. Montréal, 1981.

_____ . **Le laboratoire: un lieu de travail et non un entrepôt.** Québec, 1982.

_____ . **Les bouteilles et le verre brisés.** Québec, 1979.

Balenghien, L. "La Sécurité dans les laboratoires de chimie." **Prévention et sécurité du travail**, No. 107 (1976), pp. 23-24.

Canada. Energy, Mines and Resources Canada, Explosives Branch. **Control of Model Rocketry in Canada**. Ottawa.

Commission de la santé et de la sécurité du travail du Québec. **Application de la Loi sur la protection de la santé publique.** Québec, 1983.

_____ . **First Aid in the Workplace: Training Manual**. Québec, 1987.

_____. **Toxicological Index: Data Sheet User's Guide.** Québec, 1988.

Conseil canadien de protection des animaux. **Soins à prodiguer aux animaux d'experience.**

Hydro-Québec. **Safety on the Line.** Québec, 1983.

Kinghorn, A.D. **Toxic Plants.** New York: Columbia University Press, 1979.

Kingsburg, J.M. **Poisonous Plants of the United States and Canada.** Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1964.

Lamoureux, G. et al. **Plantes sauvages printanières.** Montréal: Éditions France-Amérique, 1975.

Lampe, K.F. and R. Fagerstrom. **Plant Toxicity and Dermatitis, a Manual for Physicians.** Baltimore: The Williams and Wilkins Company, 1968.

Le Groupe Fleurbec. **Plantes sauvages comestibles.** Saint-Cuthbert, 1981.

_____ . **Plantes sauvages des villes et des champs.** Montréal: Fides, 1979.

_____ . **Plantes sauvages des villes et des champs et en bordure des chemins, no. 2.** Saint-Augustin (Portneuf): Le Group Fleurbec and Québec Science, 1983.

Leleu, J. "Travaux dans les laboratoires de chimie." **Cahiers de notes documentaires,** No. 103 (1981), pp. 185-195.

Manitoba. **Department of Education. Safety in Science for Manitoba Science Teachers.** Manitoba, 1981.

Marie-Victorin, Frère. **Flore laurentienne.** Montréal: Les Presses de l'université de Montréal, 1964.

Medger, O.P. **Edible Wild Plants.** New York: Collier Books (MacMillan),1973.

National Science Teachers Association. **Safety in the Secondary Science Classroom.** Washington, 1978.

New Brunswick. Department of Education, Program Development and Implementation Branch. **Safety and Science Instruction.** New Brunswick, 1980.

Ordre des chimistes du Québec. **La santé et la sécurité dans les laboratoires de chimie des institutions d'enseignement au niveau secondaire.** Montréal, 1981.

_____ . **Laboratory Safety Handbook.** Montréal, 1982.

Ouellette, G. "Techniques de travail en laboratoire." **Guide scientifique en chimie-biochimie.** Montréal: Conseil de la jeunesse scientifique, 1977.

Québec. **An Act respecting industrial accidents and occupational diseases.** Québec: Éditeur officiel, 1985. A-3.001.

_____ . **An Act respecting occupational health and safety.** Québec: Éditeur officiel, 1987. S-2.1.

_____ . **Environment Quality Act.** Québec: Éditeur officiel, 1979. Q-2.

_____ . **Hazardous Waste Regulation.** Québec: Éditeur officiel, 1985.

_____. **Regulation respecting industrial and commercial establishments.** Québec: Éditeur officiel, 1982. S-21, r.9.

_____. **Regulation respecting the quality of the work environment.** Québec: Éditeur officiel, 1982. S-2.1, r.15.

_____. Ministère de l'Environnement, Direction des communications et de l'éducation, Service de l'information. **La Manipulation du mercure.** Québec, 1981.

_____. Ministère de l'Environnement, Direction des communications et de l'éducation, Service de l'éducation. **Les déchets dangereux.** Québec, 1983.

_____. Ministère de l'Environnement, Direction des communications et de l'éducation. **Les déchets dangereux, il faut s'en occuper.** Québec, 1985.

Québec Society for the Defense of Animals Inc. **Animal Welfare and the Law in Québec.** Montréal, 1982.

St. John Ambulance. **Emergency First Aid.** Montréal, 1977.

5.2 POSTER

Fisher Scientific Ltd. offers schools a poster entitled: CHEM ALERT.

This poster is available by writing to:

Fisher Scientific Ltd.
8505 Devonshire Road
Montréal, Québec
H4P 2L3

5.3 AUDIO-VISUAL MATERIAL

The material suggested here does not deal exclusively with health and safety education in the teaching of science. It may, however, help the students learn about health and safety in general and become aware of the importance of protecting themselves.

5.3.1 Video Cassettes[1]

Hazardous Materials Tactics: Scene Safety

CSST, VC-000082, 200 min.
Video conference on the definitions and descriptions of the major risks involved in the transportation of hazardous substances.

Health Concerns in Chemical Emergencies

CSST, VC-000226, 338 min.
Series of conferences and discussions on various themes related to emergency services in the event of a chemical spill. Includes a look at the health and medical aspects of this problem in the United States.

