WHMIS CORE MATERIAL

A resource manual for the application and implementation of WHMIS

WORK SAFE BC
WORKING TO MAKE A DIFFERENCE
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WorkSafeBC (the Workers' Compensation Board) is an independent provincial statutory agency governed by a Board of Directors. It is funded by insurance premiums paid by registered employers and by investment returns. In administering the Workers Compensation Act, WorkSafeBC remains separate and distinct from government; however, it is accountable to the public through government in its role of protecting and maintaining the overall well-being of the workers' compensation system.

WorkSafeBC was born out of a compromise between B.C.'s workers and employers in 1917 where workers gave up the right to sue their employers or fellow workers for injuries on the job in return for a no-fault insurance program fully paid for by employers. WorkSafeBC is committed to a safe and healthy workplace, and to providing return-to-work rehabilitation and legislated compensation benefits to workers injured as a result of their employment.

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Contents

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Federal Agencies

Health Canada, Product Safety Bureau, WHMIS Division
Human Resources Development Canada
Hazardous Materials Information Review Commission

Provincial and Territorial Occupational Health and Safety Agencies

Alberta
Saskatchewan
Manitoba
Ontario
Quebec
New Brunswick
Prince Edward Island
Nova Scotia
Newfoundland
Yukon
North West Territories and Nunavut

Labour

Canadian Labour Congress
Communication, Energy and Paperworkers Union of Canada
United Food and Commercial Workers Union

Industry

Canadian Chemical Producers' Association
Mining Association of Canada
Canadian Manufacturers and Exporters
Canadian Manufacturers of Chemical Specialties Association
Canadian Association of Chemical Distributors

Employer

Canadian Vehicle Manufacturers' Association
Federally Regulated Employers in Transportation and Communication Organizations
British Columbia Hydro

CHAPTER 1

Introduction to WHMIS

GUIDE TO CHAPTER 1

APPENDICES

1.1 Rationale and Key Elements

Purpose

The Workplace Hazardous Materials Information System (WHMIS) is a nationwide system providing information on hazardous materials used in the workplace. WHMIS recognizes the interests of workers, employers, suppliers, and regulators—balancing the worker's right to know about hazards with industry's right to protect confidential business information.

Exposure to hazardous materials can cause or contribute to a variety of health effects such as irritation, burns, sensitization, heart ailments, kidney and lung damage, and cancer. Some materials may also be safety hazards that can contribute to fires, explosions, and other accidents if improperly stored or handled.

The seriousness of these problems and the lack of information available to employers and employees prompted the federal, provincial, and territorial governments to implement WHMIS in 1988 to reduce the incidence of illness and injury caused by hazardous materials in the workplace.

WHMIS is a system of information delivery with three key elements:

Key elements

- Labels on hazardous materials and their containers. Labels immediately alert employers and workers to the dangers of products and provide basic safety precautions.
- Material Safety Data Sheets (MSDSs). These technical bulletins provide detailed information on the hazards of the product as well as precautionary measures and first aid procedures for immediate response.
- Worker Education and Training. With these programs, workers receive the instruction on hazards and training in safe work procedures that they need to work safely around or near hazardous materials.

WHMIS also includes mechanisms for ruling on claims by suppliers and employers to withhold certain information from labels and MSDSs as confidential business information (CBI or trade secrets), and for appeals to these rulings.

1.2 History and Development

WHMIS was developed over a period of almost a decade, through consultation and the collective effort of industry, labour, and federal-provincial-territorial governments.

Chronology of Events

January 1979	Working group of the Occupational Safety and Health Committee of the Canadian Association of Administrators of Labour Legislation (CAALLOSH) was formed to review current legislation in Canada for labelling hazardous substances.
May 1981	Federal-Provincial-Territorial Task Force chaired by Consumer and Corporate Affairs Canada (CCAC), the Federal Government department responsible for the HPA at that time, was formed to study the feasibility of labelling hazardous substances.
April 1982	CAALLOSH Committee submitted a final report on labelling to the CAALL Executive. Members agreed to extend the concept to a material information delivery system for hazardous materials. Labour Canada was asked to establish a tripartite consultative process to develop a proposal for the system.
February 1983	First meeting of the tripartite WHMIS Steering Committee was held. Working groups were established with participation by industry, labour, and government representatives.
April 1985	The Steering Committee published: *Workplace Hazardous Materials Information System - Report of the Project Steering Committee.*
May 1986	Deputy Ministers of Labour and heads of OSH agencies agreed to the formation of an intergovernmental Implementation Coordinating Committee (ICC).

January 1987	Consultative process began, involving federal, provincial, and territorial governments, industry, and labour on drafting of federal WHMIS legislation under the *Hazardous Products Act (HPA)* and complementary Model OSH Regulations, to be used as a basis by all OSH agencies.
June 1987	Federal legislation under Bill C-70 to amend the *HPA*, the *Canada Labour Code (Part II),* and other related federal legislation, as well as to introduce the *Hazardous Materials Information Review Act (HMIRA),* received Royal Assent, enabling implementation of WHMIS on a national basis by October 31, 1988.
January 1988	The *Controlled Products Regulations (CPR)* and Ingredient Disclosure List (IDL) under the *HPA*; confidentiality criteria regulations under the *HMIRA*; and amendments to the *Canada Occupational Safety and Health Regulations* under the *Canada Labour Code (II)* were published in final approved form in Part II of the *Canada Gazette.*
Spring 1988	Consultative process involving industry, labour, and government continued; Model Occupational Safety and Health Regulations for WHMIS workplace requirements and policy for the implementation of the information system were developed.
October 1988	WHMIS legislation went into effect.
October 1990	Report to Parliamentary Sub-committee on the tripartite review (by industry, labour, and government) of exclusions (WHMIS II) was completed.
April 1992	Parliamentary Sub-committee reported favourably to the Government on the exclusions review proposals.
May 1993	Federal Government announced agreement to implement the proposals from the exclusions review process.
May 1993 to Present	Relapse of WHMIS II proposals. Multi-stakeholder WHMIS task force formed to provide input into the proposed Globally Harmonized System (GHS) for hazardous classification, MSDSs, and labelling of chemicals that will bring into accord existing systems around the world. Currently, Canada actively participates in international GHS discussions, for which no exemptions are being considered.

1.3 Legislation

WHMIS is enforced by a combination of federal and provincial legislation, as shown in Figure 1.1.

Federal legislation

The federal *Hazardous Products Act* as amended by Bill C-70 (Chapter 30 [1987] of the Statutes of Canada) requires suppliers/importers of hazardous materials (called controlled products) to provide adequate labels and MSDSs as a condition of sale and importation.

The *Controlled Products Regulations*, issued under the authority of the *HPA*, specify the criteria defining a controlled product, the form and content of supplier labels, the information required on MSDSs, and the conditions of exemption from certain requirements.

The Ingredient Disclosure List, also established under the *HPA* lists 1736 chemicals whose identities must be disclosed on a MSDS if present above specified concentrations in a controlled product. Substances on the IDL are not the only ingredients that must be disclosed on the MSDS. *WHMIS controlled products are classified by the criteria set out in the CPR*.

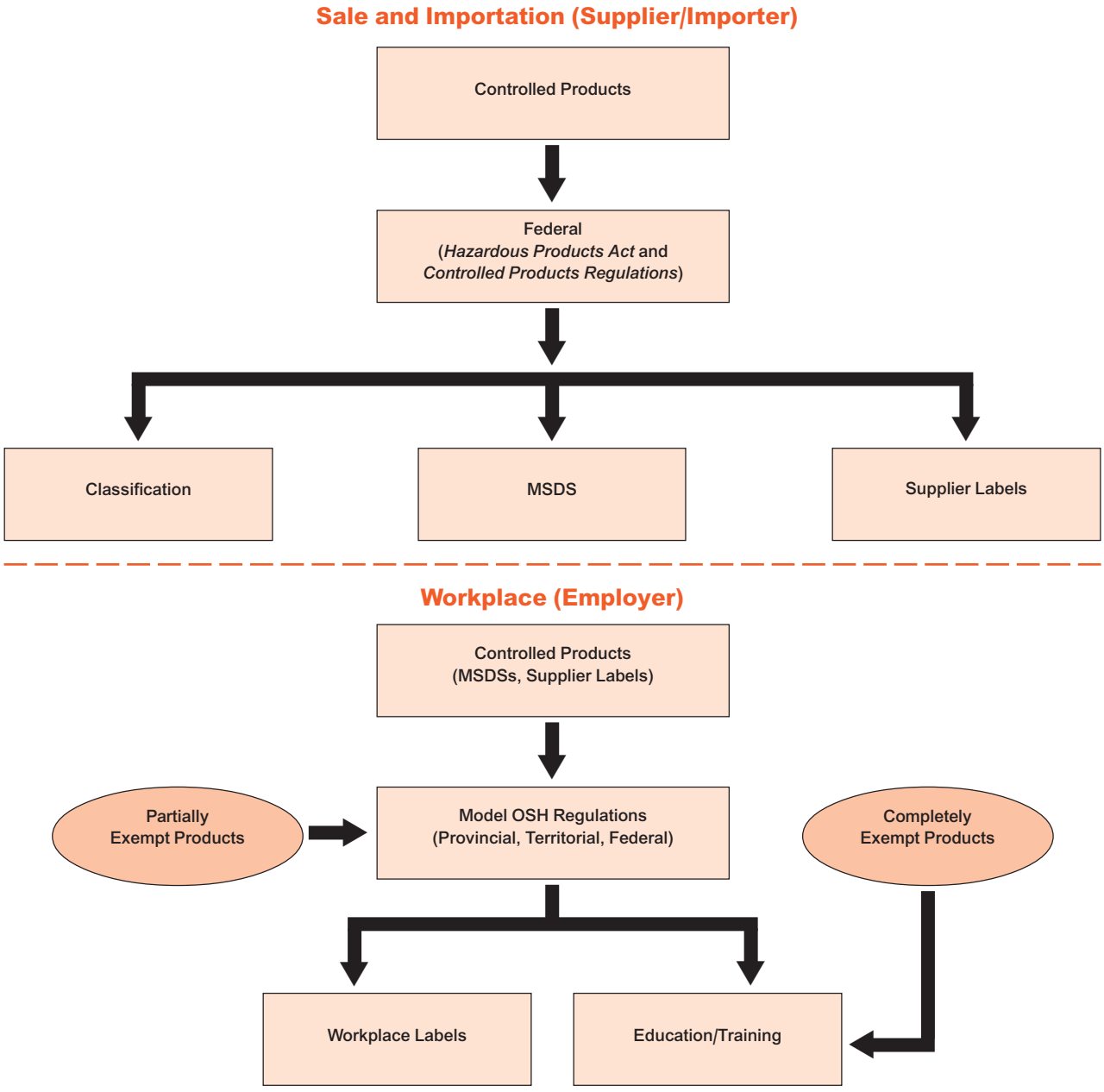
OSH legislation

Federal, provincial, and territorial Occupational Safety and Health (OSH) legislation require employers to provide labels, MSDSs, and worker education programs in the workplace. The model for this legislation is provided by the Workplace Hazardous Materials Information System Regulations (Model OSH Regulations).

HMIRA The *Hazardous Materials Information Review Act* establishes a Commission to rule on claims and appeals related to exemptions from disclosure of confidential business information. The *Hazardous Materials Information Review Regulations* provide criteria for determining the validity of a claim for exemption.

HMIRC The Hazardous Materials Information Review Commission (HMIRC) uses current literature, legislation, and policy decisions to approve confidential business information exemptions.

Figure 1.1
WHMIS Legislation



1.4 Compliance Mechanisms

The responsibility for ensuring compliance of suppliers with the *Hazardous Products Act* and the *Controlled Products Regulations* is delegated to federal, provincial, and territorial regulatory agencies, which carry out inspection programs. Health Canada, in cooperation with Customs and Excise Canada, exercises control on imports at point of entry.

Penalities: federal

The penalties under the HPA are:

- On summary conviction, a maximum fine of $100, 000, imprisonment for a maximum of six months, or both
- On proceedings by way of indictment, a maximum fine of $1 million, imprisonment for a maximum of two years, or both

The Hazardous Materials Information Review Commission is responsible for ensuring compliance with the *Hazardous Materials Information Review Act*. Penalties under the *HMIRA* are the same as those under the *HPA*.

Penalities: workplace

Human Resources Development Canada (Labour Program) and provincial and territorial occupational safety and health regulatory agencies carry out inspection programs under the legislation adopted by each agency for applying WHMIS to employers and the workplace. The penalties under such workplace legislation are established by the statutes that apply to each jurisdiction.

1.5 Implementation

To implement a WHMIS program, employers must make use of supplier labels and MSDSs, as well as their own knowledge of the hazards of products and their use in the workplace. This knowledge should take into account factors such as quantity, work processes, control measures, and work location.

General OSH regulations require employers to develop from this information written safe work procedures that ensure the health and safety of workers. They must also educate their workers about the hazards and train them in safe work procedures.

How employers implement WHMIS in their own workplaces will vary. Local occupational health and safety authorities can provide advice on requirements within each jurisdiction. The major elements of any WHMIS program, however, should contain the elements below (also see sample WHMIS Implementation Plan Checklist in Appendix 1C, "WHMIS Implementation Plan Checklist"):

1. Assign responsibility for program implementation.
2. Establish an inventory of controlled products. Determine if products in the workplace are controlled products by consulting both suppliers of products and published sources (also see Chapter 2, "Classification" and Chapter 8, "Resources").
3. Develop a system to ensure WHMIS Labels and MSDSs are in compliance:
   - **Labels**. Use compliant supplier labels on existing and newly received controlled products. Develop workplace labels or other appropriate identification for other products. (See Chapter 4, "The Label.")
   - **MSDSs**. Obtain and store current, compliant MSDSs for existing and newly received controlled products. Prepare compliant MSDSs for products produced or prepared in the workplace. (See Chapter 5, "The MSDS.")
4. Determine the hazards of controlled products in the workplace. Review possible hazards encountered in the storage, handling, use, and disposal of controlled products, in the circumstances specific to the particular work setting.

5. Establish workplace controls. Based on the hazard evaluation, establish or upgrade workplace controls:
   - Substitution of a less hazardous chemical (as first choice of control, when possible)
   - Engineering controls such as general or local ventilation, process modification, or isolation
   - Administrative controls such as work procedures or scheduling
   - Personal Protective Equipment (PPE) such as respirators and gloves (if other controls are not practicable)
6. Establish emergency procedures. Develop, review, or upgrade both general and product-specific procedures for:
   - First aid
   - Evacuation
   - Spill control and accidental release
   - Firefighting and other emergency response
7. Provide worker education and training (see Chapter 6 "Worker Education and Training"). A WHMIS education and training program includes both an explanation of facts—for example, the hazards of controlled products, the WHMIS system, the significance of product labels and MSDS—and practical training in safe, specific procedures developed from WHMIS information.
8. Review each aspect of the WHMIS program regularly for compliance and effectiveness.

Appendix 1A
Acronyms and Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists
AEC	Atomic Energy Control (Agency)
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
BEI	Biological Exposure Indices
BSI	British Standards Institute
CAALL	Canadian Association of Administrators of Labour Legislation
CANUTEC	Canadian Transport Emergency Centre
CAS	Chemical Abstracts Service
CBI	Confidential Business Information
CCAC	Consumer and Corporate Affairs Canada
CCCR	Consumer Chemicals and Containers Regulations
CCOHS	Canadian Centre for Occupational Health and Safety
CEPA	Canadian Environmental Protection Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations (U.S.)
CHEMTREC	Chemical Transportation Emergency Center
CIHR	Canadian Institutes of Health Research
CPR	Controlled Products Regulations
CSST	Commission de la santé et de la sécurité du travail
CSA	Canadian Standards Association
DOT	Department of Transport (U.S.)
EPA	Environmental Protection Agency (U.S.)
EU	European Communities
FDA	Food and Drug Administration (U.S.)
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
HBV	Hepatitis B Virus
HC	Health Canada
HCV	Hepatitis C Virus
HEPA	High-Efficiency Particulate Air (filter)
HIV	Human Immunodeficiency Virus
HPA	Hazardous Products Act

HMIRA	Hazardous Materials Information Review Act
HMIRC	Hazardous Materials Information Review Commission
HMIS	Hazardous Materials Identification System
HRDC	Human Resources Development Canada
IARC	International Agency for Research on Cancer
ICAO	International Civil Aviation Organization
IDL	Ingredient Disclosure List
IDLH	Immediately Dangerous to Life and Health
ILO	International Labour Organization (based in Geneva)
IMO	International Maritime Organization
ISO	International Organization for Standardization
IUPAC	International Union of Pure and Applied Chemistry
LC	Lethal Concentration
LCDC	Laboratory Centre for Disease Control
LD	Lethal Dose
LEL	Lower Explosive Limit
LFL	Lower Flammable Limit
MSDS	Material Safety Data Sheet
MSHA	Mine Safety and Health Administration (U.S.)
NACE	National Association of Corrosion Engineers (U.S.)
NFPA	National Fire Protection Association (U.S.)
NIOSH	National Institute for Occupational Safety and Health (U.S.)
NSC	Nuclear Safety and Control Act
NTP	National Toxicology Program (U.S.)
OECD	Organization for Economic Cooperation and Development
OSHA	Occupational Safety and Health Administration (U.S.)
ORM	Other Regulated Material
PAPR	Powered Air-Purifying Respirator
PHAC	Public Health Agency of Canada
PIN	Product Identification Number
PIS	Policy Issue Sheet
PMCC	Pensky-Martens Closed Cup
RCRA	Resource Conservation and Recovery Act

RTECS	Registry of Toxic Effects of Chemical Substances
RTK	Right-to-Know
SARA	Superfund Amendment and Re-authorization Act (U.S.)
SETA	Setaflash Closed Cup
TDG	Transportation of Dangerous Goods (Act and pursuant Regulations)
TLV	Threshold Limit Value
TSCA	Toxic Substances Control Act
UEL	Upper Explosive Limit
UFL	Upper Flammable Limit
UNCETDG	United Nations Committee of Experts on Transport of Dangerous Goods
WHMIS	Workplace Hazardous Materials Information System
WHO	World Health Organization

Appendix 1B
Definitions of Terms

About to be	A phrase which, when used where a product is "about to be appropriately labelled", generally means within one work shift.
Absolute pressure	Pressure measured with respect to zero pressure, contrasted with gauge pressure, which is measured with respect to atmospheric pressure. Absolute pressure = atmospheric pressure + gauge pressure. Absolute vapour pressure and absolute pressure in a cylinder refer to vapour and cylinder pressures measured with respect to zero instead of gauge. Pressure conversions: 1 atmosphere = 101.3 kPa = 760 mmHg = 760 torr = 14.7 lb/in^2
Acid	A chemical with a pH value less than 7.
Active ingredient (a.i.)	In a chemical formulation, the ingredient that produces the intended effect.
Acute exposure	A single exposure to a substance or multiple exposures occurring within a short time, usually 24 hours or less. See also *Chronic exposure* and *Subchronic exposure*.
Acute lethality	The death of animals immediately or within 14 days after a single dose of or exposure to a toxic substance.
Acute toxic effect	An adverse effect in a human or animal, with severe symptoms developing rapidly and advancing quickly to a crisis.
Acute toxicity	The degree to which a substance can cause adverse (acute) effects resulting from a single dose of or exposure to a substance. Ordinarily used to denote effects in experimental animals.
Aerosol	A dispersion of solid or liquid particles suspended in air.
Aerosol container	A disposable container designed to release pressurized contents through a manually operated valve that is an integral part of the container.
Affected party	If a controlled product is the subject of a claim for confidential business information, an affected party is one who is not a competitor of the claimant, and who is involved with the use or supply of a controlled product at a workplace. An affected party may be a supplier of the controlled product (or authorized representative); an employee (or legally authorized representative) or employer at the workplace; or a health and safety professional, representative, or committee member for the workplace.
Antidote	A remedy used to counteract the effects of a poison.
Aplastic anemia	A condition in which the bone marrow fails to produce an adequate number of red blood cells.
Applicable information	On MSDSs, information on a product that can help workers to properly and safely store, handle, use, or dispose of the product.
Applied	Where a label is "applied" to a controlled product or its container, the label is attached, imprinted, stencilled, or embossed on the controlled product or container or, in a bulk shipment of a controlled product, is included with or accompanies the bulk shipment in the manner prescribed.

Aqueous	Indicates the presence of water in a solution.
Aromatic solvents	Derivatives of benzene. They penetrate the skin and may be toxic if inhaled.
Asbestosis	A form of bilateral, diffuse, interstitial fibrosis of the lungs resulting from inhalation of airborne asbestos fibres.
Asphyxiant	A vapour or gas that can cause unconsciousness or death by suffocation. Two types are: • Simple asphyxiants are physiologically inert gases that in excess may displace or dilute oxygen in air to dangerously low levels. • Chemical asphyxiants are chemical substances that prevent normal delivery of oxygen to body tissues by interfering with either the uptake of oxygen by blood or the ability of cells to use oxygen
At a later time	A phrase which, when used where a controlled product will be labelled “at a later time”, generally means a period of time longer than one work shift, an interim during which a placard must be posted.
Atopic	A constitutional or hereditary tendency to develop chronic hypersensitive states such as hay fever or asthma, especially to antigens that provoke no adverse reactions in nonatopic subjects.
Autoignition temperature	The temperature at which the vapour from a liquid will ignite without a source of ignition such as a spark or flame.
Biological Exposure Indices (BEI)	Numerical reference values representing the amount of a material the human body absorbs when a healthy worker is exposed to a chemical at its threshold limit value. Determined by measuring the material or its metabolic products in tissue, fluid, or exhaled air.
Boiling point	The temperature at which the vapour pressure of a liquid is equal to the external pressure (usually standard atmospheric, or sea level, pressure of 760 mm Hg).
Bonding	In the transfer of a liquid from one container to another, refers to making an electrically conductive connection between the discharge container and the receiving container to eliminate the possibility of an electrical spark due to static discharge.
Buffer	A pH stabilizer. A substance counteracting the change in hydrogen ion concentration (pH) otherwise produced when acids or bases are added to a solution.
Bulk shipment	A shipment of a controlled product that is contained, without intermediate containment or packaging, in any of the following: • A vessel with a water capacity of more than 454 litres • A freight container, a road vehicle, a portable tank; a freight container carried on a road vehicle, railway vehicle, ship, or aircraft; or a portable tank carried on a road vehicle, railway vehicle, ship, or aircraft • The hold of a ship • A pipeline
Canister	A container filled with adsorbent materials, and designed, as part of a respirator, to remove gases and vapours from the air before they are inhaled by a worker.
Carcinogen	A substance or agent capable of producing cancer in mammals.
Carrier	A material mixed with active ingredients to make a formulation, for example, finely ground clay, diatomaceous earth, water, gas propellant.

Cartridge	In an air-purifying respirator, the small, detachable part of an air-purifying respirator that is designed to adsorb gases and vapours from the air.
CAS registry number	The identification number assigned to a chemical substance by the Chemical Abstracts Service Division of the American Chemical Society.
Caustic	A chemical with a pH value greater than 7. (May also be called *Base* or *Alkali*).
cc	Cubic centimetre; a volume measurement in the metric system, equal in capacity to one millilitre (mL).
Chemical cartridge respirator	A non-emergency, air-purifying respirator equipped with one or more cartridges specific to various gases or vapours.
Chemical family	A group of single elements or compounds with similar chemical characteristics or structure. For example, acetone, methyl ethyl ketone (MEK), and methyl isobutyl ketone (MIBK) are in the *ketone* family.
Chemical formula	A combination of chemical symbols defining a chemical. It represents the proportions of the elements that make it up. For example, H_2O is the formula for water, made up of two molecules hydrogen and one molecule oxygen.
Chemical identity	A specific chemical name. Complex chemicals may have more than one name, depending on the naming system used.
Chief Appeals Officer	The Chief Appeals Officer appointed pursuant to Section 38 of the *HMIRA*.
Chief Screening Officer	The Chief Screening Officer appointed pursuant to Section 38 of the *HMIRA*.
Chronic exposure	Repeated exposure to a substance over a relatively long period of time (typically more than 10% of lifetime in laboratory studies). See also *Acute exposure* and *Subchronic exposure*.
Chronic toxic effect	An adverse effect to the health of a person or test animal that develops: • Over time, following a single exposure to a toxic substance • From prolonged or repeated exposure to a toxic substance under conditions that do not produce that effect from a single exposure.
Coefficient of water/ oil distribution	The ratio of the solubility of a product in water to its solubility in n-octanol.
Combustible liquid	A liquid with a flashpoint of 100 °F (37.8 °C) or more but less than 93.3 °C (200 °F) when tested according to the applicable method in Schedule IV of the *CPR*.
Combustion	Rapid oxidation with the production of heat and light, as in the burning of a fuel.
Commission	The Hazardous Materials Information Review Commission established by Subsection 28(1) of the *HMIRA*.
Common chemical name	The simple chemical name of a chemical as opposed to its trade name or its technically precise IUPAC name. For example, the pesticide with the common chemical name *carbaryl* has the trade name *Sevin* and the full scientific name of 1-*naphthyl-n-methyl carbamate*.
Complex mixture	A mixture that is a combination of many chemicals, has a commonly known generic name, and is any of the following: • A naturally occurring mixture • A fraction of a naturally occurring mixture that results from a separation process • A modification of either a naturally occurring mixture or a fraction of a naturally occurring mixture that results from a chemical modification process

Concentration	The relative amount of a substance combined with other substances. Examples: 2 ppm hydrogen sulfide in air, or a 50% caustic solution.
Confidential business information (CBI)	Product information withheld from labels or MSDSs for a specified period of time in a valid claim for exemption from WHMIS disclosure requirements, and granted on the basis of criteria in the *Hazardous Materials Information Review Regulations*.
Consultation	Regarding WHMIS instruction, means a meeting in which an employer seeks information or advice from the joint occupational safety and health committee (or representative).
Container	Under the *HPA* and the *CPR*, a container sold by a supplier includes a bag, barrel, bottle, box, can, cylinder, drum, or similar package or receptacle. Under Model OSH Regulations governing employers, the term includes bulk storage tanks. See also *Outer container*.
Controlled product	Any product, material, or substance that falls within the hazard criteria set out in Part IV of the Controlled Products Regulations.
Corrosive	Refers to a material that causes visible destruction or irreversible alterations in human skin tissue at the site of contact or that has a significant corrosion rate on steel or aluminum.
Cosmetic	As defined in the *Food and Drugs Act*, means any substance or mixture of substances manufactured, sold, or represented for use in cleansing, improving, or altering the complexion, skin, hair, or teeth. This definition includes deodorants, perfumes, soaps, tattoo inks, and products used to groom animals.
Critical temperature (T_c)	The temperature above which a substance can exist only as a gas and cannot be converted to a liquid by pressure.
Cylinder pressure	The pressure to which a cylinder is filled.
Decomposition	Breakdown of a substance by heat, chemical reaction, biological, aging, or other processes into parts or elements or simpler compounds.
Dermal	Used on or applied to the skin.
Dermal toxicity	Adverse effects resulting from skin exposure to a substance. Ordinarily used to denote effects in experimental animals.
Dermatitis	Inflammation of the skin caused by an irritant substance.
Detoxify	To make harmless; to neutralize a poison or remove a poisonous effect.
Distributor	A person or company that distributes controlled products, made by manufacturers, to users or other suppliers. See also *importer, supplier*.
Drug	As defined in the *Food and Drugs Act*, includes any substance or mixture manufactured, sold, or represented for any of the following: • The diagnosis, treatment, mitigation, or prevention of a disease, disorder, abnormal physical state, or the physical symptoms thereof, in man or animal • Restoring, correcting, or modifying organic functions in man or animal • Disinfection in premises in which food is manufactured, prepared, or kept
Dust	Solid airborne particles that are mechanically generated.
Education	All those activities, including instruction, that provide both knowledge and practical skills to workers so that they may work safely with, or in proximity to, controlled products in the workplace. See also *Instruction* and *Training*.