Miamisburg: Anatomy of a Response

CSST, VC-000201, 20 min.
Video cassette showing the effort to clean up a chemical spill, followed by a fire, in an Ohio town.

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[1] Available from the Audiovidéothèque of the Commission de la santé et de la sécurité du travail du Québec (CSST) in Montréal.

The Right to Know

CSST, VC-000235, 38 min.
Explains the laws concerning WHMIS (Workplace Hazardous Materials Information System), its use (labelling, safety, training), the effects of hazardous substances on the body and possible preventive measures.

Team Work: Safe Handling of a Hazardous Materials Incident

CSST, VC-000143, 35 min.
Illustration of the various stages of an emergency clean-up. Accent on teamwork.

5.3.2 Films[1]

Help is...

15 min. 52 s.
NFB 106C 0171 559
First aid at the roadside--a clear demonstration of what the first person, or persons, on the scene of a motor vehicle accident should do during those critical minutes before the ambulance arrives. A comprehensive film, dealing not only with on-the-spot treatment of injuries but with the individual responsibility of every motorist in today's total traffic picture.

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[1] Available from the National Film Board.

The Price of Fire

21 min. 51 s.
NFB 106B 0161 017
Filmed under great difficulty and risk in Montréal's worst fire zone, this 1961 film argues, in ways no audience can ignore, the case for inspection and prevention. It is a strong reminder of the price of carelessness and the need for vigilance, especially during winter months when fire hazards are at their height.

A Time for Action

9 min. 53 s.
NFB 106C 0183 535
A slide presentation transferred to film, **A Time for Action** is a short fact-filled documentary to inform the public of the urgent need for safe and effective methods of tracking, treating and disposing of, or storing, hazardous waste. The film explains what hazardous waste is, how we have disposed of it in the past and how we must dispose of it in the future if we are to protect our environment and reduce health risks. It also gives several examples of how individuals and industry can decrease and are decreasing the risks of hazardous waste by reduction, recovery, re-use and recycling.

6. APPENDICES

6.1 SUGGESTED CHECKLIST

School: _____ Room: _____

Controller: _____ Date: _____

Basic Equipment	YES	NO
Is the following basic equipment easily accessible?		
1. Fire alarms	( )	( )
2. Telephones	( )	( )
3. Main switch	( )	( )
4. Main gas valve	( )	( )
5. Air valves	( )	( )
6. Water valves	( )	( )
7. Steam valves	( )	( )
Is the following equipment in good working order?		
8. Fire alarms	( )	( )
9. Telephones	( )	( )
10. Main switch	( )	( )
11. Main gas valve	( )	( )
12. Air valves	( )	( )
13. Water valves	( )	( )
14. Steam valves	( )	( )
Ventilation		
15. Does the ventilation system work?	( )	( )

	YES	NO
Electrical Appliances		
16. Are they grounded or insulated?	( )	( )
17. Are certain parts, such as belts, adequately protected?	( )	( )
18. Are the cords in good condition?	( )	( )
19. Is the electrical installation in good condition?	( )	( )
Electrical Panels and Switches		
20. Are they properly identified?	( )	( )
21. Are they easily accessible?	( )	( )
Respirator		
22. Is there at least one available?	( )	( )
23. Is it well situated?	( )	( )
24. Is it easily accessible?	( )	( )
25. Is the pressure sufficient?	( )	( )
Cylinders of Compressed Gas		
26. Are they properly fastened?	( )	( )
27. Are the cap plugs adequate?	( )	( )
Waste Containers		
Are waste containers available for the following substances:		
28. Broken glass?	( )	( )
29. Organic solvents?	( )	( )
30. Insoluble chemicals?	( )	( )
31. Ordinary garbage?	( )	( )

	YES	NO
Fire Blanket		
32. Is there at least one available?	( )	( )
33. Is it easily accessible?	( )	( )
Detectors		
Are there detectors for the following:		
34. Heat?	( )	( )
35. Smoke?	( )	( )
36. Flammable fumes?	( )	( )
37. Toxic fumes?	( )	( )
Are the detectors in good working condition?		
38. Heat?	( )	( )
39. Smoke?	( )	( )
40. Flammable fumes?	( )	( )
41. Toxic fumes?	( )	( )
In Case of an Accident		
42. Are the directions to follow in case of an accident posted?	( )	( )
43. Are they adequate?	( )	( )
Safety Shower		
44. Is there at least one?	( )	( )
45. Is it well situated?	( )	( )
46. Is it easily accessible?	( )	( )
47. Is it in working order?	( )	( )

	YES	NO
Lighting		
48. Is it adequate? (minimum level of lighting: 550 lx)	( )	( )
49. Is there an emergency lighting system?	( )	( )
If so, is it in good condition?	( )	( )
Laboratory Equipment		
50. Is there any equipment that could be considered dangerous (e.g. sharp edges or pointed corners)?	( )	( )
Space		
51. Is the recommended number of students respected?	( )	( )
52. Does each student have enough space (5 m^2 per person)?	( )	( )
53. Is there enough storage space?	( )	( )
Extinguishers		
54. Are there any available?	( )	( )
55. Are they in their proper places?	( )	( )
Are they easily accessible?	( )	( )
56. Are adequate instructions posted?	( )	( )
57. Are they in accordance with the standard: class 20 - B, C?	( )	( )
58. Are they in working order?	( )	( )

	YES	NO
59. Are they regularly inspected and recharged according to the standards of the National Fire Protection Association (NFPA)?	( )	( )
Leaks		
60. Do the gas lines leak?	( )	( )
61. Do the water lines leak?	( )	( )
62. Do the air lines leak?	( )	( )
Gloves, Smocks and Aprons		
63. Are there enough available?	( )	( )
64. Are they in good condition?	( )	( )
Fume Hood		
65. Is there at least one per laboratory?	( )	( )
66. Is it clean?	( )	( )
67. Is it in working order?	( )	( )
68. Does it function at the proper speed (minimum 0.4 m/s)?	( )	( )
Eye-washes		
69. Are there any available?	( )	( )
70. Are they well situated and accessible?	( )	( )
71. Do they work properly?	( )	( )
Flammable Liquids		
72. Are they stored in a proper place?	( )	( )
73. Are they properly identified?	( )	( )

	YES	NO
74. Are they contained in well-sealed safety containers?	( )	( )
75. Is there a "No Smoking" sign in the storage room?	( )	( )
76. Is there an antistatic ground?	( )	( )

Evacuation Procedure

77. Has one been established?	( )	( )
78. Is it adequately posted?	( )	( )

Floors and Traffic Areas

79. Are the floors slippery (because of spilled substances)?	( )	( )
80. Are the traffic areas identified and clear?	( )	( )
81. Is there a risk of bumping into poorly fastened or unfastened objects?	( )	( )

Emergency Exits

82. Are there any?	( )	( )
83. Do the doors open outward?	( )	( )
84. Are they properly identified?	( )	( )
85. Are they in working order?	( )	( )

Chemicals

86. Are there any unlabelled chemicals in the laboratory?	( )	( )
87. Are the chemicals stored so as to avoid reactions among them?	( )	( )
88. Are there hazardous chemicals in the laboratory?	( )	( )

	YES	NO
Cleanness		
89. Are the laboratories clean and uncluttered?	( )	( )
90. Are all objects in their proper places?	( )	( )
91. Are the waste containers emptied regularly?	( )	( )
92. Are the prep rooms clean?	( )	( )
93. Is the storage room clean?	( )	( )
Eye and Face Protectors		
94. Are there enough?	( )	( )
95. Are they in good condition?	( )	( )
Laboratory Stools		
96. Are there enough?	( )	( )
97. Are they in good condition?	( )	( )
98. Are they the right kind?	( )	( )
First-Aid Kit		
99. Is there at least one available?	( )	( )
100. Is it easily accessible?	( )	( )
101. Does it contain enough supplies?	( )	( )
102. Does it contain a first-aid manual?	( )	( )
Neutralizing Reagents for Spilled Substances		
103. Are there any available?	( )	( )
104. Are they easily accessible?	( )	( )
105. Are there enough?	( )	( )

	YES	NO
Glass Tubes		
106. Are they stored horizontally?	( )	( )
107. Are they supported across their entire length?	( )	( )
Safety Guidelines		
108. Are the safety guidelines posted?	( )	( )
109. Are they adequate?	( )	( )
Storage		
110. Is there a separate section for chlorates and permanganates?	( )	( )
111. Is there a separate section for ammonium nitrate?	( )	( )
112. Is there a separate section for acids?	( )	( )
113. Is there a separate section for nitric acid and peroxides?	( )	( )
114. Does the ventilation system work properly?	( )	( )
115. Are the containers labelled?	( )	( )

Comments

6.2 ACCIDENT REPORT

All accidents should be reported. The following is a sample accident report that could be used by all departments.

Fill out this report as soon as possible and submit it to the principal.

1. School: _____
2. When did the accident occur?
   a) Date: _____ Time: _____
3. Where did the accident occur? (Exact description)

   _____

   _____

   _____

   _____

4. What were the circumstances surrounding the accident?

   a) Supervisor: _____

      Title: _____

   b) Where was the supervisor when the accident occurred?

      _____

      _____

      _____

c) What was the victim doing when the accident occurred?

_____

_____

_____

d) What caused the accident?

_____

_____

_____

e) Describe circumstances, attitudes and behaviour that might be linked to the accident.