Embryotoxicity	Material that is toxic to the fetus at concentrations or exposures that are not toxic to the mother.
Employer	Specific meaning is established by the appropriate occupational regulatory authority. In general, refers to that person who has in service under a contract of hiring or apprenticeship—written or oral, express or implied—a person engaged in work in or about a workplace.
Emulsion	A mixture of two or more immiscible liquids, such as oil and water, where one is suspended or dispersed in the other in the form of minute droplets and remains suspended or dispersed for a period of time. An emulsifier may be used to assist the dispersion.
Epidemiology	The science dealing with the study of disease in a general population, in particular the incidence (rate of occurrence) and distribution (for example, by age, sex, or occupation) of the disease.
Evaporation	The transformation of a liquid into a vapour.
Evaporation rate	The rate at which a particular material will vaporize (evaporate) relative to butyl acetate, ether, or other specified solvent.
Explosive	As defined in the *Explosives Act*, means any substance that is made, manufactured or used to produce an explosion, or detonation, or a pyrotechnic effect and includes gunpowder, propellant powders, blasting agents, dynamite, detonating cord, lead azide, detonators, ammunition, rockets, fireworks, safety flares, or other signals.
Exposure	A condition of contact between a person and a hazardous substance. Contact may be oral, dermal, or respiratory.
Exposure limit	A maximum permitted level of exposure to an air contaminant. Three types of limits commonly used by the ACGIH are: • *Threshold Limit Value – Time-Weighted Average (TLV-TWA).* The time-weighted average concentration for a normal 8-hour work day or 40-hour work week to which almost all workers can be repeatedly exposed without adverse effect. • *Threshold Limit Value – Short-Term Exposure Limit (TLV-STEL).* The maximum concentration to which workers can be periodically exposed for up to 15 minutes without suffering irritation, chronic or irreversible tissue change, or sufficient narcosis to increase accident proneness, impair ability for self-rescue, or greatly reduce work efficiency. • *Threshold Limit Value – Ceiling (TLV-C).* The concentration that must not be exceeded at **any** time. This limit applies to substances that are irritant or fast-acting (the TLV-TWA is inappropriate for such substances).
Flame projection	The ignited discharge of the pressurized contents of an aerosol container. See also *Flashback*.
Flammable limits	The upper and lower concentrations of a gas or vapour in air between which an explosion or propagation of flame will occur when an ignition source is present. See also *LEL (LFL)* and *UEL (UFL)*.
Flammable liquid	A liquid with a flashpoint below 100 °F (37.8 °C) when tested according to the appropriate method in Schedule IV of the *CPR*. See also *Combustible liquid*.

Flammable range	The concentration range in which a gas or vapour is flammable in air between the upper and lower flammable limits.
Flammable solid	A solid that meets any of four criteria in *CPR*, Section 39.
Flashback	The part of a flame projection that extends from its point of ignition back to the aerosol container. See also *Flame projection*.
Flashpoint	The minimum temperature at which a liquid gives off enough vapour to ignite in the presence of a source of ignition under specified test conditions. Flashpoints will vary for the same material depending on the test method used. Appropriate test methods are provided in Schedule IV of the *CPR*.
Fugitive emission	A gas, liquid, solid, vapour, fume, mist, fog, or dust that escapes from process equipment, emission control equipment, or a product.
Fume	Solid particles in air condensed from the vapour of a solid material. Fumes are produced in, for example, welding operations, and often accompanied by a chemical reaction, such as oxidation.
g	Gram; a metric unit of weight. One pound is about 454 grams.
Gas	A substance that is in the gaseous state at ordinary temperature and pressure (that is, an absolute pressure of 101.325 kPa at 20 °C).
General exhaust ventilation	A system for exhausting air containing contaminants from a general work area. Also see *Local exhaust*.
Generic instruction	Instruction of workers in WHMIS hazard information without reference to specific products or worksites.
Generic material safety data sheet	A single MSDS that applies to a number of similar products.
Half life	The period of time for a chemical or radioactive substance to lose half its concentration or activity due to metabolic uptake, decay, or other chemical change.
Hazard information	Information on the proper and safe storage, and handling, use, and disposal of a controlled product; includes information relating to its toxicological properties.
Hazard symbol	Includes any design, mark, pictogram, sign, letter, word, number, abbreviation, or any combination thereof that must be displayed on a controlled product or its container to show the nature of the hazard of the controlled product.
Hazardous product	Any prohibited product, restricted product, or controlled product.
Hazardous waste	A controlled product that is intended for disposal or is sold for recycling or recovery.
High-efficiency particulate air (HEPA) filter	A filter that has been tested to assure an efficacy equal to or exceeding 99.97% for removal of particles having a mean aerodynamic diameter of 0.3 microns.
Ignition source	A condition such as flame, static discharge, or heat capable of contributing to ignition of flammable or combustible materials.
Immediately Dangerous to Life and Health (IDLH)	An atmosphere in which the concentration of oxygen or flammable or toxic air contaminants would cause fatal injury or irreversible and incapacitating health effects to a person without respiratory protection.

Immediate use	With reference to the use of the contents of a portable container, means to be used at once, without delay.
Importer	A supplier, that is, a person or company, who imports controlled products for sale, distribution, or immediate use in Canada. The importer can arrange the transaction without necessarily handling the product physically.
In proximity to	With reference to "working in proximity to a controlled product," means the area in which worker health and safety could be at risk during the storage, handling, use, or disposal of the product, or in emergencies such as accidental release or spill.
In vitro	Refers to laboratory studies performed outside living organisms, for example, in glass *(vitro)* test tubes, or Petri dishes.
In vivo	Refers to laboratory studies performed inside living organisms.
Incompatible	Materials that could cause dangerous reactions from direct contact with one another are described as incompatible.
Ingestion	Intake of a substance through the mouth.
Ingredient Disclosure List (IDL)	The IDL is a list of substances which, if present in a WHMIS controlled product must be disclosed on the MSDS if present at or above the specified cut-off concentration (1.0% or 0.1%). Ingredient disclosure is not limited to materials that appear on the IDL. The criteria for ingredient disclosure is set out in 13(a)(i) to (iv) of the *HPA*.
Inhalation	The breathing in of a substance.
Inhibitor	A chemical that is added to another substance to prevent an unwanted chemical change from occurring.
Inorganic chemicals	Generally, chemicals that do not contain carbon bonded to hydrogen.
Instruction	The methodical teaching of information. See also *Education, Training*.
Irritant	A substance that, with sufficient contact, will cause reversible inflammation of the eye, skin, or respiratory system. The contact may be single or multiple. *Primary irritants* cause irritation at the site of contact. See also *Dermatitis*.
kg	Kilogram; a metric unit of weight, about 2.2 pounds. Also see g and mg.
kPa	Kilopascal; a unit of pressure (1 atmosphere equals 101.3 kPa).
L	Litre; a metric unit of volume, equal to 1,000 cc or mL.
Label	Includes any mark, sign, device, stamp, seal, sticker, ticket, tag, or wrapper.
Laboratory	A place devoted to experimental study in any branch of natural science or to the application of scientific principles in testing and analysis. A laboratory includes non-traditional settings such as field testing locations (open or enclosed) and production line testing stations.
Laboratory sample	A sample, taken from a controlled product, that is intended solely to be tested in a laboratory but does not include a controlled product that is to be used: • by the laboratory for testing other products, materials or substances • for educational or demonstration purposes • for marketing

Lethal concentration$_{50}$ (LC_{50})	As defined by the *CPR*, means the concentration of a substance in air that, when administered by inhalation over a specified length of time in an animal assay, is expected to cause the death of 50% of a defined animal population. LC_{50} criteria in the *CPR* are based on 4-hour exposures. The LC_{50} is expressed by volume as parts of substance per million parts of air (ppm) for gases and vapours; or by weight as milligrams of material per litre or cubic metre of air (mg/L or mg/m^3) for dusts, mists, and fumes.
Lethal dose$_{50}$ (LD_{50})	As defined by the *CPR*, is a single dose of a substance that, when administered by a defined route in an animal assay, is expected to cause the death of 50% of a defined animal population. The LD_{50} dose is usually expressed as milligrams or grams of material per kilogram of animal body weight (mg/kg or g/kg).
Lower explosive limit (LEL)	See *Lower flammable limit (LFL)*.
Leukemia	A blood disease characterized by over-production of white blood cells.
Lipophilic properties	Affinity of a product for fatty tissue.
Local exhaust ventilation	A system for capturing and exhausting contaminants from the air at the point where the contaminants are produced (for example, during welding, grinding, or similar operations). Also see *General exhaust ventilation*.
Lower flammable limit (LFL)	For a vapour or gas, the lowest concentration of the substance in air that will produce a flame or explosion when an ignition source is present. At concentrations lower than the LFL, the mixture is too "lean" to burn. Also termed the *lower explosive limit (LEL)*.
m^3	Cubic metre; a metric measure of volume equal to 1,000 litres.
mL	One millilitre or cubic centimetre, one one-thousandth part of a litre.
Manufactured article	Any article that is formed to a specific shape or design during manufacture, the intended use of which is dependent in whole or in part on its shape or design, and that, under normal conditions of use, will not release or otherwise cause a person to be exposed to a controlled product.
Material safety data sheet (MSDS)	A document disclosing the information referred to in subparagraphs 13(a)(i) to (v) of the *Hazardous Products Act*. A technical document that provides detailed hazard and precautionary information on a controlled product.
Mechanical exhaust ventilation	A powered device such as a fan or venturi tube for exhausting contaminants from a workplace.
Medical professional	A person who is either of the following: • Entitled to practice medicine • Registered as a registered nurse under the laws of the province in which the person is practising
Mist	Liquid droplets suspended in air that are produced by dispersion of a liquid or by condensation of a vapourized liquid.
Mixture	A combination of two or more products, materials, or substances that does not undergo a chemical change as a result of interaction among products, materials, or substances.
Mutagenicity	The capability of a substance to cause mutations in living cells. Mutations may occur in either germ (reproductive) cells or somatic (body) cells.

NBUAC or n-BuAc	Normal butyl acetate; an organic compound assigned the evaporation rate of 1 (n-BuAc = 1). See *Evaporation rate*.
Normal atmospheric pressure	An absolute pressure of 101.325 kPa (1.00 atmosphere) at 20 °C (68 °F).
Nuclear substance	As defined in the *Nuclear Safety and Control Act* (which will replace the *Atomic Energy Control Act*), means: • Deuterium, thorium, uranium, or an element with an atomic number greater than 92 • Derivatives or compounds of deuterium, thorium, uranium, or elements with atomic numbers greater than 92 • A radioactive nuclide • A substance prescribed by the Canadian Nuclear Safety Commission as capable of releasing nuclear energy, or required for the production or use of nuclear energy • A radioactive byproduct of the development, production, or use of nuclear energy • A radioactive substance or thing used for the development or production of, or connected with the use of, nuclear energy.
Nurse	A registered nurse registered or licensed under the laws of a province. See also *Medical professional*.
Odour threshold	The lowest airborne concentration of a chemical that can be perceived by the sense of smell.
Oncogenic	Capable of creating tumours in tissue.
Oral	Taken into the body through the mouth.
Oral toxicity	Adverse effects resulting from taking a substance into the body via the mouth. Ordinarily used to denote effects in experimental animals.
Organic chemicals	Generally, chemical compounds containing carbon.
Outer container	The most outward container of a controlled product that is visible under normal conditions of storage and handling. See also *Container*.
Oxidation	A reaction in which a substance combines with oxygen provided by an oxidizer or oxidizing agent.
Oxidizer	A substance that readily yields oxygen or equivalent to stimulate the combustion of organic matter. Oxidizers are incompatible with any flammable or combustible material.
Package liner	A special case of an inner container that would normally be kept in the outer container during product storage and use.
Packing Groups	As defined under the *Transportation of Dangerous Goods Regulations*, Packing Groups are categories of hazard to which products in Classes 3, 6, and 8 are assigned.
Percent volatile	The percentage (usually by volume) of a volatile component that will evaporate at a temperature of 21 °C (70 °F) (unless some other temperature is stated).
Personal protective equipment	Devices worn by workers to protect against hazards in the environment, for example, respirators, gloves, and face shields.

Pest control product	As defined in the *Pest Control Products Act*, any product, device, organism, substance, or thing that is manufactured, represented, sold, or used as a means for directly or indirectly controlling, preventing, destroying, mitigating, attracting, or repelling any pest, and includes: • Any compound or substance that enhances or modifies or is intended to enhance or modify the physical or chemical characteristics of a control product to which it is added • Any active ingredient used for the manufacture of a control product
pH	An expression on a scale from 0 to 14 of the extent of acidity or alkalinity of a substance. Materials with pH 7 are neutral. Those below pH 7 are acidic and those above are basic.
Pictogram	The stylized graphical material that appears within a hazard symbol, for example, a skull and crossbones, stylized "T," or flame.
Pensky-Martens Closed Cup (PMCC)	A flashpoint test method.
Polymerization	A chemical reaction in which one or more small molecules combine to form larger molecules. A *hazardous polymerization* is one that takes place at a rate that releases large amounts of energy.
Powered air-purifying respirator (PAPR)	An air-filtering respirator that uses an electrically powered pump to deliver air to a face piece or head covering, and that meets minimum air flow requirements set by NIOSH.
ppb	Parts per billion; a unit for measuring the concentration of a gas or vapour in air, expressed as parts (by volume) of the gas or vapour in a billion parts of air.
ppm	Parts per million; a unit often used for measuring the concentration of a gas or vapour in air, expressed as parts (by volume) of the gas or vapour in a million parts of air.
Product Identification Number (PIN)	Four-digit number used for shipping. The PIN may be of UN (United Nations) or NA (North American) origin. Numbers can be found in Schedule II of the *Transportation of Dangerous Goods Regulations*.
Product identifier	In respect of a controlled product, the brand name, code name, or code number specified by a supplier or the chemical name, common name, generic name, or trade name.
Prohibited product	Any product, material, or substance included in Part I of Schedule I of the *HPA*.
Radioactive precribed substance	See *Nuclear substance*.
Reaction	A chemical transformation or change; the interaction of two or more substances to form new substances.
Reactivity	A description of the tendency of a substance to undergo chemical reaction with the release of energy. Undesirable effects—such as pressure buildup, temperature increase, formation of toxic, or corrosive by-products—may occur because of the reactivity of a substance to heating, burning, direct contact with other materials, or other conditions in use or in storage.
Readily available	Means, when referring to a material safety data sheet, accessible to all workers, who have the right to read the MSDS **before** using a controlled product.
Reducing agent	In a reduction reaction, the reducing agent is the substance that combines with oxygen or donates electrons to the reaction. See *Oxidation*.

Reproductive toxicity	The effect of a product on the capability of persons or test animals to produce offspring.
Research and development	Systematic investigation or search carried out in a field of science or technology by experiments or analyses, other than investigation or search for market research, sales promotion, quality control, or routine testing of controlled products. This investigation includes : • Applied research, namely, work undertaken to advance scientific knowledge with a specific practical application in view • Development, namely, use of the results of applied research to create new or improve existing processes or controlled products
Respirator	A personal protection device designed to protect the wearer from inhalation of a hazardous atmosphere.
Respiratory tract sensitization	The development in a person who is not atopic (allergic) of severe asthma-like symptoms on exposure to a substance to which the person has previously been exposed. See also *Sensitizer* and *Skin sensitization*.
Restricted product	Any product, material, or substance included in Part II of Schedule I of the *HPA*.
Risk phrase	A statement identifying a hazard that may arise from the nature of the controlled product or the class, division, or subdivision of controlled products.
Saturated vapour concentration	The vapour concentration of a material above which no further volatilization can take place.
Sell	As defined in the *HPA*, includes offer for sale, expose for sale, and distribute. The interpretation of "sell" includes the rental or lease of a controlled product as well as the distribution of sales samples of the product.
Sensitizer	A substance that on first exposure causes little or no reaction in humans or test animals, but which on repeated exposure may cause a marked response not necessarily limited to the contact site. Skin sensitization is the most common form in industry although respiratory sensitization also occurs. See also *Respiratory tract sensitization* and *Skin sensitization*.
Setaflash Closed Tester (SETA)	A flashpoint test method.
Silicosis	A degenerative disease of the lungs caused by the inhalation of substances that contain crystalline silica (free silica).
Skin sensitization	An immunologically-mediated cutaneous reaction in a person or test animal that is not atopic (allergic) on exposure to a substance to which the person or animal has previously been exposed. See also *Respiratory tract sensitization* and *Sensitizer*.
Smoke	Aerosols, gases, and vapours resulting from incomplete combustion.
Solubility in water	A term expressing the percentage of a material (by weight) that will dissolve in water at ambient temperature. *The Occupational Environment: Its Evaluation and Control* (see Chapter 8, "Resources") uses these terms used to express solubility: • Negligible (less than 0.1%) • Slight (0.1% to 10%) • Moderate (1% to 10%) • Appreciable (more than 10%) • Complete (soluble in all proportions)

Solvent	A liquid that will dissolve another substance.
Specific gravity	The weight of a material compared to the weight of an equal volume of water. Example: If a volume of a material weighs 8 grams, and an equal volume of water weighs 10 grams, the material is said to have a specific gravity of 0.8. Insoluble materials with specific gravity of less than 1.0 will float in water; insoluble materials with specific gravity greater than 1.0 will sink
Statistically significant	Shown by statistical procedures to have a high probability of being due to something other than chance.
Subchronic exposure	In laboratory tests, usually refers to toxic effects associated with repeated exposure of a test animal to a substance, the exposure not exceeding 10% of the animal's average lifetime. See also *Chronic exposure*.
Supplier	A person who is a manufacturer, processor, or packager of a controlled product or a person who, in the course of business, imports or sells controlled products.
Supplier identifier	The name of a supplier of a controlled product.
Supplier label	A label provided by a supplier disclosing the information and displaying the hazard symbols referred to in paragraph 13(b) of the *HPA*.
Supplier material safety data sheet	An MSDS provided by a supplier disclosing the information referred to in subparagraphs 13(a)(i) to (v) of the *HPA*.
Tagliabue (TAG) Closed Cup (TCC) and Open Cup (TOC)	Flashpoint test methods.
Teratogenicity	The capability of a material to cause birth defects in a fetus resulting from exposure of the pregnant female at a concentration that has no adverse effect on the mother.
Threshold Limit Value (TLV)	A term used by ACGIH to express the airborne concentration of a material to which *nearly* all persons can be exposed day after day, without adverse effects. See also *Exposure limit*.
Toxicity	The adverse effects, in animal test subjects or humans, resulting from exposure to certain materials, generally by way of the mouth, skin, or respiratory tract.
Trade name	The trademark name or commercial trade name for a material.
Trade secret	See *Confidential business information*.
Training	One type of instruction in which workers are taught specific work procedures. See also *Instruction* and *Education*.
Transmit	To pass along by any physical, electronic, optical, or other means.
Upper explosive limit (UEL)	See *Upper flammable limit (UFL)*.
Unstable	Tending toward decomposition or other unwanted chemical change during normal handling or storage.
Upper flammable limit (UFL)	The upper flammable limit of a vapour or gas; the highest concentration of the substance in air that will produce a flash of fire when an ignition source (heat, arc, or flame) is present. At higher concentrations, the mixture is too "rich" to burn. Also termed the *upper explosive limit (UEL)*.
Vapour	The gaseous form of a substance that is found in a solid or liquid state at normal atmospheric pressure (that is, an absolute pressure of 101.325 kPa at 20 °C).

Vapour density	The weight of a vapour or gas compared to the weight of an equal volume of air.
Vapour pressure	The pressure exerted by the saturated vapour of a substance in equilibrium with its liquid or solid form in a closed container. The vapour pressure of a substance increases with temperature until its critical temperature is reached. Vapour pressures are reported in millimetres of mercury (mmHg) at 20 °C (68 °F), unless stated otherwise.
Ventilation	See *General exhaust, Local exhaust,* and *Mechanical ventilation*.
Viscosity	The ability of a liquid to resist flow. Viscosity can be measured in various ways. Dynamic viscosity is the ratio of a fluid's viscosity to its density, and is reported in units such as square millimetres per second and Saybolt Universal Seconds (1 mm^2/s = 7.76 SUS).
Volatile	A volatile material is one that changes to vapour easily (and quickly) at a relatively low temperature.
Volatility	Refers to the ease with which a material evaporates.
Warning properties	The capability of chemicals to be noticed by human senses at levels in the air below those that may cause ill health effects.
Waste Profile Sheet	An information sheet that identifies ingredients in hazardous waste and provides information on potential hazards and preventative measures. (See Appendix 3A, "Sample Hazardous Waste Profile Sheet".)
Workplace	A place where a person works for remuneration.
Workplace label	A label that discloses all of: • A product identifier identical to that found on the MSDS of the corresponding controlled product • Information for the safe handling of the controlled product • A statement indicating that an MSDS for the product, if supplied or produced, is available

Appendix 1C
WHMIS Implementation Plan Checklist

Activity	Time needed	Assigned to	Date completed
Assign responsibility for WHMIS implementation			
1.			
2.			
3.			
Establish an inventory of controlled products			
Determine which products used or produced are classified as controlled products under WHMIS.			
WHMIS labels and MSDSs			
Obtain MSDSs for controlled products already in the workplace.			
Develop a process for requesting and receiving MSDSs for new purchases.			
Develop methods to store MSDSs so that they are readily available to workers.			
Develop a process to ensure that supplier labels are on or available for all new controlled products received.			
Develop a process to create and provide workplace labels and other means of identification.			
Determine hazards			
Identify and evaluate the hazards of controlled products in the workplace (for example, consider the quantities to be used and stored, and the work processes where these products are used).			
Workplace controls			
Based on the hazard evaluation, determine where the following workplace controls may need to be established or upgraded:			
• Substitution of a less hazardous product			
• Engineering controls such as local exhaust ventilation and process modification			
• Administrative controls such as work procedures and work scheduling			
• Personal protective equipment and clothing			
Integrate these controls into the overall health and safety program.			
Emergency procedures			
Review first aid procedures and upgrade them if required.			
Review spill control procedures and upgrade them if required.			
Review firefighting procedures and upgrade them if required.			
Notify the local fire department of the location, types, and quantities of controlled products used and stored.			
Worker education and training			
Complete “WHMIS Education and Training Checklist.”			
Evaluate WHMIS program			
Establish periodic review process for the following:			
• Check to ensure that no MSDS is more than 3 years old.			
• Check that all items on the MSDS have been completed.			
• Check the condition and presence of labels for all controlled products.			
• Monitor workplace controls to ensure they are effective.			
• Review the WHMIS education and training program.			

CHAPTER 2

Classification

GUIDE TO CHAPTER 2

APPENDICES

2.1 Classification: Introduction

2.1.1 The Hazardous Products Act: Prohibited, Restricted, and Controlled Products

Prohibited products

Under the *Hazardous Products Act:*

HPA, Sched 1, Part I

A prohibited product is any product, material, or substance that is listed in Part I of Schedule I of the *HPA*. Prohibited products may not be advertised, sold, or imported in Canada. Many prohibited products are toys, equipment, or clothing that pose a hazard to children. Other prohibited products contain substances hazardous to workers if used in the workplace. Examples include drywall cements, spackling, or patching compounds containing asbestos; textile fibre clothing containing asbestos fibres (other than products designed to protect against fire or heat hazards and constructed so that the fibres will not separate from the product in any reasonably foreseeable use); liquid coatings and paint and varnish removers having a flashpoint less than 0° F; and aerosol containers containing any amount of vinyl chloride.

Restricted products

HPA, Sched 1, Part II

A restricted product is any product, material, or substance included in Part II of Schedule I of the *HPA*. Restricted products may not be imported, advertised, or sold contrary to the requirements of *the Consumer Chemicals and Containers Regulations* (formerly known as *the Hazardous Products [Hazardous Substances] Regulations* and abbreviated *CCCR*). Restricted products include consumer goods such as various children's articles, food product containers, and some hazardous substances packaged for consumer use such as bleaches, cleansers, corrosives, petroleum distillates, and adhesives.

Controlled products

A controlled product is any hazardous product, material, or substance that meets the criteria specified in Part IV of the CPR to be included in any of the classes listed in Schedule II of the HPA.

HPA Part II

Note: WHMIS classification involves products, not industrial processes. For example, exposure to fugitive emissions should be dealt with on a provincial level.

2.1.2 Classification and WHMIS Information Requirements

Classification is the foundation of WHMIS. Under WHMIS, hazardous materials called controlled products are classified into one or more hazard classes. The six WHMIS classes of controlled products are:

- A Compressed Gas
- B Flammable and Combustible Material
- C Oxidizing Material
- D Poisonous and Infectious Material
- E Corrosive Material
- F Dangerously Reactive Material

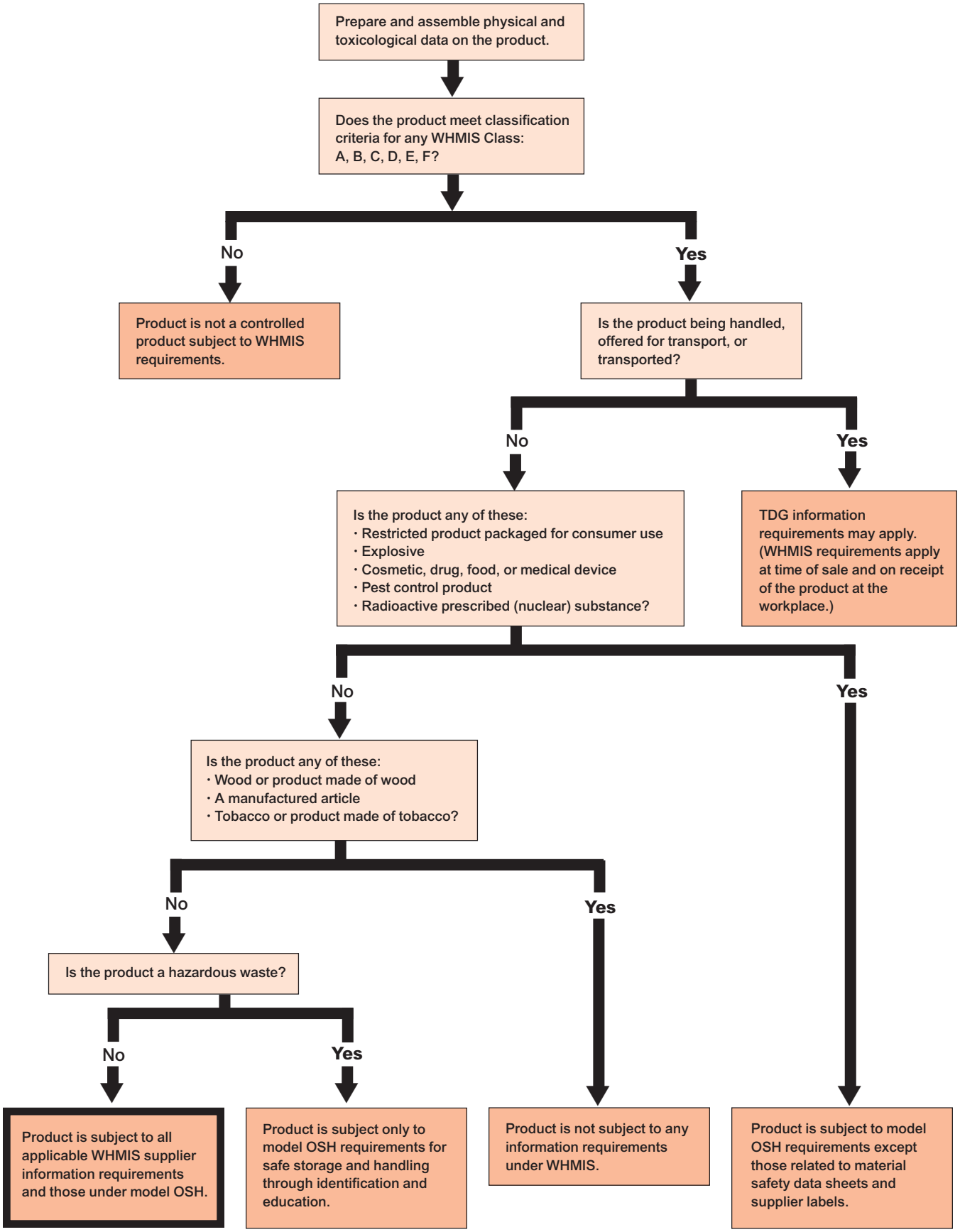
If a product meets WHMIS criteria, the following are required:

- Labels (which include hazard symbols, risk statements, and precautionary measures)
- Material safety data sheets
- Education and training for workers

Not all controlled products are covered equally by WHMIS information requirements. Some items are exempt or partially exempt from WHMIS requirements (See Chapter 3, "Partial and Complete Exemptions"). Suppliers or Employers may be granted "trade secret" exemption for specific product information. (See Chapter 7, "Confidential Business Information").

The decision tree in Figure 2.1 summarizes the logic for determining how WHMIS information requirements apply to controlled products.

Figure 2.1
Decision Tree: Is the Product Subject to WHMIS Information Requirements?



2.2 Responsibilities for Classification

2.2.1 The Supplier

The Canadian supplier/importer has the fundamental responsibility for the classification of controlled products imported into or sold in Canada.

To determine if a product belongs in any class, the supplier must use results from tests and criteria in accordance with the requirements of *CPR*. Tests must be conducted in accordance with current established scientific principles. The supplier must either conduct tests or use the results of valid tests carried out by others on the product or product ingredients. Where appropriate, information from tests on a product with similar properties may be used.

To determine if a product belongs in Class D, Poisonous and Infectious Material, a supplier may also use other information of which the supplier is aware or ought reasonably to be aware.

2.2.2 The Employer

The employer has the fundamental responsibility for classifying products produced in the workplace. The tests and criteria for assigning products to classes are the same as for the supplier.

If the employer imports a product directly into the workplace from outside Canada for use in the employer's workplace, the employer is considered the "supplier" of the controlled product to that workplace. As the supplier, the employer is responsible for classifying controlled products and providing WHMIS-compliant supplier labels and MSDSs for those products.

2.2.3 The Worker

While the worker has no specific responsibilities for the classification of controlled products under WHMIS, each worker should understand the WHMIS classification system. A worker who is aware that a product in the workplace is incorrectly classified must bring that information to the attention of the employer.