_____

_____

5. a) Were there any injuries? Yes_____ No_____

b) If not, could someone have been injured?
Yes_____ No_____

_____

_____

6. For each person injured, please specify:

NAME: _____

ADDRESS: _____

AGE: _____

GRADE: _____

NATURE AND LOCATION OF INJURY: _____

NAME: _____

ADDRESS: _____

AGE: _____

GRADE: _____

NATURE AND LOCATION OF INJURY: _____

NAME: _____

ADDRESS: _____

AGE: _____

GRADE: _____

NATURE AND LOCATION OF INJURY: _____

7. Material Losses: a) School: $_____

b) Others: $_____

Total: $_____

8. Corrective measures planned or taken to avoid a reoccurrence:

_____

_____

_____

9. Person filing report: _____

(Signature)

10. Date of report: _____

11. Principal's signature: _____

6.3 STUDENT'S VOLUNTARY ETHICAL AGREEMENT

I agree to act responsibly in the laboratory and to:

- follow all instructions given by the teacher, the laboratory technician or the laboratory attendant;

- protect all parts of my body (eyes, face, hands, etc.) when working in the laboratory;

- protect the environment;

- clean my work station properly;

- know where to find the first-aid kits, fire extinguishers, safety showers, fire blankets, and other safety equipment.

I,_____ , have read and agree to follow the safety guidelines and all other instructions issued by the supervisor or by the school.

DATE: _____ _____

(SIGNATURE)

6.4 LIST OF INCOMPATIBLE SUBSTANCES[1]

The chemicals in the left-hand column must not be stored with the substances directly across from them in the right-hand column.

Acetic acid	Chromic acid, nitric acid, hydroxylated compounds, glycol, perchloric acid, peroxides, permanganates
Alkali metals such as magnesium, sodium and potassium	Water, carbon tetrachloride and other chlorinated hydrocarbons, carbon dioxide, halogens
Acetone	Mixtures of concentrated nitric and sulphuric acid
Ammonia	Mercury (in a manometer, for example), halogens, calcium hypochlorite, hydrogen fluoride
Chlorate	Ammonium salts, acids, metallic powders, sulphur, very small or combustible organic substances
Flammable liquids	Ammonium nitrate, chromic acid, hydrogen peroxide, nitric acid, sodium peroxide, halogens

[1] This is not a complete list.

Hydrocarbons (e.g. butane, propane, benzene, gasoline, turpentine)	Fluorine, chlorine, bromine, chromic acid, sodium peroxide
Hydrogen peroxide	Copper, chrome, iron, most metals and their salts, alcohols, acetone, organic matter, aniline, nitromethane, flammable liquids, combustible substances
Mercury	Acetylene, fulminic acid, ammonia
Nitric acid (concentrated)	Acetic acid, aniline, chromic acid, hydrocyanic acid, hydrogen sulphide, flammable liquids, flammable gases
Potassium chlorate	Sulphuric acid, other acids
Potassium permanganate	Glycerine, ethylene glycol, benzaldehyde, any acid
Sulphuric acid	Potassium chlorate, potassium perchlorate, potassium permanganate (or similar compounds with light metals such as sodium and lithium)

6.5 LIST OF CORROSIVE AND FLAMMABLE SUBSTANCES

Among the most widely used chemicals in the laboratory, the following are corrosive (3rd or 4th degree) or flammable (3rd or 4th degree).

Corrosive Chemicals

Calcium oxide
Carbolic acid
Glacial acetic acid
Hydrochloric acid
Nitric acid
Potassium hydroxide
Sodium
Sodium hydroxide
Sulphuric acid

Flammable Chemicals

Acetone
Alcohols (butanol, ethanol, methanol)
Aldehydes (formaldehyde or formalin)
Benzene (carcinogenic - should be forbidden)
Carbon disulphide
Carbon monoxide
Ether
Hydrogen
Hydrogen sulphide
Toluene

6.6 SOME GASES HARMFUL TO THE RESPIRATORY SYSTEM

Gas	Risk	Gas	Risk
Ammonia	M	Hydrogen sulphide	H
Carbon dioxide	L	Nitrogen oxide[1]	H
Carbon monoxide	H	Nitrous oxide	L
Chlorine	H	Oxygen	L
Hydrogen	L	Phosphorous	H
Hydrogen chloride	H	Sulphur dioxide	M

L (Low): There is little danger if fumes, smoke or dust are inhaled during normal use.

M (Moderate): The inhalation of fumes, smoke or dust can be dangerous. Prolonged or repeated exposure to a low concentration or short exposure to a high concentration is dangerous.

H (High): The inhalation of fumes or smoke, even for short periods of time, is dangerous. An approved gas mask or self-contained breathing apparatus must be worn. A fume hood will also eliminate all danger.

[1] (Carcinogenic) As defined by the Occupational Safety and Health Administration; should be used only under highly controlled conditions.

6.7 LIST OF SYMBOLS USED FOR LABELLING

1. All chemical containers must be labelled (name and date). The supplier's label will usually contain all the necessary information.

2. The date the chemical was acquired must be written in indelible ink on all containers.

3. When a chemical is placed in a container other than its original container for temporary storage or experiments, the new container must be labelled in indelible ink with the following information:

   a) the name and chemical formula of the substance;

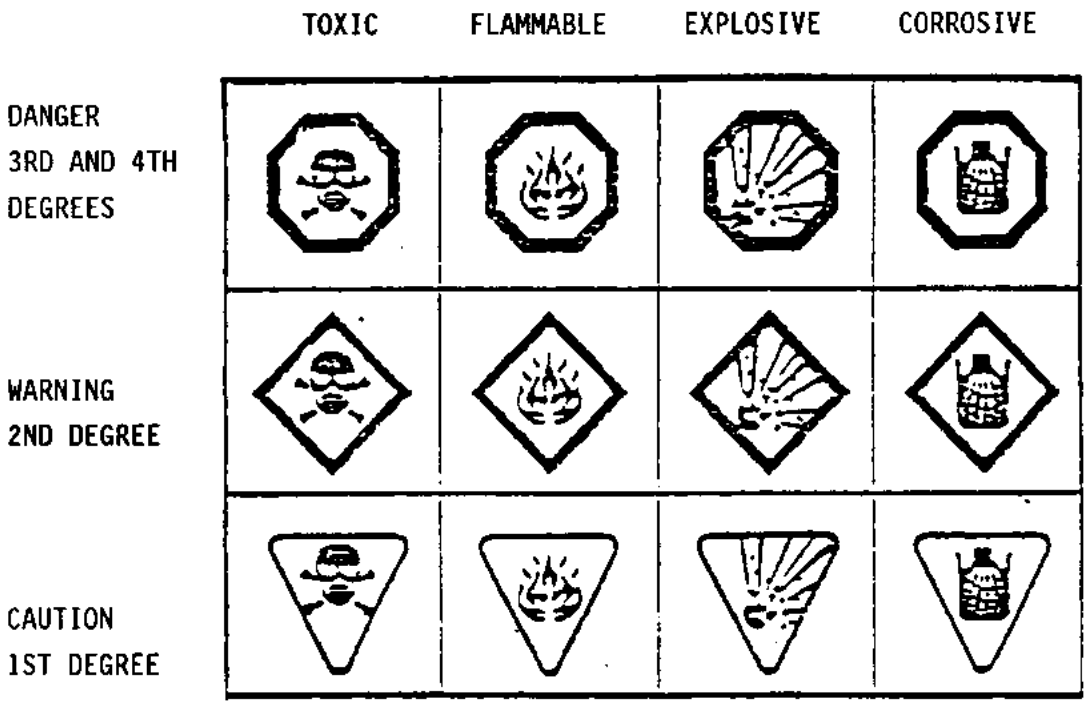
   b) the degree of risk:
      .the words DANGER, WARNING, or CAUTION must be used;

   c) the type (category) of risk involved as well as preventive measures:
      - use only words such as: TOXIC, POISON, CAUSES BURNS, FLAMMABLE, NOXIOUS FUMES, EXPLOSIVE... DO NOT HEAT, USE IN WELL-VENTILATED AREAS, AVOID CONTACT WITH EYES, CORROSIVE;
      - some substances present several types of risks. All risks must be specified;

   d) the date the chemical was prepared or transferred to the new container.

4. Symbols

Symbols can be used on the labels. The following are universal symbols representing three degrees of risk and four types of danger.



6.8 LIST OF TOXIC PLANTS

6.8.1 Mildly Toxic Plants

The following plants can cause internal irritation if ingested or external irritation if touched. The toxicity number assigned to each plant corresponds to the type of irritation or to the toxic substances involved:

1. Gastrointestinal irritation
2. Oxalic acid and oxalates
3. Plant-induced dermatitis

a) House Plants

Common Name	Scientific Name	Toxicity
Aloe	*Aloe*	1 and 3
Caladium	*Caladium*	2
Dieffenbachia	*Dieffenbachia*	2
Ivy	*Senecio* or *Hedera*	1 and 3
Pepper	*Capsicum annum*	1 and 3
Philodendron	*Philodendron*	2
Poinsettia	*Euphorbia pulcherrima*	1
Pothos	*Scindapsus aureus*	2
Rubber Plant	*Ficus*	3
Syngonium	*Syngonium*	2

b) **Outdoor Plants**

Common Name	Scientific Name	Toxicity
Buttercup	*Ranunculus acris*	1 and 3
Carnation	*Dianthus*	1 and 3
Charlock	*Brassica kaber*	1
Common Yarrow	*Achillea millefolium*	1
Daffodil	*Narcissus*	1 and 3
Gladiola	*Gladiolus*	1 and 3
Hyacinth	*Hyacinthus*	1 and 3
Iris	*Iris*	1
Narcissus	*Narcissus*	1 and 3
Poison ivy	*Rhus radicans*	1 and 3
Red baneberry	*Actaea rubra*	1 and 3
Rhubarb	*Rheum rhapontium*	2
Snakeberry	*Actaea rubra*	1 and 3
White baneberry	*Actaea alba*	1 and 3

c) **Gastrointestinal Irritation** (Toxicity number: 1)

SYMPTOMS

The symptoms resemble those observed during an attack of gastroenteritis and their intensity varies according to the sensitivity of the individual and the quantity ingested:

- nausea
- vomiting
- diarrhea
- abdominal cramps

FIRST AID

To be treated as gastroenteritis, that is, by administering liquids. If the symptoms persist, consult a doctor.

d) **Oxalic Acid and Oxalates** (Toxicity number: 2)

SYMPTOMS

- The oxalic acid and oxalates contained in the house plants listed here are not absorbed in the digestive tract. They can, however, cause irritation of the mucous membranes and, when swallowed, cause intense throat, esophagus or stomach pain. In more sensitive people, this irritation may cause an oedema (swelling) of the mouth, tongue and throat and lead to obstruction of the respiratory tract.