2.3 Classification: Rules and Criteria

This section provides information on classification as follows:

- 2.3.1 An overview of the Classes, Divisions, and Subdivisions in WHMIS.
- 2.3.2 A review of general rules for classification.
- 2.3.3 to 2.3.8 A detailed review of classification criteria for assigning a product to WHMIS Classes, Divisions, and Subdivisions. Decision trees are provided for each Class.

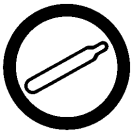
2.3.1 Classes, Divisions, and Subdivisions in WHMIS

A product is a controlled product if it meets any criterion for inclusion in any of the six WHMIS classes, shown in Figure 2.2.

Divisions within Class B are determined primarily on the basis of the phase and form of the material, its degree of flammability, and its reactivity with air or water in a manner that increases the flammability hazard.

Divisions and subdivisions within Class D are determined by the degree and type of toxic effect produced by any material (immediate and serious effects such as death, or chronic effects such as cancer or allergies) and the ability of a live organism to cause disease.

Figure 2.2
Classes, Divisions, and Subdivisions of Controlled Products

Class/Division/Subdivision	Description
 **Class A**	**Compressed Gas**
 **Class B**	**Flammable and Combustible Material**
Division 1	Flammable Gases
Division 2	Flammable Liquids
Division 3	Combustible Liquids
Division 4	Flammable Solids
Division 5	Flammable Aerosols
Division 6	Reactive Flammable Materials
 **Class C**	**Oxidizing Material**
 **Class D**	**Poisonous and Infectious Material**
Division 1	Materials Causing Immediate and Serious Toxic Effects
• Subdivision A	• Very Toxic Material
• Subdivision B	• Toxic Material
 Division 2	Materials Causing Other Toxic Effects
• Subdivision A	• Very Toxic Material
• Subdivision B	• Toxic Material
 Division 3	Biohazardous Infectious Materials
 **Class E**	**Corrosive Material**
 **Class F**	**Dangerously Reactive Material**

2.3.2 General Rules for Classification

Part IV of the *CPR* provides the criteria for determining if a product belongs in any one or more of the six classes of WHMIS.

CPR Criteria Used to Determine WHMIS Classification

1. *Tests on the whole product:* for example, the various Organization for Economic Cooperation and Development (OECD) tests for poisonous effects (Class D)
2. *Tests on ingredients in a product:* as found in criteria for Classes D and E
3. *Basic Physical or Chemical Data:* for example, the use of critical temperature and vapour pressure (Class A), flashpoints (Class B), or pH (Class E)
4. *Comparison with Classification Lists:* for example, the use of lists produced by the International Agency for Research on Cancer (IARC) and the American Conference of Governmental Industrial Hygienists (ACGIH) for determination of cancer risk in Class D
5. *Comparison with Other Regulations:* for example, comparison with Transportation of Dangerous Goods (TDG) classification for Classes B, D, and E
6. *General Scientific Evidence:* for example, evidence that a product causes sterility in humans (Class D) or necrosis of the skin (Class E)

Most of the criteria involve tests. Five general rules are used when applying any of the *CPR* criteria. Rules 1 and 2 apply to criteria for all 6 classes; rules 3 and 4 apply to Class D only; and rule 5 is a warning not to use the Ingredient Disclosure List for classification. The basis for these rules is found primarily in Section 33 of the *CPR*.

Rule 1:

To determine if a product is a controlled product, apply each of the criteria for inclusion in the six WHMIS classes as prescribed in Part IV of the *CPR*. Use the WHMIS Classification Checklist shown in Appendix 2A.

Some products will meet the criteria for more than one classification category. For example, benzene is not only a Flammable Liquid (Class B, Division 2) but also a Poisonous Material (Class D, Division 2, Subdivision A), as it is listed by IARC and ACGIH as a carcinogen.

Rule 2:

To determine if a product, material, or substance belongs in a class, use either:

a) Results from testing carried out by the supplier on the product, material, or substance where specified in Sections 34 to 66 of the *CPR*

b) Evaluation and scientific judgement based on test results on either the product, material, or substance or, where appropriate, a product, material, or substance with similar properties

Rule 2(a) means that a supplier may test a product according to test methods, where specified, and use the results to determine if the product meets the criteria.

For example, a supplier may use tests carried out in accordance with appropriate OECD Test Guidelines to classify a product in Class D for reasons of acute lethality, chronic toxic effect, teratogenicity and embryotoxicity, reproductive toxicity, mutagenicity, skin and eye irritation, or sensitization.

Rule 2(b) enables a supplier to judge if a product meets a criterion for inclusion without actually testing the product—but on one condition: the supplier must make an assessment using scientific judgement based on test results available on the product or, where relevant, test results available on a product with similar properties.

Rule 3:

If toxicological data from tests following the prescribed OECD Test Guidelines does not exist for use in classifying a product in Class D, use evaluation and scientific judgement based on tests or methods carried out in accordance with generally accepted standards of good scientific practice at the time the test was carried out.

Rule 3 allows the supplier to use the wealth of toxicological information derived, for example, from testing carried out prior to the establishment of OECD Guidelines. Subsections 33(3)(*b*) (i)-(iv) of the *CPR* give examples of tests or methods that are considered to meet acceptable standards of good scientific practice when they were first published.

Some Acceptable Tests

- In the case of a 90-day test or a chronic test, a test or method described in U.S. Food and Drug Administration (FDA) guidelines or U.S. Environmental Protection Agency (EPA) guidelines, as published in the Federal Register and as amended from time to time
- In the case of a test for skin or eye irritation, the Draize Test as described in volume 82 of *the Journal of Pharmacology and Experimental Therapeutics*, 1944, pages 377 to 390
- In the case of a test for teratogenicity, a test or method described in *Principles for the Testing of Drugs for Teratogenicity*, Technical Report Series Number 364, published in 1967 by the World Health Organization (WHO)
- In the case of a test for mutagenicity, a test or method described by the EPA in "Proposed Guidelines for Registering Pesticides in the US; Hazard Evaluation: Human and Domestic Animals," as published in volume 43 of the *Federal Register* (No. 163), 1978, pages 37, 336–37, 403.

Rule 4:

To classify a product in Class D, use either test data or other information of which the supplier is aware or ought reasonably to be aware.

This rule means that if no toxicological data is available, toxicological testing is not required if the supplier considers all **information of which the supplier is aware or ought reasonably to be aware.** This type of information includes documented scientific evidence of injury to humans following occupational exposure, published technical literature, and human evidence, and should be considered even if the material does not meet other Class D criteria.

Rule 5:

Do not use the Ingredient Disclosure List for classification.

The IDL is a list of substances which, if present in a WHMIS controlled product, must be disclosed on an MSDS if present at or above the specified "cut-off" concentrations (1.0% or 0.1%). Ingredient disclosure is not limited to substances which appear on the IDL. Substances included on the IDL are only one of several categories of ingredients which must be disclosed on the MSDS if present in a controlled product. The criteria for ingredient disclosure is set out in 13*(a)*(i) to (iv) of the *HPA*.

A publication is available to assist with classification from the Health Canada website:

www.hc-sc.gc.ca/whmis

- Guidelines on the Use of Professional Judgement in the Classification of Controlled Products under WHMIS

2.3.3 Class A: Compressed Gas (Reference: *CPR* 34)

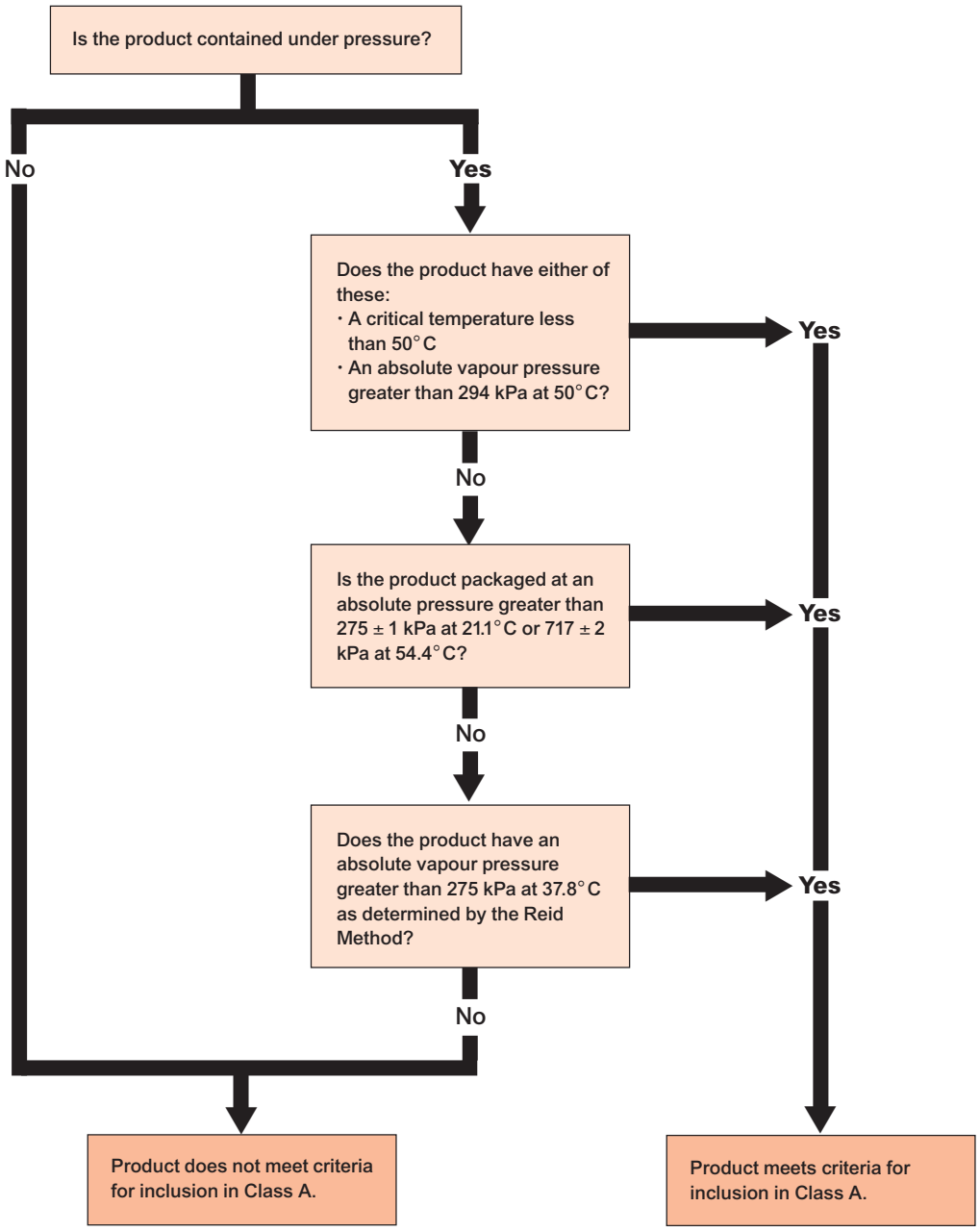
CPR 34

A product, material, or substance falls within in Class A if it is contained under pressure and meets any one of four additional criteria:

- It exhibits a critical temperature of less than 50°C (122°F). For example, a pressurized container of carbon dioxide, which has a T_c of 31°C, is a controlled product under this criterion.
- It has an absolute vapour pressure greater than 294 kPa (2.9 atmospheres) at 50°C (122°F). For example, a pressurized container of butane, which has a vapour pressure of 5 atmospheres at 50°C, is a controlled product.
- It has an absolute pressure, in the cylinder or other pressure vessel in which it is packaged, greater than 275 ± 1 kPa (2.71 ± 0.01 atmospheres) at 21.1°C (70°F) or 717 ± 2 kPa (7.07 ± 0.02 atmospheres) at 54.4°C (130°F).
- In a liquid state, it has an absolute vapour pressure exceeding 275 kPa (2.71 atmospheres) at 37.8°C (100°F) as determined by the *Standard Test Method for Vapour Pressure of Petroleum Products (Reid Method)*, ASTM D323. The Reid Method is used for gasoline, crude oil, and volatile petroleum products, but does not apply to oxygenated fuels.

Class A includes compressed gases, dissolved gases, or gases liquefied by compression or refrigeration. Figure 2.3 summarizes the decision sequence used when applying criteria for Class A.

Figure 2.3
Decision Tree: Does the Product Fall Within Class A – Compressed Gas? (Reference: *CPR* 34)



2.3.4 Class B: Flammable and Combustible Material (Reference: *CPR* 35–41)

There are six divisions within this class: Flammable Gases, Flammable Liquids, Combustible Liquids, Flammable Solids, Flammable Aerosols, and Reactive Flammable Materials. Figure 2.4 summarizes the decision sequence used when applying criteria for inclusion in Class B.

CPR 35

Class B-1

Division 1: Flammable Gases

A product, material, or substance falls into this division if it is a Compressed Gas (Class A), and at normal atmospheric pressure forms a flammable mixture with air when the compressed gas is either:

CPR 36

- In a concentration of 13% or less by volume
- Over a concentration range of at least 12% by volume

Flammable limits are determined in air, not oxygen.

A cylinder of butane is considered a Flammable Gas because its lower flammable limit in air is 1.9%, although its flammable range is only 6.5%. Hydrogen is a flammable gas both in terms of its lower flammable limit (4%) and its flammable range (70%).

Class B-2

Division 2: Flammable Liquids*

CPR 37 & Sched IV

A product, material, or substance falls into Division 2 if it has a flashpoint less than 37.8° C (100° F) when tested in accordance with the applicable method.

The test method to apply to a liquid depends on the use of the liquid and its viscosity (see Figure 2.5). All the flashpoint methods adopted under the *CPR* are closed-cup, meaning the vapour is enclosed above the liquid. (Open-cup methods, which do not provide such enclosure, tend to yield flashpoints that are higher than those measured by closed-cup techniques.)

Benzene and gasoline are examples of flammable liquids.

Class B-3

Division 3: Combustible Liquids*

CPR 38 & Sched IV

A product, material, or substance falls into Division 3 if it has a flashpoint of 37.8° C (100° F) or more but less than 93.3° C (200° F) when tested in accordance with the applicable method shown in Figure 2.5. Kerosene and mineral spirits are examples of combustible liquids.

Class B-4

Division 4: Flammable Solids*

A product, material, or substance falls into in this division if it meets any one of four criteria:

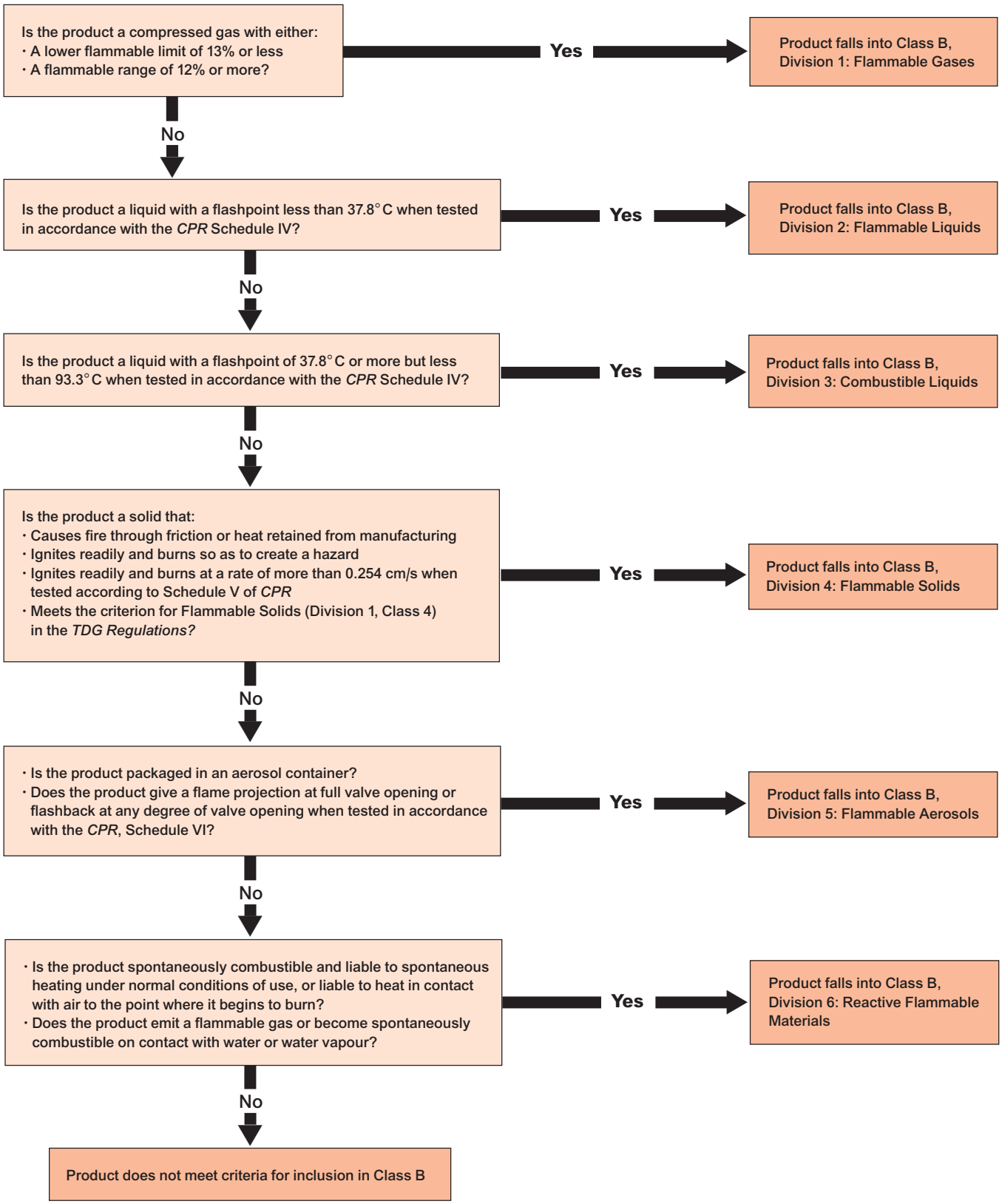
- It causes fire through friction or through retained heat from manufacturing or processing. (Examples: white phosphorus, cellulose nitrate)

CPR 39 & Sched V

- It can be ignited readily and when ignited burns so vigorously and persistently as to create a hazard. (Examples: various magnesium alloys and the pharmaceutical agent hexamine)
- It ignites readily and burns with a self-sustained flame at a rate of more than 0.254 centimetre (0.1 inch) per second along its major axis, when tested in accordance with the method set out in Schedule V of the *CPR*. (The method involves a simple measurement of rate of burn of substances along the horizontal axis.) Examples include decaborane, cesium, and cellulose nitrate.
- It meets the criterion for flammable solids (Division 1 of Class 4) of the *TDG Regulations*. Schedule II of *the TDG Regulations* provides a list of Class and Division assignments for more than 3,000 substances. (Beryllium, hafnium powder, and zirconium are examples of substances on the list that are assigned to Division 1, Class 4.)

* ASTM method D4359 covers the determination of whether a viscous material is a liquid or solid for regulatory purposes.

Figure 2.4
Decision Tree: Does the Product Fall Within Class B – Flammable and Combustible Material? (Reference: *CPR* 35-41)



Class B-5

Division 5: Flammable Aerosols

CPR 40 & Sched VI

Any product, material, or substance belongs in Division 5 if it is packaged in an aerosol container and, when tested in accordance with the method set out in Schedule VI of the *CPR*, produces a flame projection or a flashback of any length.

Ignition may be due to the flammability of either the aerosol itself or the propellant. Examples of flammable propellants are propane, butane, isobutane, and dimethyl ether.

Schedule VI of the *CPR*, called the "Test for Determining the Flashback and the Length of Flame Projection," describes the test apparatus and protocol. The use of cheesecloth, as described in the method, is unnecessary in tests determining classification; cheesecloth is used to find the length of flame projection when evaluating aerosols sold as restricted products pursuant to the *CCCR*.

Class B-6

CPR 41

Division 6: Reactive Flammable Materials

A product, material, or substance falls into Division 6 of Class B if it meets either of two conditions:

- It is spontaneously combustible and liable to spontaneous heating under normal conditions of use or liable to heat in contact with air to the point where it begins to burn. (Example: aluminum alkyl compounds)
- It emits a flammable gas or becomes spontaneously combustible on contact with water or water vapour. (Examples: metallic sodium, lithium amide, and lithium aluminum hydride)

Figure 2.5
Applicable Methods for Testing Flashpoints (from the *CPR*, Schedule IV)

Type of Fluid	Method of Testing for Flashpoint
1. Aviation turbine fuel	The appropriate test in Standard Test Methods for Flash Point by Setaflash Closed Tester, ASTM D3828
2. Paint, enamel, lacquer, varnish, or similar liquid that has a flashpoint between 0°C (32°F) and 110°C (230°F), and a viscosity of less than 15,000 mm^2/s at 25°C (77°F) determined in accordance with the Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity), ASTM D445	The appropriate test in Standard Test Methods for Flash Point of Liquids by Setaflash Closed-Cup Apparatus, ASTM D3278
3. A liquid, other than (1) or (2), having a viscosity of less than 5.8 mm^2/s (45 Saybolt Universal Seconds) at 37.8°C (100°F)	Standard Test Method for Flash Point by Tag Closed Tester, ASTM D56, or the appropriate test in the Standard Test Methods for Flash Point by Setaflash Closed Tester, ASTM D3828
4. A liquid other than (1) or (2), having a viscosity of 5.8 mm^2/s (45 Saybolt Universal Seconds) or more at 37.8°C (100°F)	Standard Test Methods for Flash Point by Pensky-Martens Closed Tester, ASTM D93

CPR 42

2.3.5 Class C: Oxidizing Material (Reference: *CPR* 42)

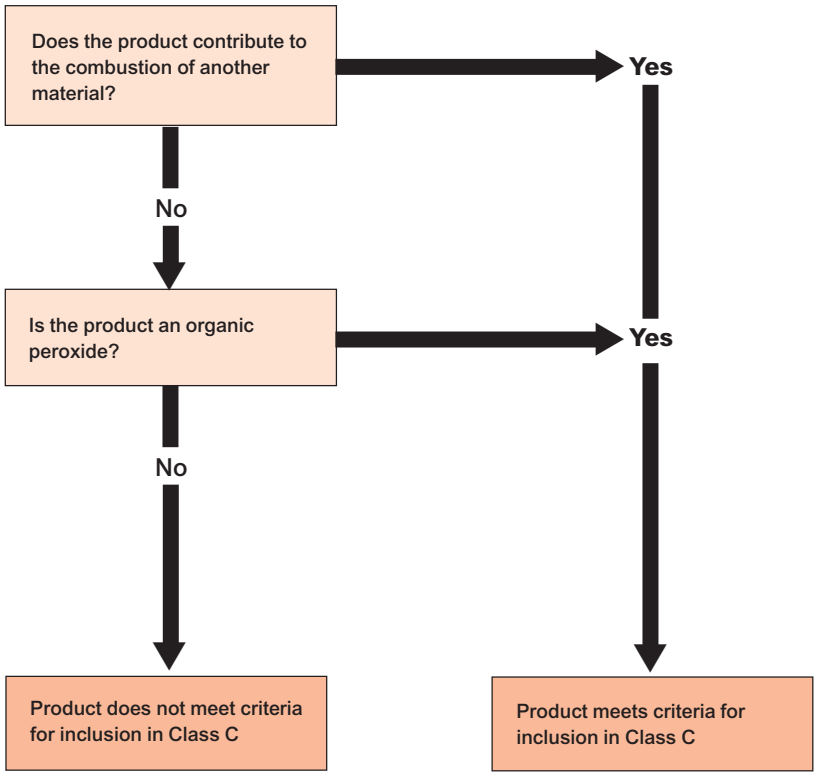
Definition of oxidizer

A product, material, or substance is a controlled product within the meaning of Class C if it meets either of two conditions:

- It causes or contributes to the combustion of another material, whether or not the product is itself combustible. Examples include: nitrates, nitrites, bromates, bromine pentafluoride, bromine trifluoride, chlorates, chlorine pentafluoride, chlorine trifluoride, dichromates, hypochlorites, iodine pentafluoride perchlorates, permanganates, inorganic peroxides, and various inorganic peroxo compounds such as peroxonitrates and peroxosulphates.
- It is an organic peroxide that contains the bivalent O-O structure. (Examples: benzoyl peroxide, various organic peroxy esters, and organic hydroperoxides)

Figure 2.6 summarizes the decision sequence used when applying criteria for inclusion in Class C.

Figure 2.6
Decision Tree: Does the Product Fall Within Class C — Oxidizing Material? (Reference: *CPR* 42)



2.3.6 Class D: Poisonous and Infectious Material (Reference: *CPR* 33, 43–64)

This is the most comprehensive class in WHMIS. The criteria for inclusion cover a broad range of adverse effects, from acute lethality to mutagenicity and cancer.

There are three divisions within Class D and two subdivisions within Divisions 1 and 2.

Division 1 (D-1): *Materials Causing Immediate and Serious Toxic Effects:*

Criteria deal primarily with the capability of products, substances, and materials to cause acute lethal effects, that is, death to test animals in short-term tests. Two Subdivisions are provided: A, Very Toxic Material (D-1A), and B, Toxic Material (D-1B). Examples include acrolein, phenol and hydrogen sulphide (D-1A), and diphenylmethane 4-4' diisocyanate and potassium hydroxide (D-1B).

Division 2 (D-2): *Materials Causing Other Toxic Effects:*

Criteria deal with effects other than those that are immediate and serious, for example, skin and eye irritation; long-term effects, in persons or animals, such as chronic toxic conditions; mutagenicity; sensitization; and cancer. Two Subdivisions labelled A, Very Toxic Material (D-2A) and B, Toxic Material (D-2B), are provided to indicate the degree of concern. Assignment to subdivisions depends on both the capability of the product to cause an adverse effect and the type of effect. Examples include styrene, perchloroethylene, and crystalline silica (quartz) for D-2A; and acetone, turpentine, and d-limonene for D-2B.

Division 3 (D-3): *Biohazardous Infectious Material:*

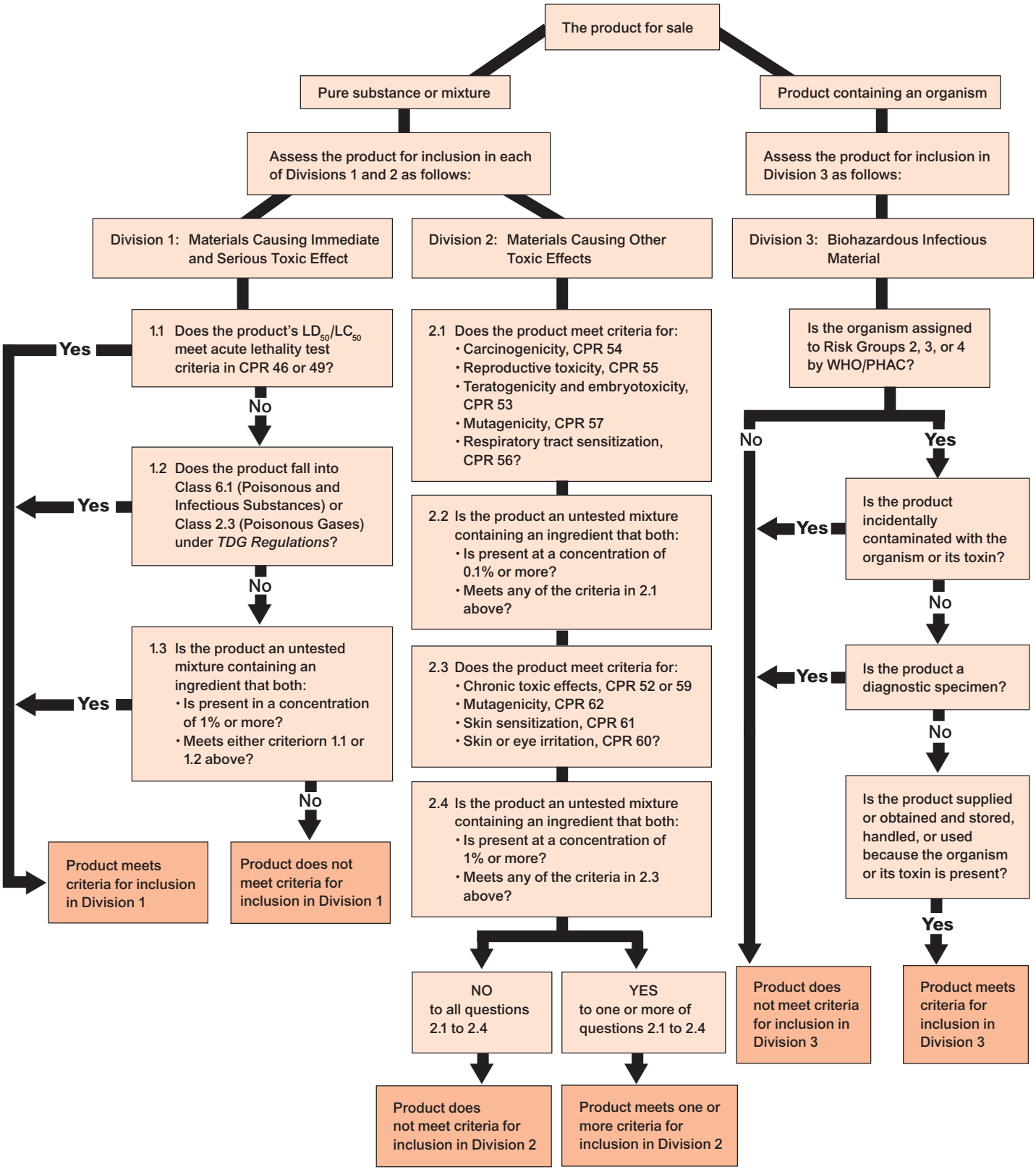
This Division applies to organisms such as viruses, bacteria, rickettsia, fungi, protozoa, and helminths, which cause disease or are reasonably believed to cause disease in persons or animals, and to the toxins produced by such organisms.

The criteria for determining if a product falls into Class D differ from the criteria for most other classes in two ways:

- Classification may be based not only on tests conducted by the supplier or evaluation and scientific judgement of results from previous tests, but also on any other information of which the supplier is aware or ought reasonably to be aware. Sources include published technical literature from the Canadian Centre for Occupational Health and Safety (CCOHS), from the Commission de la santé et de la securité du travail (CSST) in Quebec, and from the publications of regulatory agencies, industry or trade associations, and labour organizations related to occupational health and safety. Chapter 8 of this Manual provides addresses and telephone numbers for various agencies and a list of literature sources.
- **If an untested mixture contains a tested ingredient that meets any criterion for inclusion in Division 1 or Division 2 of Class D, and the ingredient is present in excess of percentages specified in the *CPR*, the entire untested mixture is assigned the classification of the tested ingredient. Specified percentages are 1% for Division 1 and either 1% or 0.1%, depending on the nature of toxic effect, for Division 2.**

Figure 2.7 summarizes the decision sequence used when applying criteria for inclusion in each of the three Divisions of Class D.

Figure 2.7
Decision Tree: Does the Product Fall Within Division 1, 2, or 3 of Class D – Poisonous and Infectious Materials? (Reference: *CPR* 33, 43–64)



Class D-1

Division 1: Materials Causing Immediate and Serious Toxic Effects

Criteria for Class D-1

The *CPR,* Sections 46–51, provides three types of criteria for inclusion of a product within this Division and assignment to Subdivision A or B within it. Inclusion of a product in Division 1 reflects the potential for immediate adverse effects to workers following short-term exposure to the product.

CPR 46, 49

Criterion 1: Acute Toxicity Tests for Pure Substances and Tested Mixtures

The results of acute toxicity tests determine whether products belong to Class D-1A or D-1B. The *CPR* reference OECD Test Guidelines No. 401 (Oral toxicity)*, No. 402 (Dermal toxicity), and No. 403 (Inhalation toxicity), or by other means established by Section 33 of the *CPR.* The OECD Guidelines provide criteria for animal selection, dose administration, observation periods, and method of evaluating effects.

Definition of acute toxicity

Acute toxicity is considered to be any adverse effect occurring within a short time of exposure. However, for WHMIS classification, it is considered to be acute lethality, that is, the capability of the product to cause death. For oral and dermal exposures, acute lethality is measured as the lethal dose of the product that will cause the death of 50% of the test animals (termed LD_{50} and reported in units of milligrams of test substance per kilogram of body weight of test animal). In inhalation experiments, lethality is measured in terms of lethal concentration of the product in air required to kill 50% of the test animals, (LC_{50}), reported in parts per million (ppm) for gases and vapours, and in milligrams per cubic metre (mg/m^3) or per litre (mg/l) for dusts, mists, and fumes.

LC_{50}/LD_{50} limits

The LD_{50} or LC_{50} determined by these tests are then compared to the LD_{50}/LC_{50} limits set out in the *CPR,* Sections 46 and 49. Figure 2.8 summarizes this use of acute toxicity tests to determine whether a product falls into Class D-1A or D-1B. Footnotes to the figure provide formulas for calculating equivalent LC_{50}s where inhalation exposures in acute toxicity tests are for periods other than four hours.

Criterion 2: Assignment to Classes 2.3 or 6.1 under the *TDG Regulations*

A product falls into Class D-1 of WHMIS if it is included in the equivalent TDG categories:

- TDG Class 2.3 (Poisonous Gases). All Poisonous Gases fall into WHMIS Class D-1A.
- TDG Class 6.1 (Poisonous and Infectious Substances). Products within TDG Class 6.1 are assigned to three Packing Groups (I, II, and III) according to their hazard levels. Products assigned to Packing Group I or II fall into WHMIS Class D-1A; those in Packing Group III fall into WHMIS D-1B.

Schedule II of the *TDG Regulations* provides a list of classification assignments for more than 3,000 products. For example, tetraethyl lead is assigned to Packing Group I of Class 6.1 (TDG) and therefore falls into Class D-1A (WHMIS); sodium fluoride is assigned to TDG Packing Group III, and falls into WHMIS Class D-1B.

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* OECD Test Guideline No. 401 will be revoked and replaced with the following upon amendment of the CPR:

- OECD Test Guideline No. 420, "Acute Oral Toxicity - Fixed Dose Method," dated July 17, 1992
- OECD Test Guideline No. 423, "Acute Oral Toxicity - Acute Toxic Class Method," dated March 22, 1996
- OECD Test Guideline No. 425, "Acute Oral Toxicity - Up-and-Down Procedure," dated September 21, 1998

Figure 2.8
Criteria for Assigning Products to Subdivisions A and B of Class D-1 Based on Acute Toxicity Tests (Reference: *CPR* 46, 49)

	Subdivision A	Subdivision B
Basis for Evaluation	**Very Toxic Material**	**Toxic Material**
1. Acute Oral Toxicity OECD Test Guideline No. 401	LD_{50} not more than 50 mg/kg	LD_{50} more than 50 but not more than 500 mg/kg
2. Acute Dermal Toxicity OECD Test Guideline No. 402	LD_{50} not more than 200 mg/kg	LD_{50} more than 200 but not more than 1,000 mg/kg
3. Acute Inhalation Toxicity OECD Test Guideline No. 403, Exposure Period of 4 Hours*		
a) Product is a gas	LC_{50} not more than 2,500 ppm	No criterion
b) Product is a vapour	LC_{50} not more than 1,500 ppm and a saturated vapour concentration at normal atmospheric pressure (and 20°C) more than two times the LC_{50}	LC_{50} more than 1,500 but not more than 2,500 ppm and a saturated vapour concentration at normal atmospheric pressure (and 20°C) of more than 0.4 times the LC_{50}
c) Product is a dust, mist, or fume	LC_{50} not more than 500 mg/m^3	LC_{50} more than 500 but not more than 2,500 mg/m^3

* If the exposure period (Y) is not four hours in the test data, an equivalent LC_{50} can be calculated for four hours using one of two formulas:

a) For a gas or vapour:

$$LC_{50} \text{ at 4 hours} = LC_{50} \text{ at Y hours} \times \frac{(\text{Y hours})^{1/2}}{2}$$

Example: The vapour for an organic solvent has an LC_{50} of 100 ppm when the exposure period is 24 hours.

$$LC_{50} \text{ at 4 hours} = 100 \text{ ppm} \times \frac{(24)^{1/2}}{2}$$
$$= 100 \text{ ppm} \times 2.45$$
$$= 245 \text{ ppm}$$

b) For a dust, mist or fume:

$$LC_{50} \text{ at 4 hours} = LC_{50} \text{ at Y hours} \times \frac{(\text{Y hours})}{4}$$

Example: The dust from a granular filtering material has an LC_{50} of 10 mg/m^3 when the exposure period is 2 hours.

$$LC_{50} \text{ at 4 hours} = 10 \text{ mg/m}^3 \times \frac{(2)}{(4)}$$
$$= 5 \text{ mg/m}^3$$

CPR 48, 51

Criterion 3: Acute Toxicity Tests for Untested Mixtures

If a product is an untested mixture, the means for determining if the product falls into Class D-1 is based on the properties of ingredients that are present in the mixture at a concentration of 1% or more.

CPR 45(1)

The acute lethality of a mixture for which the *acute lethality of every ingredient present at a concentration of 1% or more is known* may be determined by calculation. The mixture is then considered a tested mixture, with the LD_{50} or LC_{50} derived from these formulas:

For a solid or a liquid, the LD_{50} of the mixture is determined by the formula:

$$\frac{1}{LD_{50}\text{ of Mixture}} = \frac{\text{Proportion of ingredient A*}}{LD_{50}\text{ of ingredient A}} + \frac{\text{Proportion of ingredient B*}}{LD_{50}\text{ of ingredient B}} + \text{.....} + \frac{\text{Proportion of last ingredient*}}{LD_{50}\text{ of last ingredient}}$$

For a gas, vapour, dust, mist, or fume, the LC_{50} of the mixture is determined by the formula:

$$\frac{1}{LC_{50}\text{ of Mixture}} = \frac{\text{Proportion of ingredient A*}}{LC_{50}\text{ of ingredient A}} + \frac{\text{Proportion of ingredient B*}}{LC_{50}\text{ of ingredient B}} + \text{.....} + \frac{\text{Proportion of last ingredient*}}{LC_{50}\text{ of last ingredient}}$$

NOTE: Proportion is the weight of the ingredient divided by the weight of the mixture. It is recommended that the lethalities of ingredients be based on tests of the same animal species and route.

Example: For the liquid Anticorrosion Product XYZ, the Oral LD_{50} of the ingredients are:

Ingredient	Concentration (%)	Oral LD_{50} (mg/kg)
X	90	800
Y	9.5	400
Z*	0.5	10

$$\frac{1}{LD_{50}\text{ of mixture}} = \frac{(0.90 + 0.095)\text{ kg}}{(800 \quad 400)\text{ mg}}$$

$$= 0.00137\text{ kg/mg}$$

Calculated LD_{50} of mixture = 1/0.00137 = 730 mg/kg

The whole mixture, XYZ, does not meet criteria for inclusion in Class D, in spite of the fact that the LD_{50} of one ingredient, Y, does fall within the limits of the *CPR* criteria (refer to Figure 2.8) for assignment to Subdivision B.

*Ingredient Z is not included in the calculation because it does not meet the concentration cutoff of 1%.

If the acute lethality for all ingredients present at a concentration of 1% or more is unknown, the LD_{50} or LC_{50} of the mixture is taken as equal to that of the most acutely lethal ingredient, present in the mixture at a concentration of 1% or more, for which the information is known.

CPR 45(2)

Example: In Degreasing Solvent ABC, the Oral LD_{50} of the ingredients are:

Ingredient	Concentration (%)	Oral LD_{50} (mg/kg)
A	89.5	Unknown
B	10	200–300
C	0.5	10

The Oral LD_{50} is taken as that for ingredient B. Two research studies meeting the standards of OECD Test Guideline No. 401 report LD_{50} of 200 and 300 mg/kg respectively. The accepted practice is to use the lower of the LD_{50} figures for classification. The Oral LD_{50} of the solvent mixture is 200 mg/kg. According to the toxicity limits set out in the *CPR* (and summarized in Figure 2.8), the product falls into WHMIS Class D-1B.

Summary: Products meeting criteria for Class D-1

1. A pure substance or tested mixture with LD_{50}/LC_{50} meeting the acute toxicity criteria of *CPR* 46, 49 (summarized in Figure 2.8 of this chapter)
2. A product classified as either:
   - TDG Class 2.3
   - TDG Class 6.1: Packing Group I, II products are classified as WHMIS D-1A, while Packing Group III products are classified as WHMIS D-1B
3. An untested mixture with known or calculated LD_{50}/LC_{50} for ingredients present at concentrations of 1% or more

Division 2: Materials Causing Other Toxic Effects

Exposure to products in the workplace most commonly occurs in low, repeated doses that may not produce immediate, severe toxic effects. Division 2 includes criteria that may affect workers in the short term, such as skin or eye irritation. Other Division 2 products cause long-term (chronic) effects, either after a single exposure, or upon repeated or prolonged exposure.

Seven types of adverse effects are covered in Division 2:

- Chronic toxic effects
- Teratogenicity and Embryotoxicity
- Carcinogenicity
- Reproductive toxicity
- Mutagenicity
- Sensitization
- Skin or eye irritation

Division 2, like Division 1, is divided into Subdivisions A (Very Toxic Material) and B (Toxic Material). The different types of adverse health effects that appear in each of the Subdivisions are shown in Figure 2.9.

Chronic toxic, mutagenic, and sensitization effects can be either Very Toxic (Subdivision A) or Toxic (Subdivision B). In the case of chronic toxic effects, substances producing harmful effects at low doses are considered Very Toxic while those requiring higher doses to produce effects are labelled Toxic. Mutagenic substances fall into Subdivision A if evidence involves germ (reproductive) cells and B if evidence involves somatic (body) cells. A sensitizer is considered Very Toxic if it affects the respiratory tract, Toxic if it affects the skin.

Products are assigned to Division 2 as follows:

1. Any *pure substance or tested mixture* falls into in Division 2, Subdivision A or B, if it meets any of the criteria in *CPR*, Sections 33 and 52-63.
2. An *untested mixture* falls into Class D-2A if the mixture contains **0.1%** or more of a tested ingredient that meets any criterion for inclusion in Subdivision A for causing any of the following effects:
   - Carcinogenicity
   - Reproductive toxicity
   - Teratogenicity or embryotoxicity
   - Mutagenicity of reproductive cells
   - Sensitization of the respiratory tract
3. An *untested mixture* falls into Class D-2A if the mixture contains **1%** or more of a tested ingredient that meets any criterion for inclusion in Subdivision A for causing chronic toxic effects.
4. An *untested mixture* falls into Class D-2B if the mixture contains **1%** or more of a tested ingredient that meets any criterion for inclusion in Subdivision B.

Figure 2.9
Class D-2: Types of Adverse Health Effects from Overexposure to Products in Subdivisions A and B

Class D-2A Very Toxic Material	Class D-2B Toxic Material
• Chronic Toxic Effects • Carcinogenicity • Reproductive Toxicity • Teratogenicity and Embryotoxicity • Mutagenicity (of reproductive cells) • Sensitization – Respiratory Tract	• Chronic Toxic Effects • Mutagenicity (of non-reproductive cells) • Sensitization – Skin • Skin or Eye Irritation

The criteria for including a product in Division 2, based on the seven defining categories of adverse health effects, are discussed in detail in the next few pages.

Chronic Toxic Effects

Definition

CPR 32

A chronic toxic effect is an adverse effect on the health of a person or test animal that develops either over time, following a single exposure to a toxic substance, or after prolonged or repeated exposure to a toxic substance under conditions that do not produce the same effect from a single exposure. Adverse health effects in this category include life-threatening or serious impairment of body organs and the cardiovascular or nervous systems.

Tests

CPR 52, 59, 33(3)

Chronic toxic effects are evaluated using the results of animal assays carried out in conformity with OECD Test Guidelines (No. 408, No. 409, No. 411, No. 413 and No. 452). Test protocols involve either subchronic (90-day) or chronic periods during which lab animals are exposed to the product by oral, dermal, or inhalation routes. *Subchronic* usually refers to part (usually no more than 10%) of the average lifetime of experimental animals; *chronic* exposure periods are those covering a more substantial portion of lifetime. The dose required to induce chronic toxic effects, determined by these tests, are then compared to the dosages set out in the *CPR*, sections 52 and 59. These dosage limits, summarized in Figure 2.10, are used to determine whether a product falls within D-2A or D-2B.

If OECD tests have not been carried out, results from testing carried out in accordance with a test or method described in the U.S. FDA or EPA guidelines, as published in the *Federal Register* and as amended from time to time is acceptable. Results from other tests or methods carried out in accordance with the generally accepted standards of good scientific practice at the time the test is carried out may also be used.

Figure 2.10
Criteria for Assigning Products to Subdivisions A and B of Class D-2 Based on Chronic Toxic Effects

Basis for Evaluation*	Criterion for Assignment Class D-2A Very Toxic Material	Criterion for Assignment Class D-2B Toxic Material
Oral Route of Exposure 1. Subchronic Oral Toxicity – Rodent OECD Test Guideline No. 408 2. Subchronic Oral Toxicity – Non-Rodent OECD Test Guideline No. 409 3. Oral Route Test OECD Test Guideline No. 452	Dose of not more than 10 mg per kg of weight of test animal per day	Dose of more than 10 but not more than 100 mg per kg of weight of test animal per day
Dermal Route of Exposure 1. Subchronic Dermal Toxicity OECD Test Guideline No. 411 2. Dermal Route Test OECD Test Guideline No. 452	Dose of not more than 20 mg per kg of weight of test animal per day	Dose of more than 20 but not more than 200 mg per kg of weight of test animal per day
Inhalation Route of Exposure 1. Subchronic Inhalation Toxicity OECD Test Guideline No. 413 2. Inhalation Route Test OECD Test Guideline No. 452	Concentration of not more than 25 ppm by volume of a gas or vapour, or not more than10 mg/m^3 of a dust, mist, or fume	Concentration of more than 25 but not more than 250 ppm by volume of a gas or vapour, or more than 10 but not more than 100 mg/m^3 of a dust, mist, or fume

Carcinogenicity

CPR 54

Definition

Carcinogenicity refers to the capability of a product to cause cancer in animals or people that are exposed to it.

Substances classified as carcinogens appearing on current classification lists issued by either of two agencies, the American Conference of Governmental Industrial Hygienists or the International Agency for Research on Cancer, fall within WHMIS D-2A.

ACGIH

American Conference of Governmental Industrial Hygienists

The ACGIH publishes *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.* A pure substance or tested mixture falls into Class D-2A on the basis of carcinogenicity if it is classified as A1, A2, or A3* on this list. Revisions to the publication are issued each year (see sections 8.2 and 8.4 for information on obtaining current copies). A sample page from the publication is shown in Figure 2.11.

Figure 2.11
Sample Section from *Threshold Limit Values and Biological Exposure Indices* (ACGIH, 2000)

Adopted Values					
Substance [CAS No.]	**TWA (ppm/mg/m³)**	**STEL/C (ppm/mg/m³)**	**Notations**	**Mol Wgt**	**TLV Basis – Critical Effects**
o-Anisidine [90-04-0]	0.1 ppm	—	Skin; A3	123.15	Anoxia
p-Anisidine [104-94-9]	0.1 ppm	—	Skin; A4	123.15	Anoxia
Antimony [7440-36-0] and compounds, as Sb	0.5 mg/m³	—	—	121.75	Irritation; lung; CVS
Antimony hydride (Stibine) [7803-52-3]	0.1 ppm	—	—	124.78	Irritation; blood
Antimony trioxide [1309-64-4] production	—	—	A2	171.50	Cancer (lung); pneumonconiosis
ANTU [86-88-4]	0.3 mg/m³	—	A4	202.27	Lung; irritation
Argon [7440-37-1]	—	Simple asphyxiant(D)	—	39.95	Asphyxiation
Arsenic, elemental [7440-38-2], and inorganic compounds, as As	0.01 mg/m³	—	A1; BEI	74.92 Varies	Cancer (lung, skin); lung
Arsine [7784-42-1]	(0.05 ppm)	—	—	77.95	Blood; kidney
Asbestos, all forms [1332-21-4]	0.1 f/cc(F)	—	A1	NA	Asbestosis; cancer
Asphalt (Petroleum; Bitumen) fume [8052-42-4]	(0.5 mg/m³)[1]	—	A4	—	Irritation
Atrazine [1912-24-9]	5 mg/m³	—	A4	216.06	Irritation

From American Conference of Governmental Hygienists, Inc. (ACGIH®), 2000 Threshold Limit Values (TLVs®) for Chemical Substances and Physical Agents and Biological Exposure Indices (BEIs®). Copyright 2000, Cincinnati, OH. Reprinted with permission.

The ACGIH categories for carcinogenicity are:
A1 – Confirmed Human Carcinogen
A2 – Suspected Human Carcinogen
A3 – Confirmed Animal Carcinogen with Unknown Relevance to Humans
A4 – Not Classifiable as a Human Carcinogen
A5 – Not Suspected as a Human Carcinogen

The ACGIH also publishes *Documentation of the Threshold Limit Values and Biological Exposure Indices,* a compendium of position papers summarizing the rationales for assignment of Threshold Limit Values (TLVs). The "Guidelines for the Classification of Occupational Carcinogens" in this publication describes the three categories of carcinogens to which substances or industrial processes may be assigned:

- A1 - Confirmed Human Carcinogen
- A2 - Suspected Human Carcinogen
- A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans.

*Note: The *CPR* has not been updated to include references to the revised ACGIH categories.

Precautions must be taken when using ACGIH information:

- Always use the most current edition of ACGIH listings.
- Consult the *Documentation of the Threshold Limit Values and Biological Exposure Indices* for detailed information on compound identification if a group of products is listed (for example, "certain water-insoluble compounds of chromium (VI)).")
- Consider particle size as well as concentration when assessing the potential hazards associated with particle deposition in the respiratory tract. *Respirable* particles, which are less than 10 microns (μm) in diameter, may cause lung cancer. *Inhalable* particles, which are less than 100 μm in diameter, may not have the same effect.
- Be aware of information available from the ACGIH publication on industrial processes (although WHMIS involves classification of products, not processes). Occasional reference is made to processes—for example, antimony trioxide production—where specific causative agents have not been confirmed, but where the ACGIH considers exposure to the process to be causally associated with increased risk of cancer.

IARC

International Agency for Research on Cancer

The WHO publishes the IARC Monograph and supplement series on the *Evaluation of the Carcinogenic Risk of Chemicals to Humans*. A pure substance or tested mixture falls into WHMIS Class D-2A on the basis of carcinogenicity if it is listed in Group 1 or 2 in this publication. A sample page from the publication is shown in Figure 2.12 (see Chapter 8, "Resources," for information on obtaining current copies).

Individual Monographs discuss in detail the properties of various chemicals, groups of chemicals, or industrial processes. Three types of evidence are considered when assessing cancer-causing properties:

- *Human evidence* from case reports and epidemiological studies
- *Experimental animal tests* conducted in laboratories
- *Short-term tests* for DNA damage and chromosomal effects in plant, insect, or mammalian cells

The level of evidence for each type is judged to be *sufficient, limited, inadequate, negative, or not available.*

Figure 2.12
Sample Section from IARC Monographs
Overall Evaluations of Carcinogenicity to Humans

The complete list contains all agents, mixtures, and exposures evaluated as being in Group 1 to date. Where appropriate, chemical abstract numbers are given in square brackets [ ]. For details of the evaluation, the relevant Monograph should be consulted (volume number given in round brackets, followed by year of publication of latest evaluation).

Group 1: Carcinogenic to humans (75)

Agents and groups of agents

Aflatoxins, naturally occurring [1402-68-2] (Vol. 56; 1993)

4-Aminobiphenyl [92-67-1] (Vol. 1, Suppl. 7; 1987)

Arsenic [7440-38-2] and arsenic compounds (Vol. 23, Suppl. 7; 1987)

(NB: This evaluation applies to the group of compounds as a whole and not necessarily to all individual compounds within the group)

Asbestos [1332-21-4] (Vol. 14, Suppl. 7; 1987)

Azathioprine [446-86-6] (Vol. 26, Suppl. 7; 1987)

Benzene [71-43-2] (Vol. 29, Suppl. 7; 1987)

Benzidine [92-87-5] (Vol. 29, Suppl. 7; 1987)

Beryllium [7440-41-7] and beryllium compounds (Vol. 58; 1993)

(NB: Evaluated as a group)

N, N-Bis(2-chloroethyl)-2-naphthylamine (Chlornaphazine) [494-03-1] (Vol. 4, Suppl. 7; 1987)

Bis(chloromethyl)ether [542-88-1] and chloromethyl methyl ether [107-30-2] (technical-grade) (Vol. 4, Suppl. 7; 1987)

1,4-Butanediol dimethanesulfonate (Busulphan; Myleran) [55-98-1] (Vol. 4, Suppl. 7; 1987)

Cadmium [7440-43-9] and cadmium compounds (Vol. 58; 1993)

(NB: Evaluated as a group)

Chlorambucil [305-03-3] (Vol. 26, Suppl. 7; 1987)

NB: This list is a partial list

From International Agency for Research on Cancer, 2000 Overall Evaluations of Carcinogenicity to Humans, Group 1 : Carcinogenic to humans. Reprinted with permission.

IARC Group Assignment

1 Carcinogenic to Humans
2A Probably Carcinogenic to Humans
2B Possibly Carcinogenic to Humans
3 Cannot Be Classified as to Carcinogenicity to Humans
4 Probably Not Carcinogenic to Humans

IARC periodically publishes Supplements in which chemicals are formally assigned to one of the four IARC Groups.

For chemicals evaluated in IARC Monographs issued after the most recently available Supplement and not formally assigned to Groups, the following generalizations apply:

- If **sufficient evidence of carcinogenicity to humans** exists, IARC invariably assigns the product to **Group 1**, irrespective of evidence on experimental animals or from short-term tests.
- If **limited evidence of carcinogenicity to humans** exists, the chemical is invariably assigned to **Group 2**. If sufficient evidence of carcinogenicity from animal studies exists, the product is likely to be assigned to Subgroup 2A, and otherwise, to 2B.
- If **evidence of carcinogenicity in humans is inadequate, but sufficient evidence in animal studies exists**, IARC usually assigns the chemical to **Group 2**, irrespective of the nature of short-term test results.
- If **evidence from animal studies is limited or inadequate**, the product is usually assigned to **Group 3**.

As with ACGIH lists, precautions are necessary when using IARC information:

- Always use the most recently available information. IARC Monograph Supplements are published less frequently than ACGIH revisions. Products on which Monographs are issued following the most recent classification lists can be evaluated using the above generalizations.
- Consult individual product Monographs to clarify the status of unspecified compounds. Groups of products appearing in IARC lists may be accompanied by footnotes, in which the agency clarifies any intended limitations to the information given. For example, with "arsenic and arsenic compounds," IARC states that the "evaluation applies to the group of chemicals as a whole and not necessarily to all individual chemicals within the group."
- Consider particle size as well as concentration when assessing the potential hazards associated with particle deposition in the respiratory tract. *Respirable* particles, which are less than 10 microns (μm) in diameter, may cause lung cancer. *Inhalable* particles, which are less than 100 μm in diameter, may not necessarily have the same effect.
- Be aware of information on processes in the applicable Monograph. Although WHMIS classification criteria apply only to products, IARC does classify processes such as the manufacture of magenta as carcinogenic.

IARC and the ACGIH do not provide identical lists. A product need only appear on one list to be included within WHMIS as a carcinogen. If a product appears as a carcinogen on both lists but in different hazard categories, the ranking is irrelevant from the point of view of classification, although it may have implications for reporting information on the MSDS.

Examples:

IARC lists cadmium (elemental cadmium and cadmium compounds) as a Group 1 Confirmed Human Carcinogen, while ACGIH considers it a Group A2 Suspected Human Carcinogen. Under WHMIS, cadmium would be classified simply as a carcinogen under Class D-2A. Details disclosing the worst-case scenario (that is, IARC considers cadmium to be a confirmed human carcinogen) should be reported on the MSDS.

IARC classifies trichloroethylene as Group 2A, Probably Carcinogenic to Humans, while ACGIH classifies the chemical as Group A5, Not Suspected as a Human Carcinogen. The IARC designation should be used on the MSDS.

CPR 55

Reproductive Toxicity

Definition

Reproductive toxicity, as defined under WHMIS, refers to the effect of a product on the capability of mammals to produce offspring. Effects may occur in either the male or female.

A product is a reproductive toxin within the meaning of WHMIS Class D if evidence shows that it causes sterility or has an adverse effect on reproductive capability in either of two cases:

Tests

- Any person, following exposure to the product in the workplace
- An animal assay conducted in accordance with OECD Test Guideline No. 415, "One-Generation Reproduction Toxicity" or No. 416, "Two-Generation Reproduction Toxicity."

Evidence assessed under the first case must be based on sound epidemiological principles. While the criterion refers to exposure in the workplace, the supplier should be aware of studies that show adverse reproductive effects resulting from exposure outside the workplace, at minimum for reporting results from such studies on MSDSs.

The second case involves one- and two-generation studies on preferred species of mice or rats, with parent dosing periods of at least one spermatogenic cycle for males and two estrous cycles for females. Measures of effect include gonadal function, estrous cycle, mating behaviour, conception, parturition (birth of offspring), lactation, and weaning. The reproductive studies may also provide preliminary information about developmental toxic effects, such as on neonatal morbidity, mortality, behaviour, and teratogenesis, and can serve as a guide for subsequent tests.

Some ethylene glycol (monoalkyl) ethers (for example, ethylene glycol monomethyl and monoethyl ethers) are examples of reproductive toxins/agents, which may adversely affect the sexual or reproductive performance of sexually mature male or female animals.

CPR 53, 33[3]

Teratogenicity and Embryotoxicity

Definition

A teratogen is a material that causes **birth defects** in a fetus at exposures that cause no damage or injury to the mother (for example, cyclophosphamide or methyl mercury). An embryotoxin is **toxic** to the fetus at concentrations that are not toxic to the mother (for example, inorganic lead or xylene). Injuries include death, physical malformation, permanent metabolic or physiological dysfunction, growth retardation, or psychological or behavioural alteration that occurs during pregnancy, at birth or in the postnatal period. The embryonic stage of development in the human fetus, between two and eight weeks, is particularly at risk of injury from such products.