- Oxalic acid can also cause skin irritations when the skin comes in contact with the sap of plants containing it.

- Rhubarb leaves contain oxalic acid in a form that can be absorbed by the body and cause serious problems such as muscle spasms, tetany, kidney problems or coma. The health risks are in direct proportion to the amount ingested.

FIRST AID

- Try to ease the irritation by giving the person milk, water, juice or ice.

- Observe the person affected. If the lips, mouth, tongue or throat swell, take the person to the nearest emergency room.

- If there has been skin contact, wash the skin well with soapy water. Cold-water compresses can ease the pain.

- If a large quantity of rhubarb leaves (several mouthfuls) has been ingested, contact Poison Control Centre Québec at 1-800-463-5060, or the nearest emergency room.

e) **Plant-Induced Dermatitis** (Toxicity number: 3)

SYMPTOMS

- Skin contact with some plants can cause the following problems:

  - rash
  - itching
  - burning sensation
  - swelling
  - in certain cases, formation of blisters

- Poison ivy is the most well-known plant that can cause such symptoms. Other plants can cause this type of problem, but in these cases they are allergic reactions that affect only a small percentage of the population.

FIRST AID

- Wash the infected area with soapy water.
- Remove contaminated clothing, taking care not to touch it with your bare hands.
- Cold-water compresses can ease the itching. A little calamine can sometimes help.
- If the itching or swelling becomes serious, consult a doctor.

6.8.2 Highly Toxic Plants

The following plants can cause serious problems if ingested. The intensity of their effects can vary greatly according to different factors such as the amount ingested, the growth conditions of the plant and the sensitivity of the individual. Poisoning by one of these plants should not be taken lightly.

The number attributed to each plant corresponds to the type of irritation or the toxic substances involved:

4. Nicotine
5. Anticholinergics
6. Cardiac glycosides
7. Cyanogenetic glycosides
8. Solanine
9. Stimulants
10. Toxalbumin
11. Veratramine

It would be impractical to list detailed first-aid treatment for each type of irritation and each toxic substance involved because there are too many parameters that need to be considered. It is therefore recommended, in case of poisoning, that you contact Poison Control Centre Québec (1-800-463-5060) or the nearest emergency room.

If a person is found unconscious, check the vital signs (pulse, respiration) and administer cardio-pulmonary resuscitation if necessary.

a) House Plants

Common Name	Scientific Name	Toxicity
Azalea	*Azalea indica*	7
Jerusalem cherry	*Solanum pseudocapsicum*	9

b) Outdoor Plants

Common Name	Scientific Name	Toxicity
American plum	*Prunus americana*	8
American water hemlock	*Cicuta maculata*	10
Castor-oil plant (seeds)	*Ricinis communis*	11
Chinese lantern plant	*Physalis*	9
Choke Cherry	*Prunus virginiana*	8
Cotoneaster	*Cotoneaster*	8
Datura stramonium	*Datura stramonium*	6
Elderberry	*Sambucus communis*	8
Foxglove	*Digitalis purpurea*	7
Green or white hellebore	*Veratrum viride*	12
Henbane	*Hyoscyamus niger*	6
Larkspur	*Delphinium*	7
Lily of the valley	*Convallaria majalis*	7
Moonseed	*Menispermum canadense*	10
Poison hemlock	*Conium maculatum*	5
Potato (above-ground portion and sprouts),	*Solanum tuberosum*	6 and 9

Tobacco	*Nicotiana tabacum*	9
Tomato (stalk)	*Lycopersicon esculentum*	9
Woody nightshade	*Solanum dulcamara*	9

c) **Symptoms**

4. Nicotine

After having ingested a plant containing nicotine, a person may show the following symptoms:

- nausea, vomiting, diarrhea
- salivation, sweats
- headache, confusion
- trembling
- palpitations

If the poisoning is more serious, the person may show these symptoms:

- slow and irregular pulse
- low blood pressure
- convulsions
- paralysis and coma
- respiratory failure that could lead to death

5. Anticholinergics

Some plants cause a blocking of the parasympathetic autonomic nervous system. These are called anticholinergics. The first apparent effects will be:

- nausea, vomiting
- dry mouth
- dilation of pupils
- red, dry and hot skin
- palpitations

and when the poisoning is more serious:

- hallucinations
- convulsions
- coma

6. **Cardiac Glycosides**

Some plants, like foxglove, from which a very powerful drug is extracted, contain agents that affect the heart. The person who ingests them first experiences nausea and vomiting. Later, the heartbeat will become irregular.