A pure substance or tested mixture falls into WHMIS Class D-2A if, at a concentration that has no adverse effect on the pregnant female, it injures or causes abnormalities in a statistically significant proportion of test embryos or fetuses in one of the following animal assays for teratogenicity and embryotoxicity:

Tests

- OECD Test Guideline No. 414, "Teratogenicity"
- OECD Test Guideline No. 415, "One-Generation Reproduction Toxicity"
- OECD Test Guideline No. 416, "Two-Generation Reproduction Toxicity"

Reproductive studies (No. 415 and No. 416) can also provide preliminary information about the product's developmental toxic effects, such as teratogenicity and embryotoxicity, and thus serve as a guide for subsequent tests.

If tests for teratogenicity are not carried out in accordance with OECD Test Guidelines, the results from tests or methods described in *Principles for the Testing of Drugs for Teratogenicity,* Technical Report Series Number 364, published in 1967 by the WHO or tests carried out according to the generally accepted standards of good scientific practice of the time are acceptable.

CPR 57, 62, 33[3]

Mutagenicity

Definition

Mutagenicity is the capability of a substance to cause mutations in living cells. A mutation is any change in the information content, organization, expression, or amount of the genetic material, DNA, and may be spontaneous or caused by exposure to a physical agent such as radiation, or chemical agent such as ethylene oxide.

Mutations can occur in either germ (reproductive) or somatic (body) cells. Germ cell mutations, which occur in cells that give rise to eggs or sperm, are transmitted to future generations, sometimes as genetic disorders. Somatic mutations, which occur in non-reproductive tissue, are not transmitted to offspring but can play a role in the development of diseases such as cancer or atherosclerosis. Both males and females may be at risk of effects upon exposure to a product that is mutagenic to the species.

A mutagenic product may fall into either Subdivision A or Subdivision B of Class D-2, depending on whether it causes effects on germ or somatic cells, respectively.

The criteria for assigning products to the Subdivisions are based on epidemiological evidence or *in vivo* test results, as summarized in Figure 2.13. Criterion tests involve only mammalian cells (as opposed to bacteria, insect, and yeast cells) when studied *in vivo*, that is, in a living organism.

Figure 2.13
Criteria for Assigning Products to Subdivisions A and B of Class D-2 Based on Mutagenic Effects

Subdivision A: Very Toxic Material

a) Epidemiological evidence that shows a causal connection between exposure of persons to the substance or mixture and heritable genetic effects

b) Evidence of mutagenicity in mammalian germ cells *in vivo* as shown by positive results in either:

   i) A study that measures mutations transmitted to offspring

   ii) An *in vivo* study showing chemical interaction with the genetic materials of mammalian germ cells and an *in vivo* study assessing either gene mutation or chromosomal aberration in somatic cells.

Subdivision B: Toxic Material

a) Evidence of mutagenicity in mammalian somatic cells *in vivo* obtained in a test to assess either gene mutation or chromosomal aberration.

Evidence must be obtained:

- In accordance with test methods described in the "Introduction to the OECD Guidelines on Genetic Toxicology Testing and Guidance on the Selection and Application of Assays" published in the Third Addendum to the OECD *Guidelines for Testing of Chemicals*, dated March 1, 1987 and revised October 1998
- Using testing strategies described in the *Guidelines on the Use of Mutagenicity Tests in the Toxicological Evaluation of Chemicals*, dated 1986, published under the authority of the Minister of National Health and Welfare and the Minister of the Environment

Tests

Studies must be in accordance with test methods described in the "Introduction to the OECD Guidelines on Genetic Toxicology Testing and Guidance on the Selection and Application of Assays," published in the Third Addendum to the *OECD Guidelines for Testing of Chemicals*. These guidelines reference a substantial number of test protocols, about half of which are concerned with mammalian in vivo methods.

Strategies for selecting methods must be in accordance with those outlined in *Guidelines on the Use of Mutagenicity Tests in the Toxicological Evaluation of Chemicals,* 1986, published by Health and Welfare and Environment Canada. These guidelines outline the mutagenicity testing strategy, based on the potential for worker exposure to the product.

If no tests have been done in accordance with the above guidelines, results from the following tests are acceptable:

- A test or method described by the U.S. EPA in "Proposed Guidelines for Registering Pesticides in the U.S.; Hazard Evaluation: Human and Domestic Animals," volume 43 of the *Federal Register* (No. 163), 1978, pages 37, 336–37, 403
- Any other test or method carried out in accordance with generally accepted standards of good scientific practice at the time the test was carried out

CPR 56, 61

Sensitization

Definition

Sensitization involves allergic response and is the process whereby a person or animal (who is not atopic) is exposed to a substance that at first causes little or no immune reaction, but which, on repeated exposure, induces an immune response that is often stronger and not necessarily limited to the contact site. Typically, people respond differently to sensitizers, and little relationship exists between level of exposure and degree of response. Sensitization differs from irritation or corrosion, which do not involve allergic response.

Symptoms of skin sensitization include erythema (reddening of the skin), blisters, fissures in tissue, and fluid discharge. Skin sensitization is the most common form of sensitization in the industrial setting, although respiratory sensitization, in which coldlike symptoms escalate to asthmatic wheezing, coughing, and difficulty breathing, is also known.

Tests, D-2A

A pure substance or tested mixture falls into WHMIS Class D-2A if evidence shows that respiratory tract sensitization follows exposure to the product in the workplace. Ethylene diamine and various isocyanates such as toluene diisocyanate (TDI) are examples of substances that can cause sensitization of the respiratory tract.

A product falls into WHMIS Class D-2B if skin sensitization occurs within either of two criteria:

Tests, D-2B

- If in an animal assay carried out in accordance with OECD Test Guideline No. 406, "Skin Sensitization," the sample produces a response in either:
  - Thirty percent or more of the test animals when one of the techniques incorporates the use of an adjuvant
  - Fifteen percent or more of the test animals when one of the techniques does not incorporate the use of an adjuvant
- Evidence shows that the product causes skin sensitization in persons following exposure in a workplace

OECD Guideline No. 406 lists seven acceptable methods for evaluation. In all cases, after initial exposure to a test substance, the animals (guinea pigs are recommended) are subjected to a challenge exposure with the same substance after a period of not less than one week to establish if a hypersensitive state has been induced. Nickel, glutaraldehyde, pyrethrum, and various chromates are examples of substances that can cause skin sensitization.

CPR 60, 33[3]

Skin or Eye Irritation

Definition

Irritation is the production of **reversible** inflammatory changes of the skin or eye after contact with a substance.

Irritancy vs. corrosivity

Irritation is different from corrosion, which is the production of *irreversible* tissue damage at the site of contact due to chemical reaction between the product and the tissue. Products that are corrosive to the skin fall into WHMIS Class E, Corrosive Material, and should not be classified in Class D2 as an irritant.

Neither irritation nor corrosion involves an allergic response, and in that sense both differ from sensitization. Sensitizers fall into Subdivisions A or B of Class D2 depending on whether they cause respiratory sensitization or skin sensitization. A product is not considered a skin or eye irritant solely on the basis of physical abrasiveness.

Although the *CPR* do not set out specific criteria, lung irritants would be considered controlled products.

Effects of irritants on the skin include erythema (reddening), eschar (sloughing), or edema (swelling), and on the eyes, swelling or redness of the conjunctiva. In more severe cases, the inflammatory response (rather than chemical corrosion) may damage the cornea or iris. Any reaction other than "slight" or "mild" meets the WHMIS criterion for irritation.

A pure substance or tested mixture falls into WHMIS Class D-2B if, in an animal test conducted in accordance with the applicable OECD Test Guideline, results exceed the criteria listed in Figure 2.14 as measured at any time specified in the test. Examples include isopropyl alcohol and acetone.

If tests have not been conducted in accordance with applicable OECD Guidelines, the Draize Test, as described in volume 82 of *The Journal of Pharmacology and Experimental Therapeutics,* 1944, pages 377–390, is acceptable.

Figure 2.14
Criteria for Assigning Products to Subdivision B of Class D-2 Based on Skin or Eye Irritation

Location for Application of Product	Applicable OECD Test Guideline	Criteria
Skin	No. 404, Acute Dermal Irritation/ Corrosion	1. Erythema Formation – a mean of two or more (i.e. well-defined erythema) 2. Edema Formation – a mean of two or more (i.e. slight edema)
Eyes	No. 405, Acute Eye Irritation/ Corrosion	1. Corneal Damage – a mean of two or more (i.e. easily observable translucence) 2. Iris Damage – a mean of one of more (i.e. marked congestion, swelling, etc. but iris still reacting to light) 3. Conjunctival Swelling or Redness – a mean of 2.5 (i.e. diffuse crimson) or more (beefy red)

Class D-3

Division 3: Biohazardous Infectious Material

Division 3 of Class D applies to any organism that has been shown to cause disease or is reasonably believed to cause disease in humans or animals, and the toxins of such organisms. Organisms may be viruses, bacteria, rickettsia, fungi, protozoa, mycoplasma, chlamydia, or helminths. Organisms that cause disease in animals are of concern to WHMIS if the disease can be transmitted from animals to humans. Such diseases are termed *zoonoses*. Examples include psittacosis, Q-fever, and rabies.

CPR 64

Definition

Under WHMIS, biohazardous infectious materials are materials that are supplied or obtained and stored, handled, or used because they contain organisms likely to cause disease. These materials include cultures, concentrates, or other forms of production of such organisms and are typically found in laboratory and research facilities, particularly those associated with medicine, biotechnology, and agriculture.

Biohazardous infectious materials within the meaning of Division 3 do not normally include:

- Plants, animals, foods, soils, or goods (for example, isolation linen) that may be incidentally contaminated with disease-causing organisms
- Any organism that is unlikely to cause human disease or animal disease transmittable to humans
- Diagnostic specimens such as blood, feces, sputum, urine, organs, or body tissue that may contain such organisms*

*The HPA applies to the sale and importation of controlled products. The distribution of diagnostic specimens from one hospital or clinic to another, both operating under a provincial ministry of health, is outside the scope of the *HPA/CPR*.

Occupational Safety and Health agencies should be consulted regarding labelling and other requirements for diagnostic specimens.

(Reference: *Reference Manual for the WHMIS Requirements of the Hazardous Products Act and the Controlled Products Regulations,* Health Canada, 1996)

WHMIS classification of biohazardous organisms is based on the World Health Organization's system for determining whether an organism is capable of causing disease. The WHO has advised each country to draw up its own list, classifying indigenous organisms by risk group. The Public Health Agency of Canada (PHAC) and Health Canada can be considered appropriate agencies for classifying microorganisms in Canada.

If an organism has not been assigned to a risk group by these agencies, its assignment should be based on similarity to organisms already assigned and on the risk factors identified by the WHO.

Risk groups

In both systems, organisms are assigned to one of four risk (or hazard) groups based on capability to cause disease in people. Risk group descriptions and examples are shown in Figure 2.15. An organism is considered to be biohazardous within the meaning of Division 3 under WHMIS if it falls into Groups 2, 3, or 4 as defined by the WHO/PHAC.

An agency may identify a Risk Group 5 to cover pathogens not indigenous to Canada that would be extremely harmful if introduced; such pathogens fall within WHMIS if present in the workplace, for example, under special permission from federal authorities.

Risk factors

The PHAC bases its classification (marked in Figure 2.15) on these risk factors:

- Disease severity
- Routes of infection
- Virulence
- Infectiousness
- Existence of effective therapies
- Immunization
- Presence/absence of vectors
- Quantity of agent
- Indigenousness

Figure 2.16 summarizes the decision sequence used when applying criteria for inclusion in Division 3 of Class D.

Figure 2.15
Classification of Infective Microorganisms by Risk Group

WHO Risk Group I/PHAC group 1: low worker and low community risk

A microorganism that is unlikely to cause disease in healthy workers.
Examples: *Bacillus subtilis, Escherichia coli* (non-toxigenic strains).

WHO Risk Group II/PHAC group 2: moderate worker risk, limited community risk

A pathogen that can cause human disease but is unlikely to be a serious hazard to workers or the community. Workplace exposures may cause serious infection, but effective treatment and preventive measures are available and the risk of spread of the pathogen is limited. Examples: Hepatitis B Virus (HBV), Hepatitis C Virus (HCV).

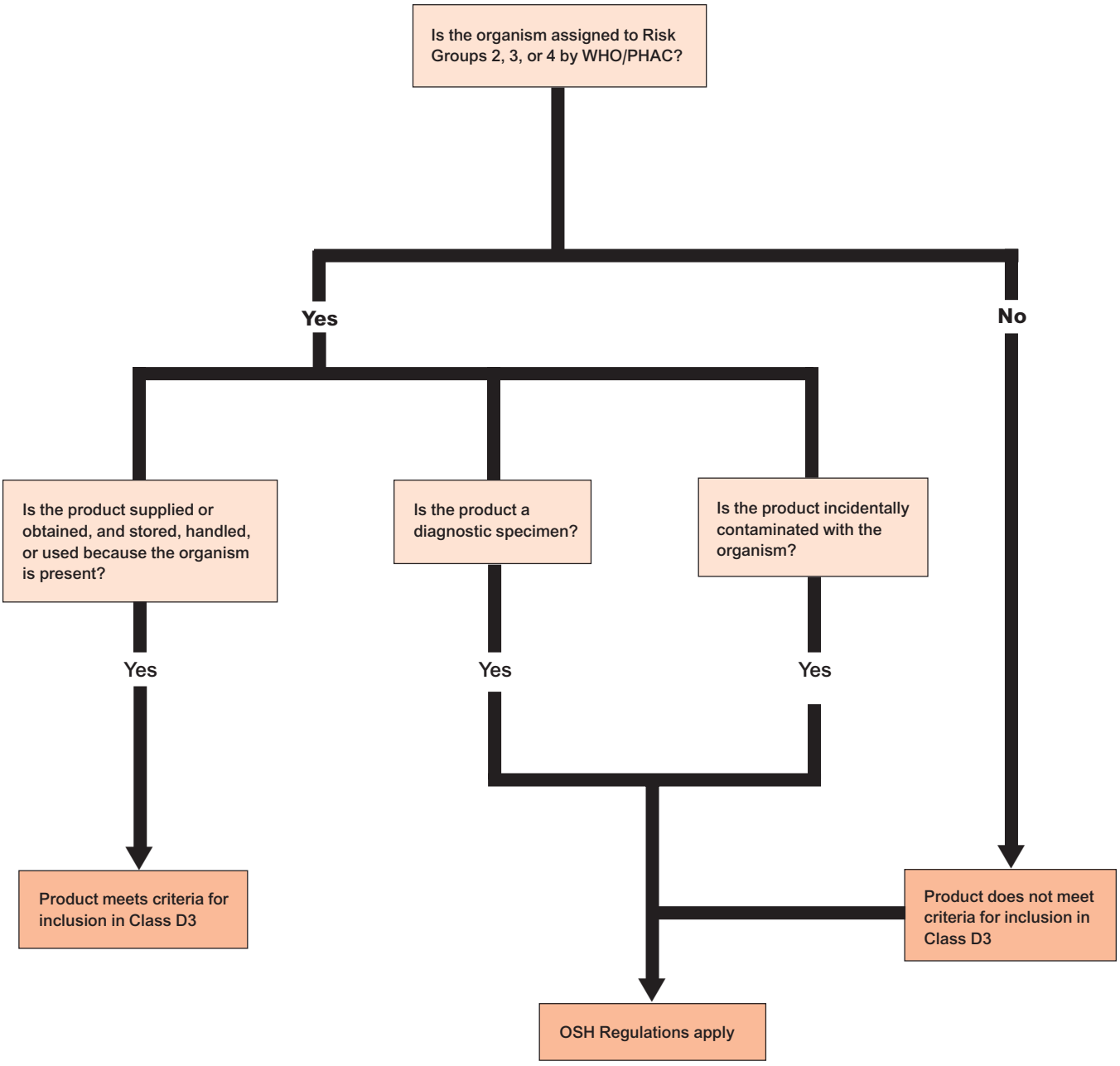
WHO Risk Group III/PHAC group 3: high worker risk, low community risk

A pathogen that usually produces serious human disease but where the pathogen does not ordinarily spread by casual contact from one infected individual to another. Examples: HIV, Hantavirus, *Mycobacterium tuberculosis.*

WHO Risk Group IV/PHAC group 4: high worker risk, high community risk

A pathogen that usually produces very serious human disease, often untreatable, and where the pathogen may be readily transmitted from one individual to another, directly or indirectly. Examples: Ebola virus, Lassa virus, Marburg virus.

Figure 2.16
Decision Tree: Does the Product Fall Within Class D-3 – Biohazardous Infectious Material?



2.3.7 Class E: Corrosive Material (Reference: *CPR* 65)

CPR 65

Corrosives are materials that visibly destroy or irreversibly alter living tissue by chemical action at the site of contact. Examples of Class E materials include sodium hydroxide, hydrochloric and hydrofluoric acids, and monoethanolamine.

Definition

Corrosion is the production of *irreversible* tissue damage to the skin as a result of chemical reaction between the product and dermal tissue. It differs from irritation, which is the production of *reversible* inflammatory changes. Skin irritants fall into WHMIS Class D-2. Any substance that meets the criteria of Class E need not also be classified as Class D-2B, Skin and Eye Irritation .

Five criteria related to corrosion of metal, corrosive effects on human skin, and the requirements of the *TDG Regulations* determine whether a product, material, or substance falls into Class E:

Criteria for corrosivity

1. The product corrodes SAE 1020 steel or 7075-T6 non-clad aluminum surfaces at a rate exceeding 6.25 mm per year at a test temperature of 55° C when tested in accordance with *Test Method Laboratory Corrosion Testing of Metals for the Process Industries*, NACE Standard TM-01-69.

2. The product is corrosive to the skin when tested in accordance with OECD Test Guideline No. 404, "Acute Dermal Irritation/Corrosion."

   OECD Guideline No. 404 states that "Strongly acidic or alkaline substances. . .**with a demonstrated pH of 2 or less or 11.5 or greater need not be tested for primary dermal irritation, owing to their predictable corrosive properties.**" A substance with a demonstrated pH of 2 or less or 11.5 or greater is classified as WHMIS Class E unless results from tests using OECD Guideline No. 404 yield contradictory data.

3. Evidence shows that the product causes visible necrosis (death) of human skin tissue.

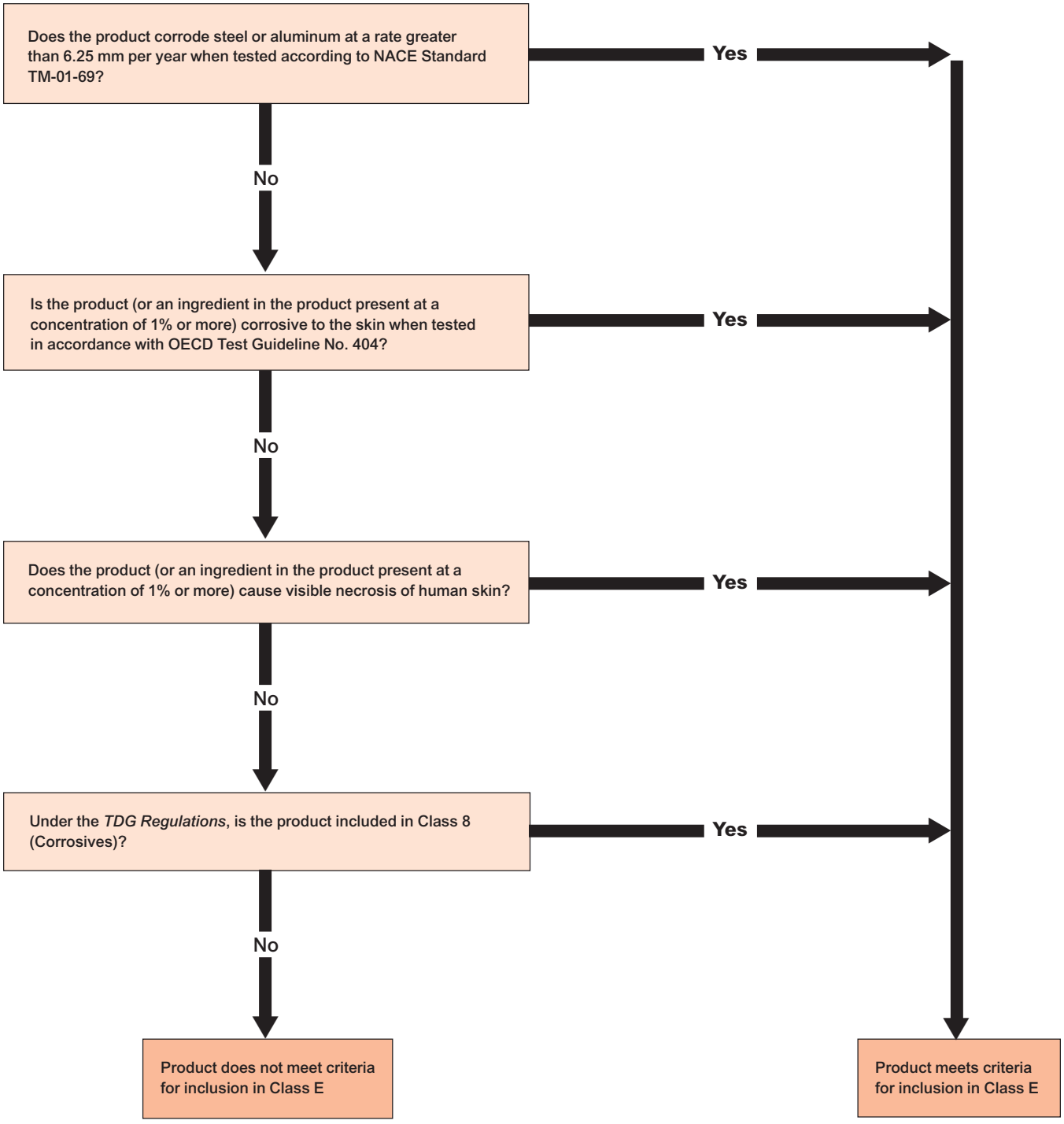
   Fresh chemical burns are often white, or in some cases, stained yellow (for example, if caused by nitric or picric acid). Caustic burns result in a sloughy skin. Dead tissue often turns black due to the degeneration of hemoglobin pigments.

4. The product is an untested mixture containing a product, material, or substance that meets criterion (2) or (3) and is present in a concentration of at least 1%.

5. The product is included in Class 8 (Corrosives) under the *TDG Regulations*.

Figure 2.17 summarizes the decision sequence used to apply criteria for inclusion in Class E.

Figure 2.17
Decision Tree: Does the Product Fall Within Class E – Corrosive Material? (Reference: *CPR* 65)



CPR 66

2.3.8 Class F: Dangerously Reactive Material (Reference: *CPR* 66)

Criteria

A product, material, or substance belongs in this Class if it meets any one of three criteria:

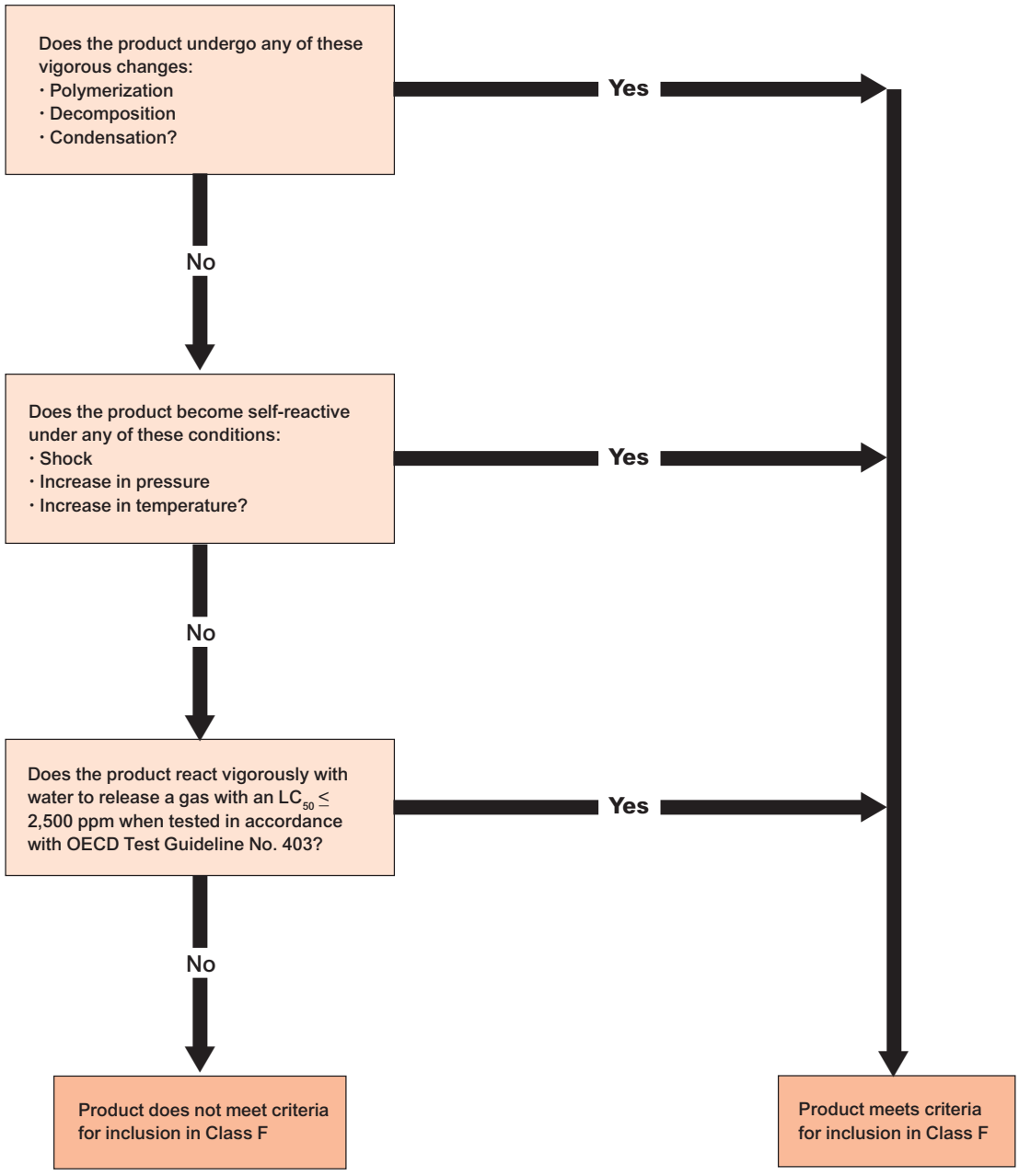
1. It undergoes vigorous polymerization, decomposition, or condensation. For example, the monomeric product 1,3-butadiene will undergo hazardous self-polymerization unless inhibitors are added to prevent the process from occurring.
2. It becomes self-reactive under conditions of shock or increased pressure or temperature. For example, metal azides and acetylides can be explosive if subjected to physical shock.
3. It reacts vigorously with water to release a gas that has an LC_{50} no more than 2,500 ppm by volume of gas, when tested for four hours in accordance with OECD Test Guideline No. 403, "Acute Inhalation Toxicity." For example, anhydrous ferric and beryllium chlorides will liberate toxic hydrogen chloride gas on contact with water.

Figure 2.18 summarizes the decision sequence used when applying criteria for inclusion in Class F.

NOTE: The category "Dangerously Reactive Material" must not be confused with the hazard concept of "incompatibility." Materials that are incompatible are those that react dangerously on contact to produce excessive heat, explosions, or toxic products. For example, many caustics are incompatible with acids, and many oxidizers are incompatible with flammables.

Only criterion #3 of Class F involves an incompatibility—between a product and water. Many other materials that are incompatible with other products are not classified as Dangerously Reactive. This point must be understood when completing the MSDS item on "Incompatibility." See Chapter 4, "The Material Safety Data Sheet."

Figure 2.18
Decision Tree: Does the Product Fall Within Class F – Dangerously Reactive Material? (Reference: *CPR* 66)



2.4 Comparison of Classification Systems: WHMIS and TDG

The WHMIS and TDG classification systems are similar, but not identical. A detailed comparison of the two systems is shown below.