7. **Cyanogenetic Glycosides**

Several succulent-fruit trees and shrubs such as plum, cherry and peach can also be poisonous. The toxic agent, found in the kernel, bark or leaves, releases cyanide in the digestive tract. The cyanide can cause nausea, severe vomiting, epigastric pain, convulsions and coma.

If a person swallows a whole, unbroken stone, there is no danger. Since gastric juices have no effect on the outside of the stone, the kernel will not release any cyanide.

8. **Solanine**

Solanine is a poison that can produce the following effects:

- nausea, vomiting, diarrhea, abdominal pain
- salivation, sweats, fever
- reduced heart rate
- muscular weakness
- convulsions
- coma and respiratory difficulty

When solanine is found in plants, it is concentrated primarily in the leaves and the green fruit. Fortunately, the ripened fruit contains very little. When dealing with solanine, vigilance is the key word since the symptoms can appear several hours later, or even the next day.

9. Stimulants

The toxic agents of this class of plant are not entirely understood. It is known, however, that when ingested they can cause nausea and vomiting, as well as convulsions.

10. Toxalbumin

Toxalbumin is a very toxic substance found inside the seeds of the castor-oil plant. Within hours of ingesting these seeds, the person will suffer nausea, vomiting and severe diarrhea. Afterwards, within one to ten days, the capillaries will become more fragile, causing damage to the liver and kidneys.

11. Veratramine

Veratramine is the toxic agent in green hellebore (known as white hellebore in North America). This plant can easily be mistaken for wild garlic in the spring and can cause the following problems:

- nausea, vomiting, diarrhea
- salivation, perspiration
- a drop in blood pressure
- reduced heart rate
- respiratory trouble

6.9 ADDRESSES OF THE MINISTÈRE DE L'ÉDUCATION, THE MINISTÈRE DE L'ENVIRONNEMENT AND THE COMMISSION DE LA SANTÉ ET DE LA SÉCURITÉ DU TRAVAIL

REGION	MINISTÈRE DE L'ÉDUCATION	MINISTÈRE DE L'ENVIRONNEMENT	COMMISSION DE LA SANTÉ ET DE LA SÉCURITÉ DU TRAVAIL
01 Bas Saint-Laurent - Gaspésie	376, avenue de la Cathédrale Rimouski (Québec) G5L 5K9 (418)722-3600	337, rue Moreault Rimouski (Québec) G5L 1P4 (418)722-3511	180, rue des Gouverneurs Rimouski (Québec) G5L 8G1 (418)722-3717 Telex: 051-86306 Casier postal 5000 144, boulevard Gaspé Gaspé (Québec) J0C 1R0 (418)368-5510
02 Saguenay - Lac-Saint-Jean	3950, boulevard Harvey 2e étage Jonquière (Québec) G7X 8L6 (418)695-2633	3950, boulevard Harvey 2e étage Jonquière (Québec) G7X 8L6 (418)542-3565	901, boulevard Talbot Casier postal 5400 Chicoutimi (Québec) G7H 6P8 (418)696-5200
03 Québec	1035, rue de la Chevrotière Québec (Québec) G1R 5A5 (418)643-7095	3900, rue Marly Sainte-Foy (Québec) G1X 4E4 (418)643-6071	730, boul. Charest Est Casier postal 4900 Québec (Québec) G1K 7S6 (418)643-5860 Telex: 051-2332 777, Promenade du Sud Casier postal 2217 Saint-Romuald (Québec) G6W 6J3 (418)839-2500
04 Trois-Rivières	100, rue Laviolette 2e étage Trois-Rivières (Québec) G9A 5S9 (819)376-3711	100, rue Laviolette 2e étage Trois-Rivières (Québec) G9A 5S9 (819)376-7341	1055, boul. des Forges 2e étage, Bureau 200 Trois-Rivières (Québec) G8Z 4J9 (819)373-1255 Telex: 058-37167
05 Estrie	740, rue Galt Ouest 2e étage, Bureau 201 Sherbrooke (Québec) J1H 1Z3 (819)565-0667	209, rue Belvédère Nord Sherbrooke (Québec) J1H 4A7 (819)566-5882	1335, rue King Ouest Sherbrooke (Québec) J1J 2B8 (819)821-5000 Telex: 058-36158
06.1 Laval - Laurentides Lanaudière	300, rue Sicard Sainte-Thérèse (Québec) J7E 3X5 (514)430-3611	4, Place Laval Laval (Québec) H7N 5Y3 (514)662-2616 800 boul. de Maisonneuve Est Montréal (Québec) H2L 4L8 (514)873-1901	432, rue de Lanaudière Joliette (Québec) J6E 7X1 (514)759-8080 Telex: 052-68658