Classes and Divisions within WHMIS and TDG: A Detailed Summary

Type of Hazard	WHMIS Class	WHMIS Class and Division Designation	TDG Class and Division Designation	Comments
Compressed Gas	Compressed Gas	Class A	Class 2, Div. 2	Essentially identical criteria
Flammable Gas	Flammable & Combustible Material	Class B, Div. 1	Class 2, Div. 1	Identical criteria
Flammable Liquid	Flammable & Combustible Material	Class B, Div. 2	Class 3	Equivalent criteria
Combustible Liquid	Flammable & Combustible Material	Class B, Div. 3	—	Generally not covered by TDG
Flammable Solid	Flammable & Combustible Material	Class B, Div. 4	Class 4, Div. 1	Equivalent criteria
Flammable Aerosol	Flammable & Combustible Material	Class B, Div. 5	Class 2, Div. 1	Criteria unique to WHMIS, but equivalent products are listed in TDG
Reactive Flammable Material	Flammable & Combustible Material	Class B, Div. 6	Class 4, Div. 2 & 3	Equivalent criteria
Oxidizers	Oxidizing Material	Class C	Class 5	Similar criteria
Acute Lethality	Poisonous & Infectious Material	Class D, Div. 1	Class 6, Div. 1	Equivalent criteria (*TDG* referenced in *CPR*)
Toxic Gas	Poisonous & Infectious Material	Class D, Div. 1	Class 2, Div. 3	Equivalent criteria
Other Toxic Effects*	Poisonous & Infectious Material	Class D, Div. 2	—	Not covered by TDG
Biohazardous Infectious Material	Poisonous & Infectious Material	Class D, Div. 3	Class 6, Div. 2	Equivalent regulatory statements in WHMIS and TDG
Metal and Skin Corrosives	Corrosive Material	Class E	Class 8	Includes equivalent criteria (*TDG* referenced in *CPR*)
Dangerously Reactive Material	Dangerously Reactive Material	Class F	—	Some are covered by TDG under other hazard Classes
Miscellaneous Materials	No equivalent WHMIS Class	—	Class 9	This "catch-all" Class addresses primarily environmental concerns. WHMIS covers some of these materials (e.g. asbestos, PCBs) in Class D
Explosives	Not covered by WHMIS	—	Class 1	Covered by *Explosives Act* and *TDG Act*
Radioactive Materials	Not covered by WHMIS	—	Class 7	Covered by *Atomic Energy Control Act (Nuclear Safety and Control Act)* and *TDG Act*

*Includes: Skin and Eye Irritation; General Chronic Toxicity (target organ effects); Respiratory Tract Sensitization; Mutagenicity; Carcinogenicity; Teratogenicity/Embryotoxicity; Reproductive Toxicity; and Skin Sensitization.

Appendix 2A
WHMIS Classification Checklist

WHMIS CLASSIFICATION CHECKLIST

Product:

CLASS A — Compressed Gas 	
May be located in MSDS section(s): Physical Data, Fire and Explosion Data	
❒ Aerosol container — liquid	❒ Cylinder — Gas under pressure (> 40 psi)
CLASS B — Flammable/Combustible Material 	
May be located in MSDS section(s): Fire and Explosion Data	
❒ **Class B1 — Flammable Gases** : Compressed gas that forms a flammable mixture with air at a concentration of ≤ 13% or concentration range ≥ 12% ❒ **Class B2 — Flammable Liquids** : Flashpoint of < 37.8° C (100° F) ❒ **Class B3 — Combustible Liquids** : Flashpoint of 37.8° C–93.3° C (100° F–200° F) ❒ **Class B4 — Flammable Solids** : Ignites readily, causes fires through friction/retained heat and burns with self-sustained flame ❒ **Class B5 — Flammable Aerosols** : Aerosol container that when tested gives a flame projection at full valve opening or a flashback at any degree of valve opening ❒ **Class B6 — Reactive Flammable Materials** : Spontaneously combusts under normal conditions or contact with air/water, or emits flammable gas if in contact with water	
CLASS C — Oxidizing Material 	
May be located in MSDS section(s): Reactivity Data	
❒ Contributes to the combustion of another material whether or not the product itself is combustible	
❒ Organic peroxide that contains the double-bonded oxygen structure	
CLASS D — Poisonous and Infectious Material 	
May be located in MSDS section(s): Hazardous Ingredients, Toxicological Properties	
1. Class D1: Materials Causing Immediate and Serious Toxic Effects (≥ 1%) *Materials causing acute lethal effects*	
Class D1A: Very Toxic Material at ≥ 1%	
❒ TDG Class 2.3, TDG class 6.1, Packing group I or II	
❒ Oral Toxicity: LD_{50} ≤ 50 mg/kg	❒ Dermal Toxicity: LD_{50} ≤ 200 mg/kg
❒ Inhalation Toxicity: (4 hours) — Gas: LC_{50} ≤ 2500 ppm; Vapour: LC_{50} ≤ 1500 ppm; Dust, mist, fumes: LC_{50} ≤ 500 mg/m^3	
Class D1B: Toxic Material at ≥ 1%	
❒ TDG class 6.1, Packing group III	
❒ Oral Toxicity: LD_{50} > 50 but ≤ 500 mg/kg	❒ Dermal Toxicity: LD_{50} > 200 but ≤ 1000 mg/kg
❒ Inhalation Toxicity: (4 hours) — Gas: No criterion; Vapour: LC_{50} > 1500 but ≤ 2500 ppm; Dust, mist, fumes: LC_{50} > 500 but ≤ 2500 mg/m^3	

Product:

2. Class D2: Materials Causing Other Toxic Effects	
Class D2A: Very Toxic Material at ≥ 0.1%	
❒ Carcinogenicity: IARC — group 1, 2A, or 2B ACGIH — group A1, A2, or A3	
❒ Reproductive Toxicity — Adverse effect on reproductive capability (male or female)	
❒ Teratogenicity — Birth defects in the fetus but not toxic to the pregnant mother	
❒ Embryotoxicity — Toxic effects in the fetus but not toxic to the pregnant mother	
❒ Mutagenicity — Mutations of the reproductive cells *in vivo*	
❒ Respiratory Sensitization — Allergic reaction in the respiratory tract	
Class D2A: Very Toxic Material at ≥ 1%	
❒ Chronic toxic effects in **small** doses — Threatens life or causes serious impairment of body organs, or cardiovascular or nervous systems	
Class D2B: Toxic Material at ≥ 1%	
❒ Chronic toxic effects in **larger** doses — Threatens life or causes serious impairment of body organs, or cardiovascular or nervous systems	
❒ Mutagenicity — Mutations of the non-reproductive cells	
❒ Skin Sensitization — Allergic skin reaction	
❒ Skin/Eye Irritation — Reversible damage	
3. Class D3: Biohazardous Infectious Material	
May be located in MSDS section(s): Hazardous Ingredients, Toxicological Properties	
❒ Organism that has been shown to cause or is reasonably believed to cause disease in persons or animals	
❒ Organisms classified into Risk Group 2, 3, and 4 as determined by the World Health Organization (WHO) or the Public Health Agency of Canada (PHAC)	
CLASS E — Corrosive Material at ≥ 1%	
May be located in MSDS section(s): Hazardous Ingredients, Physical Data, Toxicological Properties	
❒ pH ≤ 2.0 **or** pH ≥ 11.5	❒ Burns — Causes irreversible damage/necrosis of skin tissue
❒ Corrodes SAE 1020 steel or aluminum type 7075-T6	❒ TDG Class 8
CLASS F — Dangerously Reactive Material	
May be located in MSDS section(s): Reactivity Data	
❒ Vigorous polymerization, decomposition, or condensation	
❒ Self-reactive under conditions of shock, increased pressure, or temperature	
❒ Reacts vigorously with water to release a toxic gas	

LISTE DE CONTRÔLE SIMDUT

Produit :

CLASSE A — Gas comprimé 	
Peut être trouvé dans ces sections de la FS : Données physiques, données sur le feu et l'explosion	
❒ Contenant aérosol – liquide	❒ Bonbonne – Gaz sous pression (> 40 psi)
CLASSE B — Matières inflammables/combustibles 	
Peuvent être trouvées dans ces sections de la FS : Données sur le feu et l'explosion	
❒ **Classe B1 — Gaz inflammables** : gaz comprimé qui forme un mélange inflammable avec l'air à une concentration de ≤ 13% ou une échelle de concentration ≥ 12%	
❒ **Classe B2 — Liquides inflammables** : point d'éclair < 37.8° C (100° F)	
❒ **Classe B3 — Liquides combustibles** : point d'éclair de 37.8° C–93.3° C (100° F–200° F)	
❒ **Classe B4 — Solides inflammables** : s'enflamment facilement, causent l'incendie par voie de friction/chaleur retenue et produisent une flamme qui s'entretient d'elle-même	
❒ **Classe B5 — Aérosols inflammables** : contenants aérosols qui, à l'épreuve, projettent une flamme quand le robinet est ouvert à fond et produisent un retour de flamme à tout degré d'ouverture du robinet	
❒ **Classe B6 — Matières inflammables réactives** : brûlent spontanément dans des conditions normales ou au contact de l'air/eau, ou émettent un gaz inflammable au contact de l'eau	
CLASSE C — Matières oxydantes 	
Peuvent être trouvées dans la (les) section(s) de la FS : Données sur la réactivité	
❒ Contribue à la combustion d'une autre matière, que la matière elle-même soit ou non combustible	
❒ Peroxyde organique contenant la structure d'oxygène à double liaison	
CLASSE D — Matières toxiques ou infectieuses 	
Peuvent être trouvées dans cette (ces) section(s) de la FS : Ingrédients dangereux, propriétés toxicologiques	
1. Classe D1 : Matières causant des effets toxiques immédiats et sérieux (≥ 1%) ***Matières causant des effets toxiques mortels***	
Classe D1A : Matières très toxiques à ≥ 1%	
❒ TMD Classe 2.3; TMD classe 6.1 Groupe d'emballage I ou II	
❒ Toxicité orale : DL_{50} ≤50 mg/kg	❒ Toxicité cutanée : DL_{50} ≤ 200 mg/kg
❒ Toxicité par inhalation : (4 heures) — Gaz	CL_{50} ≤ 2500 ppm
Vapeur	CL_{50} ≤ 1500 ppm
Poussière, brouillard, fumée	CL_{50} ≤ 500 mg/m^3
Classe D1B : Matières toxiques à ≥ 1%	
❒ TMD classe 6.1, Groupe d'emballage III	
❒ Toxicité orale : DL_{50} >50 mais≤ 500 mg/kg	❒ Toxicité cutanée : DL_{50} >200 mais ≤ 1000 mg/kg
❒ Toxicité par inhalation : (4 heures) — Gaz	Aucun critère
Vapeur	CL_{50} > 1500 mais ≤ 2500 ppm
Poussière, brouillard, fumée	CL_{50} > 500 mais ≤ 2500 mg/m^3

Produit:

2. Classe D2 : Matières causant d'autres effets toxiques	
Classe D2A : Matières très toxiques à ≥ 0.1%	
❒ Cancérogénicité : IARC — groupe 1, 2A, ou 2B ACGIH — groupe A1, A2, ou A3	
❒ Toxicité reproductive — Effets délétères sur la capacité reproductive (mâle ou femelle)	
❒ Tératogénicité — Malformations congénitales chez le fœtus mais non toxique pour la femme enceinte	
❒ Embryotoxicité — Effets toxiques sur le fœtus mais non toxique pour la femme enceinte	
❒ Mutagénicité — Mutations au niveau des cellules reproductives in vivo	
❒ Sensibilisation respiratoire — Réaction allergique au niveau des voies respiratoires	
Classe D2A : Matières très toxiques à ≥ 1%	
❒ Effets toxiques chroniques à **petite** dose : posent une menace à la vie ou peuvent causer de sérieux dommages aux organes, de même qu'aux systèmes cardio-vasculaire et nerveux	
Classe D2B : Matières toxiques à ≥ 1%	
❒ Effets toxiques chroniques à dose **plus élevée** : posent une menace à la vie ou peuvent causer de sérieux dommages aux organes, de même qu'aux systèmes cardio-vasculaire et nerveux	
❒ Mutagénicité – Mutations au niveau des cellules non reproductives	
❒ Sensibilisation de la peau – réaction allergique au niveau de la peau	
❒ Irritation de la peau ou des yeux– dommage réversible	
3. Classe D3 : Matières infectieuses	
Peuvent être trouvées dans cette (ces) section(s) de la FS : Ingrédients dangereux, propriétés toxicologiques	
❒ Organisme au sujet duquel on a établi, ou on a raison de croire, qu'il cause la maladie chez l'humain ou chez l'animal	
❒ Organismes appartenant aux Groupes de risque 2, 3, et 4 selon l'Organisation mondiale de la santé (OMS) ou le Conseil des recherches médicales du Canada (CRMC)	
CLASSE E — Matières corrosives à ≥ 1%	
Peuvent être trouvées dans cette (ces) section(s) de la FS : Ingrédients dangereux, données physiques, propriétés toxicologiques	
❒ pH ≤ 2.0 **ou** pH ≥ 11.5	❒ Brûlures – dommage irréversible/nécrose du tissu cutané
❒ Corrode l'acier SAE 1020 ou l'aluminium type 7075-T6	❒ TMD Classe 8
CLASSE F — Matières possédant une réactivité dangereuse	
Peuvent être trouvées dans cette (ces) section(s) de la FS : Ingrédients dangereux, données sur la réactivité	
❒ Vigoureuse réaction de polymérisation, de décomposition, ou de condensation	
❒ Auto-réactive lorsque soumise soit à un choc, soit à une augmentation de la pression ou de la température	
❒ Réagit fortement avec l'eau pour dégager un gaz toxique	

Appendix 2B
Example: Classification of XYZ Cleaner (A Hypothetical Product)

The hypothetical product, XYZ Cleaner is an untested mixture containing five ingredients:

Ingredient	Percent by Weight
VM and P Naphtha	60 (Range 54–56)
2-Ethoxyethanol	31 (Range 28–34)
Sodium Dodecyl Benzene Sulphonate	0.8 (Range 0.7–0.9)
1,1,1-Trichloroethane (TCE)	8 (Range 7–9)
1,4-Dioxane (Stabilizer in TCE)	0.08 (Range 0.07–0.09)

The supplier carries out a literature search for physical and toxicological data on each of the ingredients. The information gathered is shown below, and summarized in the Classification Checklist that follows. Typical reference materials for a literature search are listed in Chapter 8.

In overview, the literature search provides classification information on the ingredients as follows:

1. VM and P Naphtha (60%)
   - Skin and eye irritant [D-2B]
   - Flashpoint 14°C [B-2]

2. **2-Ethoxyethanol** (31%)
   - An LC_{50} of 2400 ppm / 4 hours [D-1B]
   - Documented reproductive effects [D-2A]
   - Flashpoint 43°C [B-3]
   - Eye Irritant [D-2B]

3. **Sodium Dodecyl Benzene Sulphonate** (0.8%)
   - Eye irritant, but concentration is less than 1%

4. **1,1,1-Trichloroethane** (8%)
   - Eye, skin and respiratory tract irritant [D-2B]
   - TDG class 6.1, packing group III [D-1B]

5. **1,4-Dioxane** (0.08%)
   - An eye and respiratory tract irritant, but concentration is less than 1%
   - An IARC carcinogen, but concentration is less than 0.1%
   - Flashpoint 12°C

On the basis of information on ingredients in XYZ Cleaner and in the absence of test data on the mixture, the supplier, using reasonable professional judgement, makes the following conclusions:

1. The product does not fall into WHMIS Classes A: Compressed Gas, C: Oxidizing Material, E: Corrosive Material, or F: Dangerously Reactive Material.

2. As the *CPR* specifies classification within Class D on the basis of the properties of ingredients and cutoff concentrations, the supplier classifies the product as falling into Class D within the following sub-levels:
   - Division 1, Subdivision B (Toxic) on the basis of LC_{50} data on 2-ethoxyethanol
   - Division 1, Subdivision B (Toxic) on the basis of meeting TDG class 6.1, packing group III for 1,1,1-trichlorethane
   - Division 2, Subdivision A (Very Toxic) on the basis of reproductive effects of 2-ethoxyethanol
   - Division 2, Subdivision B (Toxic) on the basis of irritant qualities of VM and P Naphtha, 2-ethoxyethanol and 1,1,1-trichloroethane

NOTE: Sodium dodecyl benzene sulphonate and 1,4-dioxane are irritant and carcinogenic (IARC) respectively, but have concentrations in XYZ Cleaner less than applicable cutoffs.

For mixtures, conclusions based on properties of ingredients are not as definitive as information based on evaluations and tests of the mixture itself.

3. In the supplier's professional judgement, XYZ Cleaner is likely to be a Flammable Liquid (WHMIS Class B, Division 2) based on the flashpoints of the two major ingredients, VM and P Naphtha and 2-ethoxyethanol. This judgement is confirmed when the supplier tests the mixture according to the applicable closed-cup flashpoint method in Schedule IV of the *CPR*, and determines the flashpoint for the mixture to be 25°C (77°F).

Having classified XYZ Cleaner, the supplier then prepares a supplier label and MSDS, based in part on the data used for classification.

NOTE: Information derived from the application of the very specific criteria for classification prescribed in the *CPR* is likely to be incomplete when assembling overall hazard information on the product, particularly for MSDSs.

For example:

- 1,1,1-trichloroethane is not flammable or combustible within WHMIS criteria; however, because it can be ignited in the presence of an electric arc or other high-energy source the chemical may be dangerous if used as a metal cleaner in arc welding operations.
- While none of VM and P Naphtha, 2-ethoxyethanol or 1,1,1-trichloroethane is dangerously reactive within the meaning of WHMIS Class F, two of the ingredients are incompatible with strong oxidizers and one with caustics and reactive metals. The classification concept of "dangerously reactive" overlaps with, but is not identical to, the hazard concept "incompatibility," which is reported on the MSDS.

WHMIS CLASSIFICATION CHECKLIST

Product: XYZ Cleaner

CLASS A — Compressed Gas

May be located in MSDS section(s): Physical Data, Fire and Explosion Data

❒ Aerosol container — liquid	❒ Cylinder — Gas under pressure (> 40 psi)

CLASS B — Flammable/Combustible Material

May be located in MSDS section(s): Fire and Explosion Data

- ❒ **Class B1 — Flammable Gases** : Compressed gas that forms a flammable mixture with air at a concentration of ≤ 13% or concentration range ≥ 12%
- ☑ **Class B2 — Flammable Liquids** : Flashpoint of < 37.8°C (100°F) Tested Flashpoint: 25˚C (cc)
- ❒ **Class B3 — Combustible Liquids** : Flashpoint of 37.8°C–93.3°C (100°F–200°F)
- ❒ **Class B4 — Flammable Solids** : Ignites readily, causes fires through friction/retained heat and burns with self-sustained flame
- ❒ **Class B5 — Flammable Aerosols** : Aerosol container that when tested gives a flame projection at full valve opening or a flashback at any degree of valve opening
- ❒ **Class B6 — Reactive Flammable Materials** : Spontaneously combusts under normal conditions or contact with air/water, or emits flammable gas if in contact with water

CLASS C — Oxidizing Material

May be located in MSDS section(s): Reactivity Data

- ❒ Contributes to the combustion of another material whether or not the product itself is combustible
- ❒ Organic peroxide that contains the double-bonded oxygen structure

CLASS D — Poisonous and Infectious Material

May be located in MSDS section(s): Hazardous Ingredients, Toxicological Properties

1. Class D1: Materials Causing Immediate and Serious Toxic Effects (≥ 1%)
Materials causing acute lethal effects

Class D1A: Very Toxic Material at ≥ 1%

- ❒ TDG Class 2.3, TDG class 6.1, Packing group I or II

❒ Oral Toxicity: LD_{50} ≤ 50 mg/kg	❒ Dermal Toxicity: LD_{50} ≤ 200 mg/kg

❒ Inhalation Toxicity: (4 hours)	Gas	LC_{50} ≤ 2500 ppm
	Vapour	LC_{50} ≤ 1500 ppm
	Dust, mist, fumes	LC_{50} ≤ 500 mg/m^3

Class D1B: Toxic Material at ≥ 1%

- ☑ TDG class 6.1, Packing group III (Trichloroethane)

❒ Oral Toxicity: LD_{50} > 50 but ≤ 500 mg/kg	❒ Dermal Toxicity: LD_{50} > 200 but ≤ 1000 mg/kg

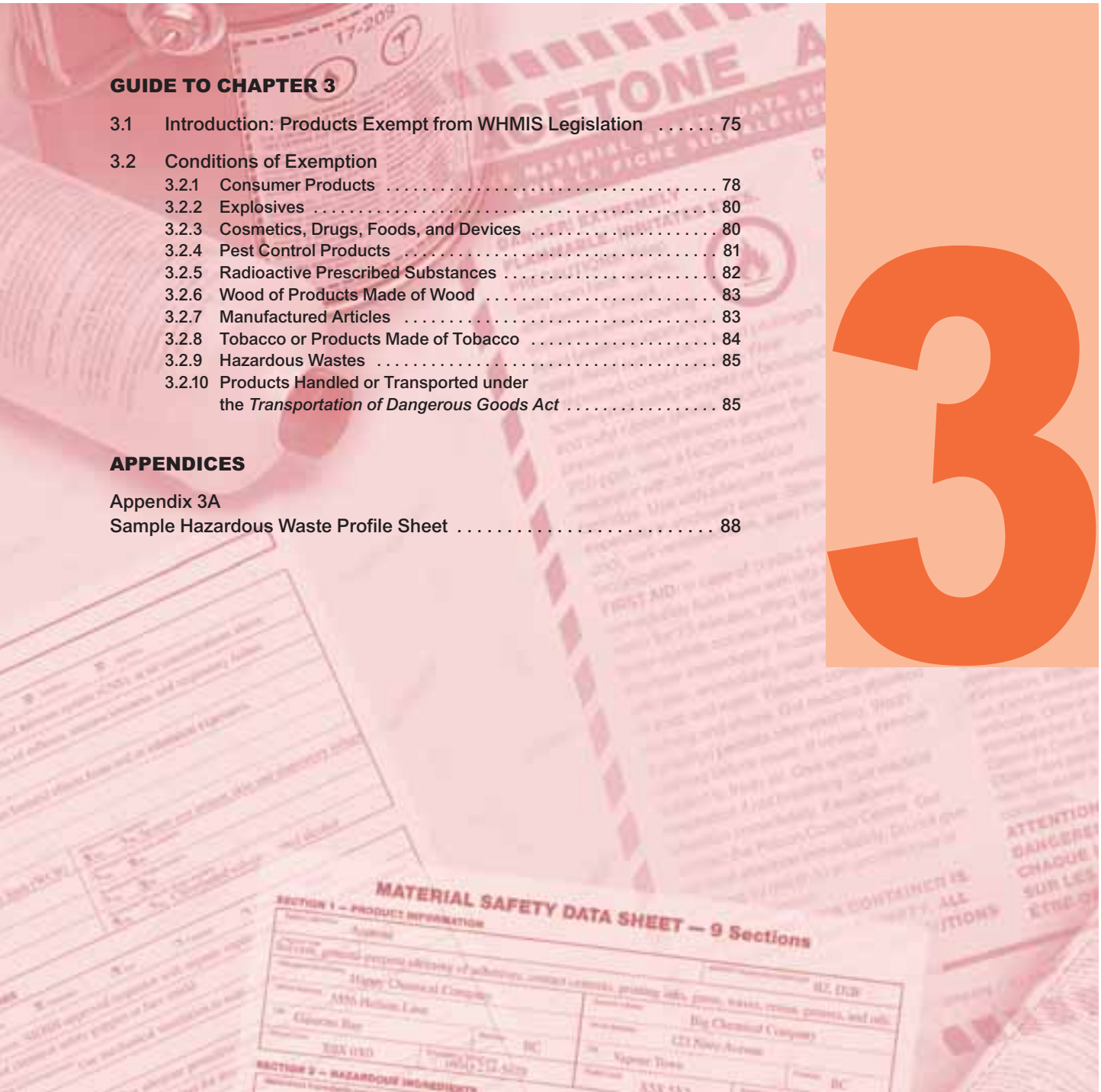
☑ Inhalation Toxicity: (4 hours) (2-ethoxyethanol)	Gas	No criterion
	Vapour	LC_{50} > 1500 but ≤ 2500 ppm
	Dust, mist, fumes	LC_{50} > 500 but ≤ 2500 mg/m^3

Product: XYZ Cleaner

2. Class D2: Materials Causing Other Toxic Effects	
Class D2A: Very Toxic Material at ≥ 0.1%	
❒ Carcinogenicity: IARC — group 1, 2A, or 2B ACGIH — group A1, A2, or A3	
☑ Reproductive Toxicity — Adverse effect on reproductive capability (male or female) (2-ethoxyethanol)	
❒ Teratogenicity — Birth defects in the fetus but not toxic to the pregnant mother	
❒ Embryotoxicity — Toxic effects in the fetus but not toxic to the pregnant mother	
❒ Mutagenicity — Mutations of the reproductive cells *in vivo*	
❒ Respiratory Sensitization — Allergic reaction in the respiratory tract	
Class D2A: Very Toxic Material at ≥ 1%	
❒ Chronic toxic effects in **small** doses — Threatens life or causes serious impairment of body organs, or cardiovascular or nervous systems	
Class D2B: Toxic Material at ≥ 1%	
❒ Chronic toxic effects in **larger** doses — Threatens life or causes serious impairment of body organs, or cardiovascular or nervous systems	
❒ Mutagenicity — Mutations of the non-reproductive cells	
❒ Skin Sensitization — Allergic skin reaction	
☑ Skin/Eye Irritation — Reversible damage (VM & P Naptha, 2-ethoxyethanol, trichloroethane)	
3. Class D3: Biohazardous Infectious Material	
May be located in MSDS section(s): Hazardous Ingredients, Toxicological Properties	
❒ Organism that has been shown to cause or is reasonably believed to cause disease in persons or animals	
❒ Organisms classified into Risk Group 2, 3, and 4 as determined by the World Health Organization (WHO) or the Public Health Agency of Canada (PHAC)	
CLASS E — Corrosive Material at ≥ 1%	
May be located in MSDS section(s): Hazardous Ingredients, Physical Data, Toxicological Properties	
❒ pH ≤ 2.0 **or** pH ≥ 11.5	❒ Burns — Causes irreversible damage/necrosis of skin tissue
❒ Corrodes SAE 1020 steel or aluminum type 7075-T6	❒ TDG Class 8
CLASS F — Dangerously Reactive Material	
May be located in MSDS section(s): Reactivity Data	
❒ Vigorous polymerization, decomposition, or condensation	
❒ Self-reactive under conditions of shock, increased pressure, or temperature	
❒ Reacts vigorously with water to release a toxic gas	

CHAPTER 3

Partial and Complete Exemptions



GUIDE TO CHAPTER 3

APPENDICES

3.1 Introduction: Products Exempt from WHMIS

Ten types of products are exempt in whole or part from WHMIS information requirements.

Partial exemptions

Partially exempt products, which are labelled under federal legislation other than WHMIS, can be sold without WHMIS labels and MSDSs. **However, when these products are used in the workplace, provincial OSH regulations require worker education and training, and workplace labels must be applied if they are not in their original containers.** The following categories of products are exempt from WHMIS labels and MSDSs:

- Restricted products when packaged as a consumer product and labelled under the *Consumer Chemicals Containers Regulations (CCCR)*
- Explosives within the meaning of the *Explosives Act*
- Cosmetics, drugs, food or (medical) devices within the meaning of the *Food and Drugs Act*
- Pest control products within the meaning of the *Pest Control Products Act (PCP Act)*
- Radioactive substances within the meaning of the *Atomic Energy Control Act (AEC Act)* now the *Nuclear Safety and Control Act (NSC Act)*

Complete exemptions

Completely exempt products are excluded from both federal (HPA, CPR) and provincial (model OSH) WHMIS requirements, although general occupational health and safety requirements governing workplace education and training, as well as hazard identification, must be met. Completely exempt products are:

- Wood or products made of wood
- Manufactured articles
- Tobacco or products made of tobacco
- Hazardous wastes
- Products handled or transported pursuant to the *TDG Act*

Although these products are exempt (in part or in whole) from WHMIS legislation, WHMIS is only one area of right-to-know legislation. Some requirements for information on partially exempt products are covered by separate legislation. In addition, health and safety regulatory agencies typically have generic right-to-know legislation other than WHMIS that requires provision of information on products that could be harmful to workers. All forms of legislation must be complied with. Figure 3.1 summarizes the information requirements for exempt products.

Other materials meeting the WHMIS definition of a controlled product may be exempt only under specific conditions of size and shape. For example, sand or gravel (which meet the WHMIS definition of a controlled product because they contain silica) do not endanger workers when piled at a quarry or on the site of a construction project. The policy followed by regulatory agencies for these special cases states that WHMIS requirements apply only if such materials are packaged or processed for a specific purpose, for example, stone crushed and sized for use in abrasive cleaners.