REGION	MINISTÈRE DE L'ÉDUCATION	MINISTÈRE DE L'ENVIRONNEMENT	COMMISSION DE LA SANTÉ ET DE LA SÉCURITÉ DU TRAVAIL
06.2 Longueuil	201, Place Charles-Lemoyne 6e étage Longueuil (Québec) J4K 2T5 (514)873-2132	201, Place Charles-Lemoyne Longueuil (Québec) J4K 2T5 (514)646-1434	25, boulevard Lafayette Bureau 500 Longueuil (Québec) J4K 5B7 (514)442-6200 Telex: 052-4507
06.3 Montréal	600, rue Fullum 8e étage Montréal (Québec) H2K 4L1 (514)873-4630	5199, rue Sherbrooke Est Bureau 3860 Montréal (Québec) H1T 3X9 (514)253-1901	1, Complexe Desjardins Tour du Sud, 31e étage Casier postal 3 Succursale Desjardins Montréal (Québec) H5B 1N1 (514)873-8017 Telex: 052-5342
07 Outaouais	170, rue Hôtel-de-Ville 4e étage Hull (Québec) J8X 4C2 (819)778-1774	170, rue Hôtel-de-Ville 4e étage Hull (Québec) J8X 4C2 (819)762-6551	15, boulevard Gamelin Hull (Québec) J8Y 6N5 (819)770-3134 Telex: 053-3518
08 Abitibi - Témiscamingue	180, boulevard Rideau Rouyn-Noranda (Québec) J9X 1N9 (819)797-1766	29, rue du Terminus Rouyn-Noranda (Québec) J9X 2P3 (819)762-6551	33, rue Gamble Ouest Rouyn-Noranda (Québec) J9X 2R3 (819)762-4391 Telex: 057-46549
09 Côte-Nord	106, rue Napoléon 1er étage Sept-Îles (Québec) G4R 3L7 (418)968-6420 625, boulevard Laflèche Bureau 347 Baie-Comeau (Québec) G5C 1C5	818, boulevard Laure 1er étage Sept-Îles (Québec) G4R 1Y8 (418)962-3378	Au Grand Passage 690, boulevard Laure Bureau 20 Sept-Îles (Québec) G4R 4N8 (418)962-7031 Telex: 051-84191
10 Nouveau Québec	1020, route de l'Église 3e étage Sainte-Foy (Québec) G1V 3V9 (418)643-1857	3900, rue Marly Sainte-Foy (Québec) G1X 4E4 (418)643-7974	LG-2 Casier postal 690 Radisson (Québec) J0Y 2X0 (0)638-8978

6.10 MANIFEST FOR TRANSPORTING HAZARDOUS WASTE[1]

SCHEDULE VI
(Division V)

Ministère de l'Environnement

Manifest for Transporting Hazardous Waste

Section A – To be filled out and signed by the consignor and the carrier

CONSIGNOR
Business no. Tel. no.
Name
Address
Province Country Postal Code

CARRIER
Business no. Tel. no.
Name
Address
Province Country Postal Code

CONSIGNEE
Business no. Tel. no.
Name
Address
Province Country Postal Code

Shipping details
Expected shipping date Y M D | Expected arrival date Y M D | Transit region A B C D E F G H

Number of manifest cancelled with regard to this shipment, where applicable

Vehicle registration
Motor vehicle Prov | Trailer #1 Prov | Trailer #2 Prov

If cross-border
Expected point of entry into Quebec
Region of entry | Expected date of entry Y M D
Expected point of exit from Quebec
Region of exit | Expected date of exit Y M D

Description of hazardous waste

Hazardous waste no.	Name of hazardous waste	Quantity shipped Weight		Physical state	Containers Number	Type	Lining

Emergency instructions

Declaration of consignor
Shipping number
I declare that the information above is true
Name (Please print) | Date
Signature | Time

Declaration of carrier
I declare that I have taken delivery of the hazardous waste described above
Name (Please print) | Date
Signature | Time

1. **SECTION A:** To be sent to the Office of the ministère de l'Environnement, Direction régionale of the shipping point

URGENCE-ENVIRONNEMENT
(418) 643-4595

SECTION B – To be filled out by the consignee and the carrier or, upon exit from Quebec, by the carrier

Gouvernement du Québec
Ministère de l'Environnement

Declaration of consignee

Hazardous waste no.	If different from Section A, describe	Refused Total	Partial		Decontamination of containers		

Acceptance
Date Y M D
Time

Registration
Vehicle motor | Prov
Trailer #1
Trailer #2

Decontamination of vehicles

Quantity accepted (weight in kg)
Entry
Exit
Quantity accepted

I declare that the information in this declaration is true
Name (Please print) | Date
Signature | Time

Declaration of carrier
1. If outside Quebec
Point of exit | Region | Date of exit Y M D | Time

2. In every case
Describe any events to be reported | Code
I declare that ...
Name (Please print) | Date
Signature | Time

AU MINISTÈRE

1. **SECTION B:** To be sent to the office of the ministère de l'Environnement, Direction régionale of the shipping point

URGENCE-ENVIRONNEMENT
(418) 643-4595

[1]Gazette Officielle du Québec, June 26, 1985, Vol. 117, No. 28, p. 2035.

Gouvernement du Québec
Ministère
de l'Éducation

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