The Application of WHMIS Information Requirements

Completely Included:

Products classified in any of the six WHMIS Hazard Classes (under the *CPR* and the *HPA*) and intended for use in the workplace

Partially Exempt:

- Consumer restricted products
- Cosmetics, drugs, foods, and medical devices
- Explosives
- Pesticides
- Radioactive substances

Completely Exempt

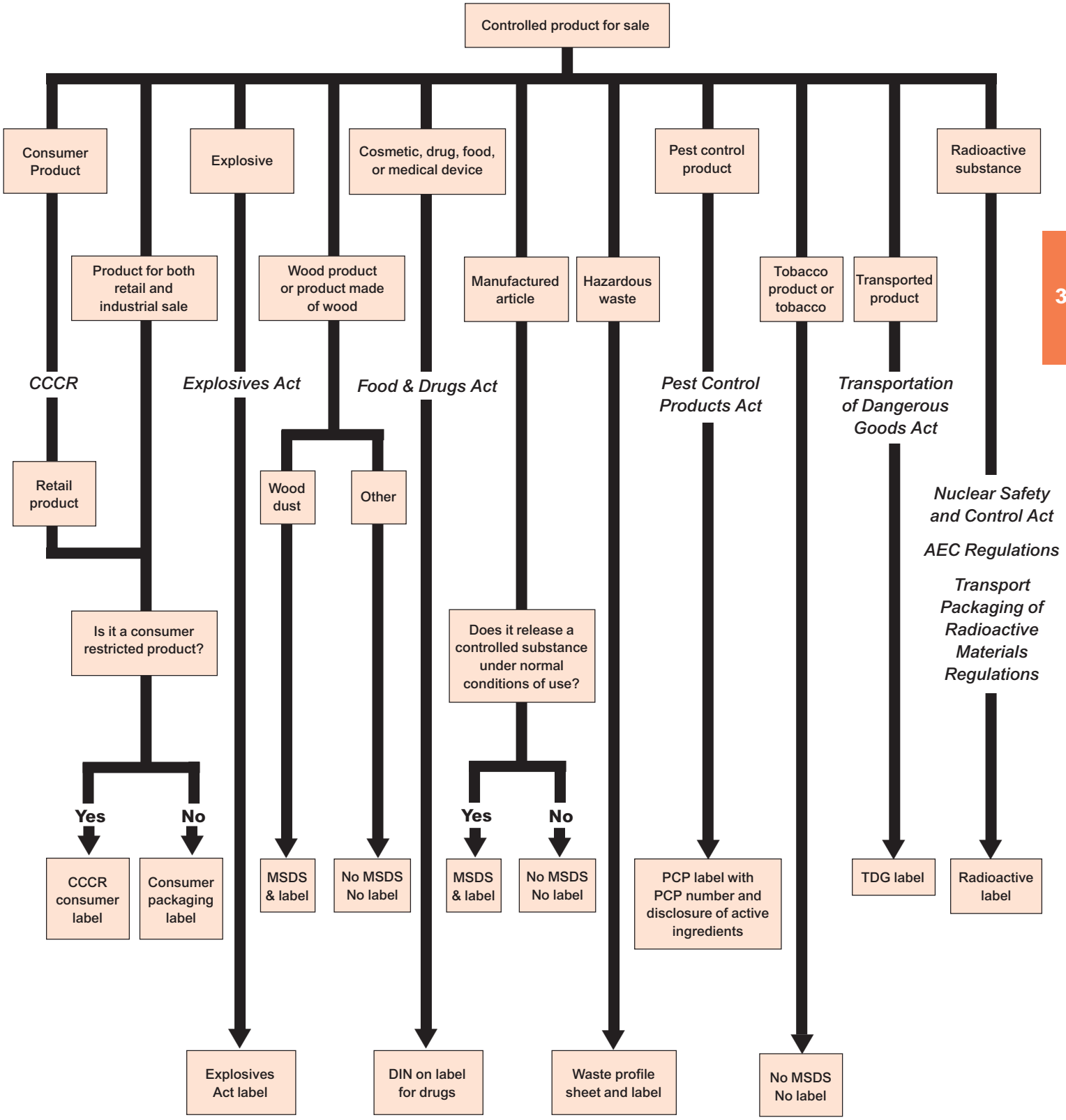
- Wood or products made of wood
- Manufactured articles
- Tobacco or products made of tobacco
- Hazardous wastes
- Transported products

The federal legislation establishing WHMIS, required that the matter of excluded (completely or partially exempt) products be reviewed by a committee of Parliament. This review, which led to proposed legislation called "WHMIS II," was completed in October 1990. However, passage of WHMIS II was dropped in May, 1993. Instead, a Globally Harmonized System has been proposed, for which no exemptions are being considered.

Presently, the exemptions provided for cosmetics, consumer restricted products, and controlled product carrier materials in radionuclides are being revised. In addition, the Pest Management Regulatory Agency (PMRA) may adopt WHMIS-equivalent requirements. These proposed changes will be consistent with global harmonization.

Further information on the Global Harmonization System can be found on Health Canada's website: www.hc-sc.gc.ca/ahc-asc/intactiv/ghs-sgh/index_e.html

Figure 3.1
Information Requirements for Exempt Products



3.2 Conditions of Exemption

3.2.1 Consumer Products

Supplier Exemption

A restricted product (that is, included in Part II of Schedule I of the *HPA*) that is "packaged as a consumer product" is exempted, under paragraph 12(*f*) of the *HPA,* from the WHMIS requirements for a supplier label and supplier MSDS. In such cases, the labelling and packaging requirements of the *CCCR* and the *Consumer Packaging and Labelling Act* and Regulations apply.

Many consumer products are likely to contain hazardous substances and may be used in the workplace.

To be considered packaged as a consumer product, the product must meet two conditions:

- It must be packaged, individually or in cases, for the consumer. This condition means that the product is packaged in the size and type of receptacle or package normally offered for sale and displayed to the consuming public.
- It must be available to the general public through retail systems, either at outlets or on a door-to-door basis.

Figure 3.2 outlines the decision-making process for determining whether consumer or WHMIS requirements apply.

Health Canada recently reviewed the *CCCR.* Instead of the current list of restricted products, the proposed *CCCR* 2000 is a criteria-based system that uses hazard criteria to classify each consumer chemical product and pressurized container. Hazard categories are Toxic, Corrosive, Flammable, Quick Skin-Bonding Adhesives and Pressurized Containers; these groups are further divided into subcategories of varying degree of hazard (for example, Toxic substances are categorized as very toxic, toxic, or harmful).

Employer Exemption

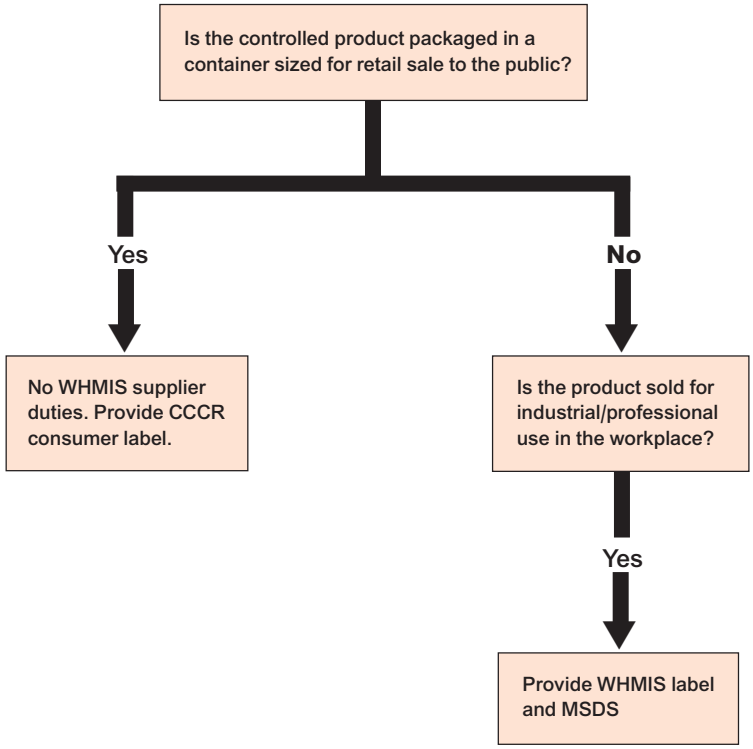
Model OSH requirements for MSDSs and supplier labels do not apply to the employer for products packaged as consumer products, in quantities normally used by the consuming public. However, the employer must provide workplace labelling on workplace containers into which consumer products are decanted, and workers must be instructed in the hazards of controlled products and proper procedures for their storage, handling, use, and disposal.

Quantities normally used by the consuming public will vary from product to product. For example, paint may normally be available to the consumer in quantities of up to five gallons (23 litres) while a nut-locking compound is found in much smaller quantities, 200 ml or less.

Employers who purchase such products on a consumer basis are encouraged to ask if MSDSs are available.

Requirements for labels on restricted products sold for consumer use are provided in Appendix 4A, "Federal Labelling Requirements in Canada - Other than WHMIS," in Chapter 4 of this Manual.

Figure 3.2
Supplier Decision Tree:
Consumer Versus WHMIS Information Requirements
(for Products Meeting Criteria for Inclusion in Classes A-F)



When a restricted product in a container available on a retail basis to the public is sold in the same container to an industrial account for workplace use, the consumer labelling and packaging required for sale to the public is sufficient. However, the supplier is encouraged to make an MSDS available upon request.

Alternatively, the supplier can separate product distribution into two streams: a retail stream with consumer labelling and packaging, and an industrial stream with WHMIS labelling and MSDS.

3.2.2 Explosives

Explosives are not subject to the federal WHMIS requirements for labels and MSDSs. The *Explosives Act* defines an explosive as:

Definition

Any substance that is made, manufactured, or used to produce an explosion or detonation or a pyrotechnic effect and includes gunpowder, propellant powders, blasting agents, dynamite, detonating cord, lead azide, detonators, ammunition, rockets, fireworks, safety flares, or other signals.

Explosives are distinct from substances such as ethers and furans, which may form explosive peroxides and picric acid, a chemical that may become explosive when dry. Such products are considered controlled products within Class F, Dangerously Reactive Material.

Labelling requirements for the manufacture and sale of explosives in Canada are described in Appendix 4A, "Federal Labelling Requirements in Canada - Other than WHMIS" in Chapter 4 of this Manual.

3.2.3 Cosmetics, Drugs, Foods, and Devices

Products containing controlled products are exempt from the WHMIS requirements for labels and MSDSs if the products are governed by the *Food and Drugs Act*. The Act defines these products as:

Cosmetic: Any substance or mixture of substances manufactured, sold, or represented for use in cleansing, improving, or altering the complexion, skin, hair, or teeth, and includes deodorants, perfumes, soaps, tattoo inks, and products used to groom animals.

A review of the *Cosmetic Regulations* of the *Food and Drugs Act* was undertaken in 1997. Proposed changes include ingredient disclosure on cosmetics packaging; an International Nomenclature for Cosmetic Ingredients; a comprehensive "Restricted List," based on the European List, to replace the current "Hot List" of cosmetic ingredients; and an Annual Registration (licensing) System to replace the current product notification system.

Drug: Includes any substance or mixture of substances manufactured, sold, or represented for use in:

- The diagnosis, treatment, mitigation, or prevention of a disease, disorder, abnormal physical state, or the symptoms thereof, in man or animal
- Restoring, correcting, or modifying organic functions in man or animal; or
- Disinfection in premises in which food is manufactured, prepared, or kept.

Device: Any article, instrument, apparatus, or contrivance...for use in the diagnosis, treatment...or prevention of a disease, restoring...body function, the diagnosis of pregnancy...or care...during pregnancy and at and after birth... [An example is a portable emergency oxygen inhalator].

Food: Any article...for use as food or drink for man, chewing gum, and any ingredient that may be mixed with food..."

Because carbon dioxide used in carbonated beverages and phosphoric acid used for pH control are considered ingredients in certain foods, these chemicals are exempt from WHMIS labels and MSDSs .

If a product ordinarily considered a food has a non-food use in the workplace, it is not exempted from WHMIS as a food product. For example, flour, which is a respiratory tract sensitizer, would fall within WHMIS Class D if sold and used as an additive to industrial filler.

Criteria: WHMIS vs. the *Food and Drugs Act*

Of the four types of products subject to the *Food and Drugs Act*, cosmetics and drugs are the most likely to contain controlled products. Three criteria help distinguish between products used in the cosmetic and drug industries that are subject to the *Food and Drugs Act* and those that must meet WHMIS supplier information requirements:

- All drugs are issued with *Drug Identification Numbers (DINs),* which must appear on the label. Health Canada maintains lists of drugs available in Canada and their ingredients in the publication *Canadian Drug Identification Code*. The Council of the Pharmaceutical Society of Great Britain summarizes the properties, actions, and uses of most drugs in clinical use throughout the world in the publication *Martindale, the Extra Pharmacopeia*.
- Cosmetics and drugs are defined in terms of being sold or represented for specific purposes. A controlled product sold as a drug or cosmetic would be subject to WHMIS supplier requirements if sold for a different use. For example, the chemical 2,4-diaminoanisole is excluded from WHMIS supplier requirements when sold in hair dye formulations, but is included when used as a fur dye.
- Cosmetics and drugs are usually products that are applied on or taken into the body. A hair dye is a cosmetic, but the formaldehyde solution used to disinfect a hairbrush is not.

  NOTE: The exception to this rule is the use of a drug for disinfection in premises in which food is manufactured, prepared, or kept. A disinfectant labelled for use in such locations and having a DIN number is a drug. (In addition, some disinfectants are excluded from WHMIS supplier requirements because they are either restricted products meant for consumer use (see Section 3.2.1) or pest control products (see Section 3.2.4).)

Labelling requirements for the supply of cosmetics and drugs in Canada are described in Appendix 4A, "Federal Labelling Requirements in Canada - Other than WHMIS," in Chapter 4 of this Manual.

3.2.4 Pest Control Products

Definition

Products used for pest control are exempt from WHMIS-legislated labels and MSDSs. Under the *Pest Control Products Act*, a pest is "any injurious, noxious, or troublesome insect, fungus, bacterial organism, virus, weed, rodent, or other plant or animal pest, and includes any injurious, noxious, or troublesome organic function of a plant or animal."

A pest control product is:

any product, device, organism, substance, or thing that is manufactured, represented, sold, or used as a means for directly or indirectly controlling, preventing, destroying, mitigating, attracting, or repelling any pest, and includes:

a) Any compound or substance that enhances or modifies or is intended to enhance or modify the physical or chemical characteristics of a control product to which it is added, and

b) Any active ingredient used for the manufacture of a control product.

Substances in category (a) include stickers, spreaders, adjuvants, and emulsifiers that are not primarily responsible for the controlling effect of the product, but enhance or modify that effect. Category (a) does not include products that do not alter effect ("non-active" ingredients), such as various solvents, diluents, and products intended to adjust pH. Examples of non-actives include asbestos, benzene, formaldehyde, free silica, lead compounds, toluene, and toluene diisocyanate.

Active ingredients in category (b) are the substances that cause the effect of the control product (for example, the insecticide parathion, the herbicide glyphosate, and the fungicide pentachlorophenol) and synergists such as piperonyl butoxide.

Pest control products are, like cosmetics and drugs, defined in terms of intended use. Any controlled product present in a pesticide, manufactured and intended for another use, is subject to all WHMIS information requirements. For example, Stoddard solvent is used as a herbicide but has a variety of other industrial applications as a solvent and cleaning agent. WHMIS label and data sheet requirements also apply to containers of "non-active" controlled products at pesticide manufacturing and formulation facilities prior to their inclusion in control products.

Pest control products require registration numbers unless exempted for any of the following reasons:

- The product is used for research
- The product is used for seed treatment
- The product is used for cleansing (for example, as a general disinfectant)

The Pest Management Regulatory Agency, Health Canada, administers the *Pest Control Regulations* and registration of pesticides. Labels required for the sale of pest control products in Canada are described in Appendix 4A, " Federal Labelling Requirements in Canada Other than WHMIS," in Chapter 4 of this Manual.

3.2.5 Radioactive Prescribed (Nuclear) Substances

WHMIS labels and MSDSs are not required for radioactive prescribed (nuclear) substances covered under the *Atomic Energy Control Act* (to be replaced by the *Nuclear Safety and Control Act)*. Under the *AEC Act,* a prescribed substance means:

Definition

Uranium, thorium, plutonium, neptunium, deuterium, their respective derivatives and compounds, and any other substances that the Atomic Energy Control Board may by regulation designate as being capable of releasing atomic energy or as being requisite for the production, use, or application of atomic energy.

Currently, the definition of a prescribed substance includes the whole product, including any non-radioactive carrier and accessories. Lists of radioactive substances pursuant to this definition are provided in the schedules to the *Atomic Energy Control Regulations* and the *Transport Packaging of Radioactive Materials Regulations*.

Under the new *Nuclear Safety and Control Act,* the definition of nuclear substance includes:

- Deuterium, thorium, uranium, or an element with an atomic number greater than 92
- Derivatives or compounds of deuterium, thorium, uranium, or elements with atomic numbers greater than 92
- A radioactive nuclide
- A substance prescribed by the Canadian Nuclear Safety Commission as capable of releasing nuclear energy, or required for the production or use of nuclear energy
- A radioactive byproduct of the development, production, or use of nuclear energy

A radioactive substance or thing used for the development or production of, or connected with the use of, nuclear energy.

Under this Act, nonradioactive, hazardous carrier materials in radioactive mixtures are no longer exempt from WHMIS. Proposed amendments to the *CPR* will require MSDSs and supplier labels for these carrier materials.

Appendix 4A, "Federal Labelling Requirements in Canada - Other than WHMIS," in Chapter 4 of this Manual provides a summary of labelling requirements pursuant to those regulations.

3.2.6 Wood or Products Made of Wood

Definition

Wood and products made of wood are exempt from all WHMIS requirements. Wood is composed of cellulose fibre, hemicellulose, lignin, and various sugars. Products are considered to be made of wood if they are composed entirely or in large measure of wood, but they need not be manufactured in the specific shape or design of their intended use. Examples include lumber of all sizes, laminated beams, plywood, chipboard, particleboard, wood chips, sawdust, and any such products that have been coated with paints or preservatives.

A product made from one or more chemical components of wood, but lacking the properties of wood, for example, pulp, paper (a manufactured article), turpentine, and tall oil, is not considered a product made of wood.

At facilities where specialized products made of wood are manufactured, additives such as adhesives, paints, and preservatives are subject to all applicable WHMIS information requirements prior to their addition to the finished product.

Wood dust

Wood dust that is sold or imported for use in Canadian workplaces and meets the criteria of a controlled product is not exempt. For example, wood dust from an allergenic species of tree or certain hardwoods such as beech and oak, which are classified as group A1 carcinogens by ACGIH, are subject to all applicable WHMIS requirements.

3.2.7 Manufactured Articles

Definition

A manufactured article, which is completely exempt from WHMIS regulations, is any article that all of these conditions:

- It is formed to a specific shape or design during manufacture
- Its intended use when in that form depends in whole or in part on its shape or design as manufactured
- It will not, under normal conditions of use, release or otherwise cause a person to be exposed to a controlled product

The following interpretations apply:

- *Shape, design,* and *form* refer to the external outline and contours of the product, rather than to the material of which it is made.
- *Normal conditions of use* means the normally expected conditions under which the product is employed for its intended purpose. *Normal conditions of use* excludes release of a controlled product that may occur during installation or maintenance or that occur if the article is abused.
- *To be exposed to a controlled product* means to be exposed to hazardous amounts of a controlled product present in the manufactured item, rather than to decomposition products or byproducts formed and released during the use of the product.

The manufactured article exemption does not apply if, during normal use, a controlled product in the manufactured article is released, in either an unaltered form or an *altered form that is also a controlled product* (for example, an oxide).

For an article that is not exempted because it releases a controlled product under normal conditions of use, the hazard information and ingredient disclosure requirements relate only to those ingredients that are both controlled products *and* that are released under normal conditions.

In addition, any hazardous decomposition and combustion products (of which the supplier is aware, or ought reasonably to be aware) that are released during normal use must be identified on the MSDS. The supplier is not expected to give toxicological data on probable releases that are not ingredients of the product.

If a supplier is uncertain if a controlled product releases hazardous chemicals under normal conditions of use (for example, the product is intended to be cut, melted, or heated), general warnings about possible toxic releases must be provided. (*CPR*, Section 12(11) requires that an MSDS include any other hazard information related to the controlled product of which the supplier is aware or ought reasonably to be aware.) See Chapter 5, "The Material Safety Data Sheet," for further information.

When Is an Article Considered a Manufactured Article?

- Welding rods *are not* manufactured articles. Although formed to a specific design, they release controlled products, previously contained in the rods, when used as intended.

  however:

  Precut, threaded piping *is* a manufactured article. Air contaminants are not released during its intended use of conveying fluids from one point to another.
- Sheets of friction materials containing asbestos and manufactured for users to cut or shape into specific friction products *are not* manufactured articles. Asbestos fibres may be released when the sheets are used.

  however:

  Specific friction products containing asbestos, such as vehicular brake shoes fitted with pre-arced linings, *are* manufactured articles. While workers may be exposed to asbestos fibres during installation or maintenance of these articles, exposure is not likely when used for braking, as intended. For the protection of workers, non-WHMIS right-to-know regulations must be used.
- A cylinder produced as a container for acetylene *is* a manufactured article.

  however:

  Once filled with acetylene, this gas cylinder becomes a container for a controlled product and, when sold as such, *is not* a manufactured article, and must be sold with labels and data sheets in conformity with WHMIS requirements.

Note: A refrigerator is considered a manufactured article, even though it also includes a system for containing compressed gases. Unlike the compressed gas cylinder, the refrigerator is not considered to be a container of a controlled product.

3.2.8 Tobacco or Products Made of Tobacco

Tobacco and products made of tobacco are completely exempt from WHMIS requirements and include cigarettes, cigars, chewing tobaccos, and snuffs. Requirements for the labelling of these products are found in the *Tobacco Products Control Act,* administered by Health Canada.

Chemicals derived from tobacco—nicotine, for example—are not considered to be products made of tobacco, and are not exempt from WHMIS.

3.2.9 Hazardous Wastes

Definition

Hazardous wastes are not subject to specific federal or provincial WHMIS requirements unless the hazardous waste is recycled/recovered for sale (testing may be needed to identify ingredients). A hazardous waste is defined in WHMIS as a "controlled product that is intended for disposal or is sold for recycling or recovery." Examples of wastes include various solid and liquid materials such as waste insulation in asbestos removal projects; the contents of tailing ponds or sewage systems; and products for recycling, such as used engine oils. A byproduct of a process, such as black liquor from the pulping process, that is recycled or otherwise used on-site is not a hazardous waste. A byproduct supplied to a party off-site for use as is (that is, not subjected to a conversion process such as recycling or recovery) is also not considered a hazardous waste.

The definition of a hazardous waste implies intent to manage or handle the product. In that sense, a hazardous waste differs from a fugitive emission, which is defined in the Model OSH Regulations as a "gas, liquid, solid, vapour, fume, mist, fog, or dust that escapes from process equipment, from emission control equipment, or from a product." Fugitive emissions include examples such as stack emissions, leaks from corroded process equipment, and the release of asbestos fibre from friable insulation.

While WHMIS legislation does not apply, under OSH Regulations, an employer must ensure that workers are instructed in safe disposal of a product and in procedures to be followed when fugitive emissions are present.

In addition, when hazardous wastes are produced on-site, the employer must take additional steps to ensure worker safety through a combination of any means of identifying the waste (such as placards, coded labels, or workplace labels) and worker education and training. For example, a barrel of used oil must be identified at the originating service station, but not at the oil recycling depot to which it is sent; an asbestos removal firm must identify the contents of containers of waste insulation at the asbestos removal site, while no identification is required at the hazardous waste disposal site receiving the asbestos waste. Completion of a Waste Profile Sheet (see Appendix 3A, "Sample Hazardous Waste Profile Sheet") is also recommended.

The identification of wastes during transport is subject to applicable TDG and provincial regulations, while identification and handling of wastes at waste disposal or recycling sites are governed by applicable environmental and health and safety regulations.

3.2.10 Products Handled or Transported under the *Transportation of Dangerous Goods Act*

TDG vs. WHMIS

While being transported or handled for transport, products are not subject to any WHMIS requirements but instead, to the *Transportation of Dangerous Goods Act*. TDG and WHMIS are complementary information systems. TDG covers information requirements on products in the course of shipment to or from workplaces, while WHMIS applies to products within workplaces. No overlap is intended; one system takes over where the other leaves off. Although WHMIS labels and MSDSs may be provided with shipments, WHMIS requirements formally apply only at the point of sale and in the workplace after the controlled product is received.

Because workers are most likely to be exposed to dangerous goods in transit during emergency, short-term circumstances such as vehicle accidents and spills, TDG requirements deal with acute exposure information and the use of symbol alerts on labels and placards.

In contrast, worker exposure to controlled products in the workplace can occur in a wider variety of circumstances and over longer periods of time. WHMIS requirements are more extensive than TDG, and include the use of explicit labels and MSDSs.

Definition

Dangerous goods defined under TDG legislation include any product, substance, or organism listed in Schedule 1 or 2 of the *TDG Regulations* or otherwise classified as dangerous goods when the criteria described in Part 2 of those regulations are applied.

TDG Act and Regulations

The TDG Act and Regulations apply to the handling, offering for transport, and transportation of dangerous goods except in the circumstances described in Part 1 of the *TDG Regulations*, for example:

- Goods under the sole direction of the Minister of National Defence
- Transport of oil or gas by pipeline where governed by appropriate federal or provincial legislation
- Transport of goods, other than explosives and radioactive substances, solely within the confines of the manufacturing or processing facility, if public access to the facility is controlled
- Bulk transport of goods within the meaning of the *Canada Shipping Act*

The following interpretations will help determine where TDG requirements apply:

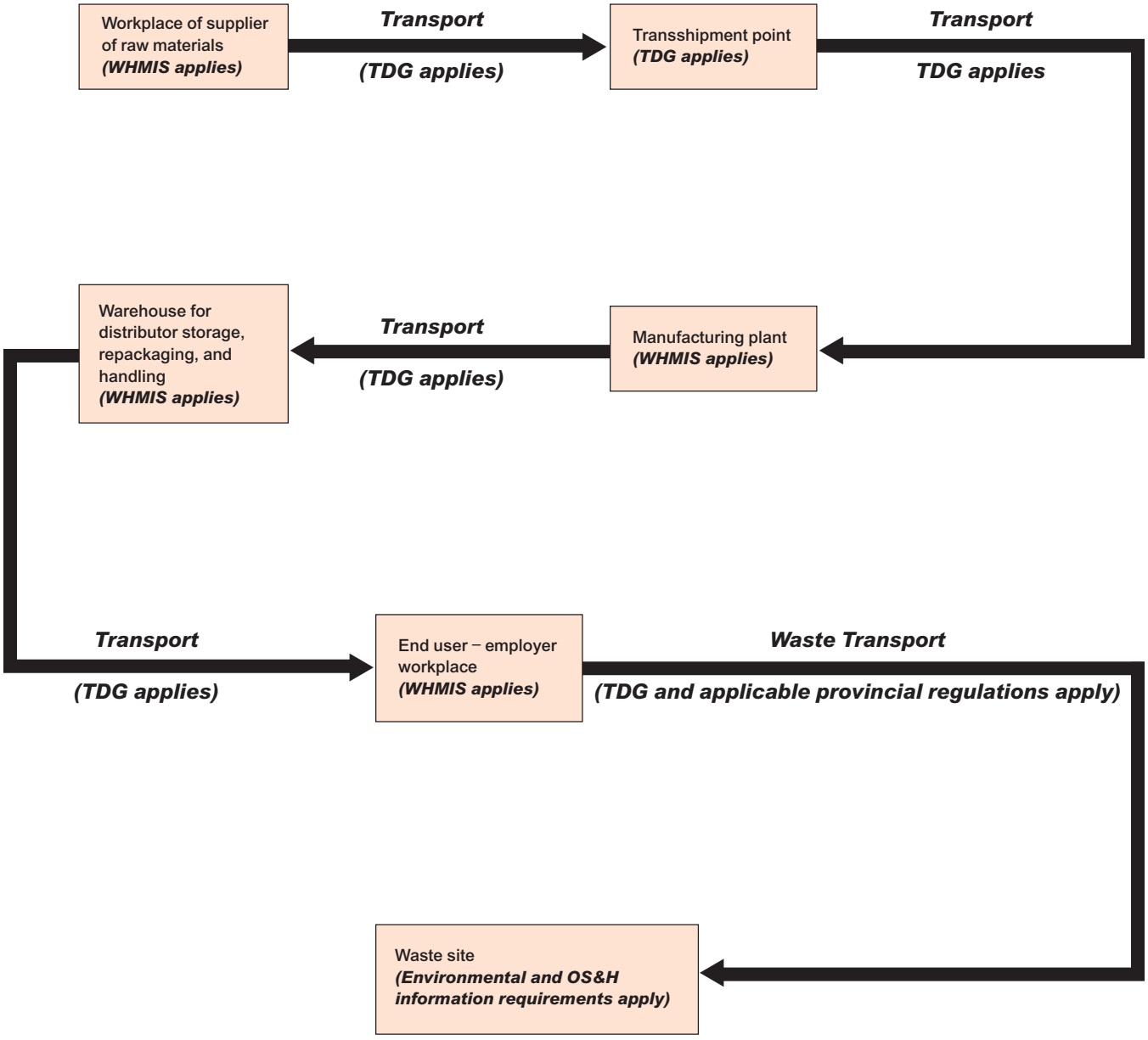
- *Handling and offering for transport.* Refers to activities such as packing, unpacking, storing, loading, and unloading for transport. For example, WHMIS does not apply to products in temporary storage in a distribution warehouse.
- *Storing for transport.* Refers to storage in which goods will not be handled at the workplace except to load goods directly onto a transport vehicle for removal from the workplace (in transshipment).
- *Transportation.* Generally means to and from workplaces. WHMIS applies to all circumstances where goods are transported from one point to another within a workplace, except for radioactive substances and explosives, in which case TDG applies.
- *Warehousing.* When warehoused, controlled products can be stored for transport, repackaged, used, processed, or sold. TDG applies only to products stored for transport. WHMIS applies when products in a warehouse are handled (that is, repackaged, used, processed, or sold).

The exemption for products being transported means that an employer does not have to provide WHMIS labels, MSDSs, or education and training to drivers of vehicles transporting controlled products. However, if the driver is exposed to the controlled product by being actively involved in loading or unloading the product (for example, the driver of an oil or gasoline truck), the driver should have access to the MSDS at the point of loading or unloading and should undergo training as outlined in Chapter 6, "Worker Education and Training."

Figure 3.3 outlines how WHMIS and TDG information requirements generally apply to the flow of goods through commerce. Although not shown in Figure 3.3, WHMIS labels will, subject to exemptions (for example, bulk shipment, outer containers if inner containers bear a WHMIS symbol), also be applied to containers of controlled products between the points of product supply and use (where TDG applies). These WHMIS labels are intended for use at the points of sale or use rather than during shipment.

Amendments to the *TDG Act* were enacted in 1992. A review of the *TDG Regulations* also resulted in revisions, which were proposed in clear language and published in the *Canada Gazette* (Part I) on August 7, 1999.

Figure 3.3
The Application of WHMIS and TDG Information Requirements as Goods Flow through Commerce



Appendix 3A
Sample Hazardous Waste Profile Sheet (WPS)

Example of a WPS

WPS No. _____ **Hazardous Waste Profile Sheet (WPS)** Manifest No. _____

Name of Waste Stream and/or Waste Class No.:

_____

Waste Management Company: _____ Provincial Licence No._____

Address: _____

Telephone #: ( ) _____

Fax #: ( ) _____

Date of Collection (dd/mm/yy): _____

SECTION 1: GENERATOR INFORMATION

Generator Name: _____

Address: _____

_____

_____

Telephone #:( )_____

Fax #: ( )_____

Provincial Generator Registration No. _____

Waste Stream Info:

Quantity: _____

Frequency: _____

Container: _____

For Office Use Only

Approved: _____

Approved by: _____

Process code: _____

WPS Prepared by:_____

SECTION 2: HAZARD CLASSIFICATION

1. WHMIS Class(es): Please Check:

☐ Class A
☐ Class B1 ☐ B2 ☐ B3 ☐ B4 ☐ B5 ☐ B6
☐ Class C
☐ Class D1 ☐ D2
☐ Class D3
☐ Class E
☐ Class F

2. TDG Information:

PIN: _____

TDG Class: _____

Packing Group: _____

Type of Packing Group: _____

Shipping Name: _____

_____

3. Other Hazard Information:

	Y	N
a. Ozone Depleting?	☐	☐
b. Scrap Metal?	☐	☐
c. Radioactive?	☐	☐
d. Rocks > 15mm	☐	☐
e. Concrete debris > 15mm	☐	☐

SECTION 3: CHEMICAL COMPOSITION OF WASTE

1. Ingredients	%	LD_{50} (specify species and route)	LC_{50} (specify species)
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
Total:	_____		

2. Metals (ppm) ☐ Total ☐ Leachable

☐ Arsenic ☐ Mercury
☐ Barium ☐ Nickel
☐ Cadmium ☐ Selenium
☐ Chromium ☐ Silver
☐ Cobalt ☐ Thallium
☐ Copper ☐ Vanadium
☐ Lead ☐ Zinc

3. ☐ No Metals

LD_{50} for Mixture (if available): _____ LC_{50} for Mixture (if available): _____

4. Other Components (specifically identify): ☐ PCBs_____ ☐Cyanides_____

☐ Sulfides_____ ☐ Pesticides_____ ☐ Phenolics_____

☐ Dioxins_____ ☐ Furans_____ ☐ Halogens_____

SECTION 4: PHYSICAL CHARACTERISTICS OF WASTE

Colour: _____

Evaporation Rate: _____
pH: _____
Odour Threshold: _____
Boiling Point: _____
Specific Gravity: _____
Density: _____
Heat Content: _____

Physical State	%
☐ Liquid	___
☐ Solid	___
☐ Gas	___
☐ Aerosol	___
☐ Powder	___
☐ Sludge	___
☐ Lab-pack	___

Other Properties of a Liquid, Paste or Sludge

Layers	Viscosity	Free Liquids
☐ Single Phase	☐ Low	☐ Yes
☐ Bi-layered	☐ Medium	☐ No
☐ Multi-layered	☐ High	☐ Volume _____%

SECTION 5: FIRE/EXPLOSION/REACTIVITY DATA

1. Flammability Data

	Y	N
Flammable?	☐	☐

If yes, under what conditions? _____
Means of Extinction: _____
Flash Point Estimate: (specify exact f.p. if known):_____

☐ < 23°C ☐ 61 - 93°C
☐ 23 - 60°C ☐ > 93°C

Upper flammable limit: _____
Lower flammable limit: _____

2. Reactivity Data

	Y	N
Chemically stable?	☐	☐

Incompatible Substances: _____

Reactivity Conditions:_____

SECTION 6: HEALTH HAZARDS/ TOXICOLOGICAL PROPERTIES

Routes of Entry: ☐ Skin Contact ☐ Skin Absorption ☐ Eye Contact ☐ Inhalation ☐ Ingestion
Effects of Acute Exposure: _____

Effects of Chronic Exposure: _____

☐ Irritant ☐ Carcinogen ☐ Teratogen Occupational Exposure Limits:
☐ Sensitizer ☐ Reproductive Toxin ☐ Mutagen

SECTION 7: PREVENTATIVE MEASURES

Specific Protective Equipment:
Respirator: _____ Clothing: _____
Eyewear: _____ Other: _____
Gloves: _____
Safe Handling Procedures & Equipment: _____
Storage Requirements: _____

SECTION 8: FIRST AID MEASURES

Specific Measures for:
Eye Contact: _____
Skin Contact: _____
Inhalation: _____
Ingestion: _____

SECTION 9: GENERATOR CERTIFICATION STATEMENT

I hereby certify that all information submitted in this and all attached documents is complete and accurate to the best of my knowledge and all known or suspected hazards have been disclosed. Also, I certify that the materials tested are representative of all materials described on this waste profile sheet.

Generator's Authorized Signature: _____ Date: _____

SECTION 10: ADDITIONAL INFORMATION

	Y	N	
Additional Pages Attached:	☐	☐	If yes, how many _____
MSDS Attached:	☐	☐	If yes, how many _____

Comments: _____
Note: N/AV = Not Available N/AP = Not Applicable N/E= Not Established

Exemple de FRD

FRD No. _____

Fiche du résidu dangereux (FRD)

Manifeste No. _____

Nom du flux de résidus et (ou) no. du type du résidu : _____
Compagnie de gestion de résidus : _____ Permis provincial no. _____
Adresse : _____
No. de téléphone : ( )_____
No. de télécopieur : ( )_____
Date de collecte (aa-mm-jj) : _____

SECTION 1: RENSEIGNEMENTS SUR LE PRODUCTEUR

Nom du producteur: _____
Adresse: _____
_____
_____
No. de téléphone: ( )_____
No. de télécopieur: ( )_____
No. d'enregistrement provincial du producteur _____

Renseignements sur le flux de résidus :
Quantité : _____
Fréquence : _____
Contenant : _____

À l'usage du bureau seulement
Approuvé : _____
Approuvé par : _____
Code de processus : _____

FRD préparée par: _____

SECTION 2: CLASSIFICATION DES DANGERS

1. Catégorie(s) du SIMDUT : Veuillez cocher :
☐ Catégorie A
☐ Catégorie B1 ☐ B2 ☐ B3 ☐ B4 ☐ B5 ☐ B6
☐ Catégorie C
☐ Catégorie D1 ☐ D2
☐ Catégorie D3
☐ Catégorie E
☐ Catégorie F

2. Renseignements TMD :
NIP : _____
Classe TMD : _____
Groupe d'emballage : _____
Type de groupe d'emballage : _____

Appellation réglementaire :
_____
_____

3. Autres renseignements sur les dangers :

	O	N
a. Appauvrit la couche d'ozone?	☐	☐
b. Ferraille?	☐	☐
c. Radioactif?	☐	☐
d. Roches > 15mm	☐	☐
e. Débris de ciment > 15mm	☐	☐

SECTION 3: COMPOSITION CHIMIQUE DU RÉSIDU

1. Ingrédients	%	DL_{50} (spécifiez espèce et voie d'administration)	CL_{50} (spécifiez l'espèce)
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
Total :	_____		

2. Métaux (ppm) ☐ Total ☐ Lixiviable
☐ Argent ☐ Mercure
☐ Arsenic ☐ Nickel
☐ Baryum ☐ Plomb
☐ Cadmium ☐ Sélénium
☐ Chrome ☐ Thallium
☐ Cobalt ☐ Vanadium
☐ Cuivre ☐ Zinc

3. ☐ Aucun métal

DL_{50} pour le mélange (si disponible) : _____ CL_{50} pour le mélange (si disponible) : _____

4. Autres composants (identifiez spécifiquement) : ☐ BPCs_____ ☐ Cyanures_____
☐ Sulfures_____ ☐ Pesticides_____ ☐ Phénols_____
☐ Dioxines_____ ☐ Furannes_____ ☐ Halogènes_____

SECTION 4: CARACTÉRISTIQUES PHYSIQUES DU RÉSIDU

Couleur : _____

		Apparence	%	Couches	État physique Viscosité	Liquides libres
Taux d'évaporation :	_____	☐ Liquide	___	☐ Une	☐ Basse	☐ Oui
pH :	_____	☐ Solide	___	☐ Deux	☐ Moyenne	☐ Non
Seuil de l'odeur :	_____	☐ Gaz	___	☐ Plusieurs	☐ Élevée	☐ Volume _____%
Point d'ébullition :	_____	☐ Aérosol	___			
Poids spécifique :	_____	☐ Poudre	___			
Densité :	_____	☐ Boue	___			
Enthalpie :	_____	☐ «Labpack»	___			

SECTION 5: DONNÉES SUR LES DANGERS D'INCENDIE, D'EXPLOSION OU DE RÉACTION

1. Inflammabilité

	O	N
Inflammable?	☐	☐

Si oui, conditions d'inflammabilité _____
Moyens d'extinction : _____
Estimation du point d'éclair : (p. d'é. exact si connu) : _____

☐ < 23°C ☐ 61 - 93°C
☐ 23 - 60°C ☐ > 93°C

Seuil maximal d'inflammabilité _____
Seuil minimal d'inflammabilité _____

2. Réactivité

	O	N
Chimiquement stable?	☐	☐

Substances incompatibles : _____

Conditions de réactivité : _____

SECTION 6: DANGERS POUR LA SANTÉ / PROPRIÉTÉS TOXICOLOGIQUES

Voies d'administration : ☐ Contact avec la peau ☐ Absorption par la peau ☐ Contact oculaire ☐ Inhalation ☐ Ingestion
Effets de l'exposition aiguë : _____

Effets de l'exposition chronique : _____

☐ Irritant ☐ Cancérogène ☐ Tératogène Limites d'exposition au travail :
☐ Sensibilisant ☐ Agent toxique pour la reproduction ☐ Mutagène

SECTION 7: MESURES PRÉVENTIVES

Matériel de protection spécifique :
Respirateur : _____ Vêtements : _____
Lunettes : _____ Autre : _____
Gants : _____
Méthode et équipement pour la manutention : _____
Exigences en matière d'entreposage : _____

SECTION 8: PREMIERS SOINS

Premiers soins particuliers à administrer en cas de :
Contact oculaire : _____
Contact avec la peau : _____
Inhalation: _____
Ingestion: _____

SECTION 9: ATTESTATION DU PRODUCTEUR

J'atteste par la présente qu'à ma connaissance tous les renseignements inclus dans ce document et dans les pièces jointes sont complets et exacts et que tous les dangers connus ou soupçonnés ont été divulgués. J'atteste également que les matières mises à l'essai sont caractéristiques de toutes les matières décrites dans cette fiche du résidu dangereux.

Signature autorisée du producteur : _____ Date: _____

SECTION 10: RENSEIGNEMENTS SUPPLÉMENTAIRES

	O	N	
Pages additionnelles jointes :	☐	☐	Si oui, combien _____
Fiche signalétique jointe :	☐	☐	Si oui, combien _____

Commentaires : _____
Note: N. d. = Non disponible S. o. = Sans objet

CHAPTER 4

The Label

GUIDE TO CHAPTER 4

APPENDICES

4.1 Introduction

4.1.1 What Is a WHMIS Label?

Definition

A WHMIS label is a source of information, on a controlled product. The WHMIS label is designed to alert employers and workers, in an easily understood way, to the hazards of the product and the precautions to be taken with it.

A label may be a mark, sign, stamp, device, seal, sticker, ticket, tag, or wrapper and must be attached to, or imprinted, stencilled, or embossed on the controlled product or its container.

The label is one element of the WHMIS information delivery system, and directs people to the second element of the system, the MSDS, for more detailed information. The third element is the education and training of workers on the hazards and safe handling of controlled products, including instruction on the content of the product label, its meaning, and significance.

WHMIS prescribes requirements for the design and use of labels on controlled products, from their initial importation, production, or distribution through to their receipt and use in the workplace. However, WHMIS is only one of a number of label systems mandated by federal legislation. WHMIS labels must be developed and used in a manner that minimizes the likelihood of conflict with labelling requirements under TDG. Information on other federal legislation, under which labelling requirements have been established, is provided in Appendix 4A of this Chapter.

4.1.2 The Supplier Label, Workplace Label, and Other Means of Identification

Two types of labels are prescribed under WHMIS legislation: the supplier label, intended for use with controlled products that will be distributed to workplaces in Canada, and the workplace label, which would be used in some circumstances during the storage, handling, use, and disposal of controlled products in the workplace. Legislation also provides for means of identification other than workplace labels in specific situations where WHMIS and workplace labels would be impractical or unnecessary to ensure worker health and safety.

The Supplier Label

Definition

A supplier label is the label provided, as a condition of sale, by the supplier of a controlled product. A supplier is a person who manufactures, processes, or packages a controlled product or a person who imports or sells controlled products.

The supplier label must meet requirements on hazard symbols, information categories and label design, format and language. Flexibility is provided in the choice of wording within categories and in label format.

Use and requirements

The supplier is responsible for applying the supplier label to the controlled product unless, under permitted circumstances, the purchaser assumes that responsibility.

Requirements for the availability and design of supplier labels are set out in Part II of the *HPA* and the associated *CPR*. Regulation under the *Canada Labour Code* and in the occupational health and safety legislation of the provinces and territories prescribe requirements for the use of supplier labels in the workplace and the instruction of workers in the label system.

The Workplace Label

An employer must provide workplace labels for containers when:

- Controlled products are produced and used in the workplace
- Controlled products from a supplier are transferred to other containers in the workplace
- Supplier labels are lost, defaced, or illegible

Workplace labels must include information on product identity and safe handling. However, considerable flexibility is permitted for label wording and format.

Requirements for workplace labels are found in regulations under the *Canada Labour Code* and provincial and territorial occupational health and safety legislation.

Other Means of Identification

Using other means of identification

Workplace labels are not required with some portable containers, with transfer or conveyance systems, and process or reaction vessels. However, in such cases, other means of identification must be used (warning signs, number or colour codes, piping diagrams, for example) in combination with worker education to ensure that workers are informed of hazardous contents.

4.2 Responsibilities for Labels

The supplier, employer, and worker each have responsibilities that must be met to ensure the proper implementation of the WHMIS labelling system.

4.2.1 The Supplier

Supplier responsibilities

The supplier must fulfill these responsibilities:

- Develop or obtain supplier labels for all controlled products manufactured, processed, packaged, imported, or sold by the supplier.

Labelling exemptions:

- Apply appropriate supplier labels to controlled products and all containers of controlled products, except in the circumstances outlined below:

exported products

- *The product is in a container or form intended solely for export.* In this case, the supplier must apply a workplace label or post a placard as per Model OSH Regulations.

bulk shipments

- *The shipment is in bulk*. The supplier is exempted from the requirement to apply labels to bulk shipments when WHMIS label information is sent to the purchaser in one of three forms: on a WHMIS supplier label, on an MSDS, or in a written statement. If the purchaser is an employer, the responsibility for applying a label becomes the employer's.

  For the first-time sale of a bulk shipment, the supplier must transmit the label information to the purchaser on or before the date the shipment is received. Label information may accompany shipping documents. For subsequent bulk shipments of the same product, the supplier is exempt from sending further information if the purchaser already possesses complete, valid label information.

  If information is transmitted on an MSDS or written statement, label information should be set apart and easily distinguished from other information on the MSDS. Hazard symbols must be provided or reference made to the WHMIS Class (and in the case of Class D, the Division as well), to permit the purchaser to determine the appropriate WHMIS hazard symbol(s).

imported products

- *The product is imported for labelling or repacking*. The importer is exempt from the requirement to label the package of the imported product before its use or sale if the importer provides information and, if requested, a sample of the product to an inspector in each province where the product is imported. One item of required information is a description of the "nature" of the controlled product, meaning a product identifier and general description of the type of product (for example, acid, base, biological hazard, flammable gas, organic solvent).

  CPR 23

  If a controlled product is imported under this exemption, it must be brought into compliance with WHMIS label requirements before being used or sold in Canada. Either the importer or, if the importer imports a product directly to a third party, the third party must apply the WHMIS label. However, the importer is relieved of responsibility only if the third party assumes that responsibility in writing.

multi-container shipment

- *A controlled product is distributed in multi-container shipments* (that is, with inner and outer containers). In this case, the supplier does not have to apply a label to any of:
  - An inner container if the outer container bears a WHMIS supplier label, and the supplier has received a *written* commitment from the purchaser to apply supplier labels to the inner container
  - A package liner (an inner container normally kept in the outer container during product storage and use, for example, a plastic bag used to contain powder in a box) of the controlled product
  - The outer container, if the WHMIS label on an inner container is visible and legible through the outer container under normal conditions of storage and handling (for example, inner containers shrink-wrapped in clear plastic)
  - The outer container, if the outer container has a label applied to it in accordance with *TDG Regulations*. (Note: The inner container(s) in this case must each bear a WHMIS supplier label.)

Supplier responsibilities for developing and applying labels are summarized in the Decision Tree shown in Figure 4.1. (Note: Four different types of supplier labels are prescribed by the *CPR*, for products from a laboratory supply house, laboratory samples, and products in certain ranges of weight and volume.) See Part 4.3.1 of this Chapter for detailed information on supplier label content, design, and application.

Note: An employer importing a controlled product for his/her own use is considered to be a supplier.

4.2.2 The Employer

The employer must fulfill these responsibilities:

Education and training

- Ensure that all workers who work with or in proximity to controlled products are instructed in the content, purpose, and significance of supplier and workplace labels and other identifiers. Instruction will also ensure that workers know the procedures for safe use, storage, handling, and disposal of controlled products, including procedures to be followed when fugitive emissions are present or an emergency involving a controlled product arises. (See Chapter 6, "Worker Education and Training," of this Manual.)

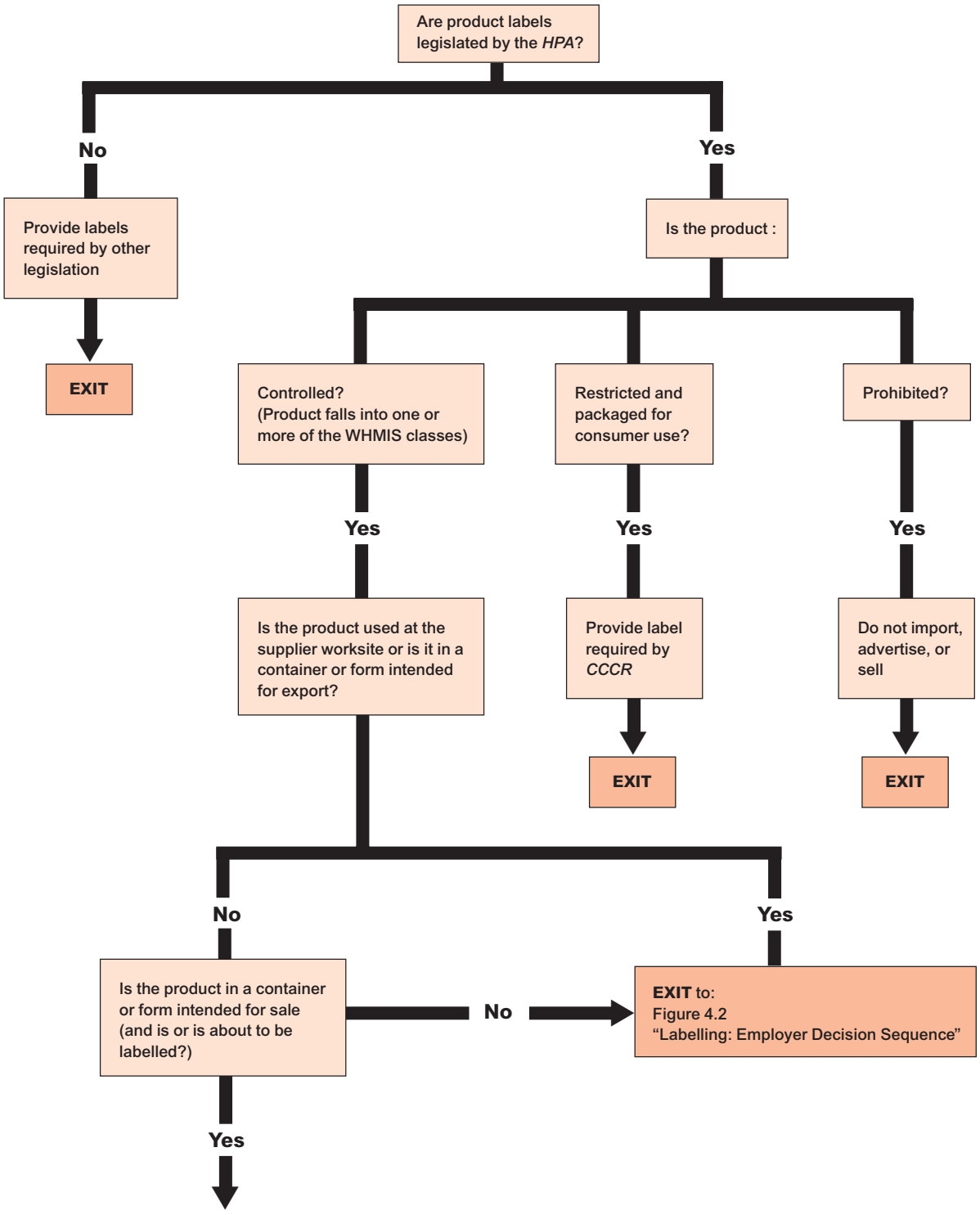
Supplier labels

- Ensure that a controlled product or its container has a proper label applied at the time of entry into the workplace. The employer must affix the *supplier label* to:
  - Inner containers of a multi-container shipment if the employer has agreed in writing with the supplier to apply labels to inner containers
  - Imported products if the employer has imported the product for use at the employer's worksite
  - Bulk shipments, unless, pursuant to Section 15 of the *CPR*, the supplier provides an MSDS or a statement of label information instead of a supplier label for a controlled product, in which case the employer may affix a workplace label
- Ensure that no controlled product is handled in the workplace unless the proper label has been applied. If a controlled product is received without a proper label from a supplier, the employer may store the product only, while *actively seeking* supplier label information.
- Take measures through worker education, for example, to ensure that *supplier labels* are not removed, defaced, or altered in the workplace.

Workplace labels

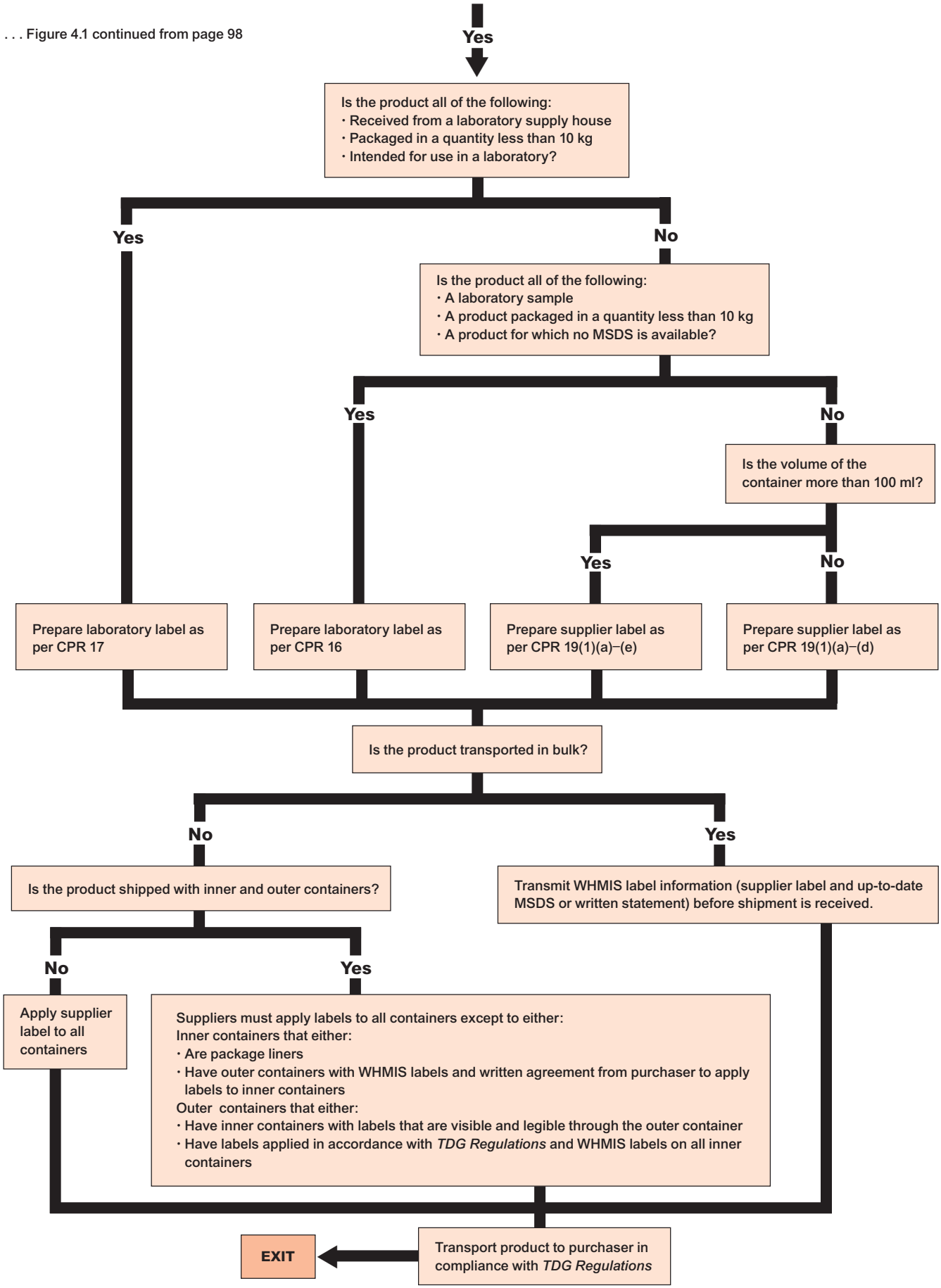
- Develop and apply *workplace labels* to controlled products or their containers if:
  - The employer produces a controlled product in the workplace—except where the product is a hazardous waste or fugitive emission; is an intermediary in a reaction; is produced in a laboratory solely for research and development in the laboratory; is in a container or form intended solely for export; or is in a container intended for sale or disposition and is or is about to be (generally within one work shift) appropriately labelled
  - An existing supplier label becomes illegible or is accidentally removed and a replacement supplier label is not available

Figure 4.1
Labelling: Supplier Decision Sequence



. . . Figure 4.1 continued on next page

. . . Figure 4.1 continued from page 98



- A controlled product is transferred to another container (including a storage tank) unless:
  - The new container is to be used only in a laboratory
  - The container is portable, clearly marked with its contents, filled directly from a labelled container, and is either required for immediate use or controlled solely by the employee who filled it and used only by that employee during the shift in which it was filled
- In the case of a bulk shipment, the supplier does not provide a supplier label pursuant to Section 15 of the *CPR*.

Other means of identification

- Provide *other means (modes) of identification* (not necessarily workplace labels) that clearly identify contents, for any controlled product that is:
  - A hazardous waste (other than a fugitive emission) produced in the workplace
  - A substance contained in a transfer or reaction system such as a pipe or piping system, process or reaction vessel, tank car or tank truck, ore car, conveyor belt or similar conveyance
  - A substance transferred to a new container that is either:
    - Used only in a laboratory
    - Filled directly from a labelled container, is portable, and is under the control of the employee who filled it and used only by that employee during the shift in which it was filled (products required for immediate use)
  - A mixture or substance undergoing analysis, test, or evaluation in a laboratory (including products produced by a laboratory for research and development work in the same laboratory)
- Provide and post a *placard*, which need not be a label, that discloses the information required for a workplace label and is sized and placed so that the placard information is conspicuous and clearly legible to workers when a controlled product is:
  - Not in a container
  - In a container or form intended for export
  - In a container intended for sale, to be labelled without undue delay at a later time (generally, longer than one work shift) in the normal course of the employer's business

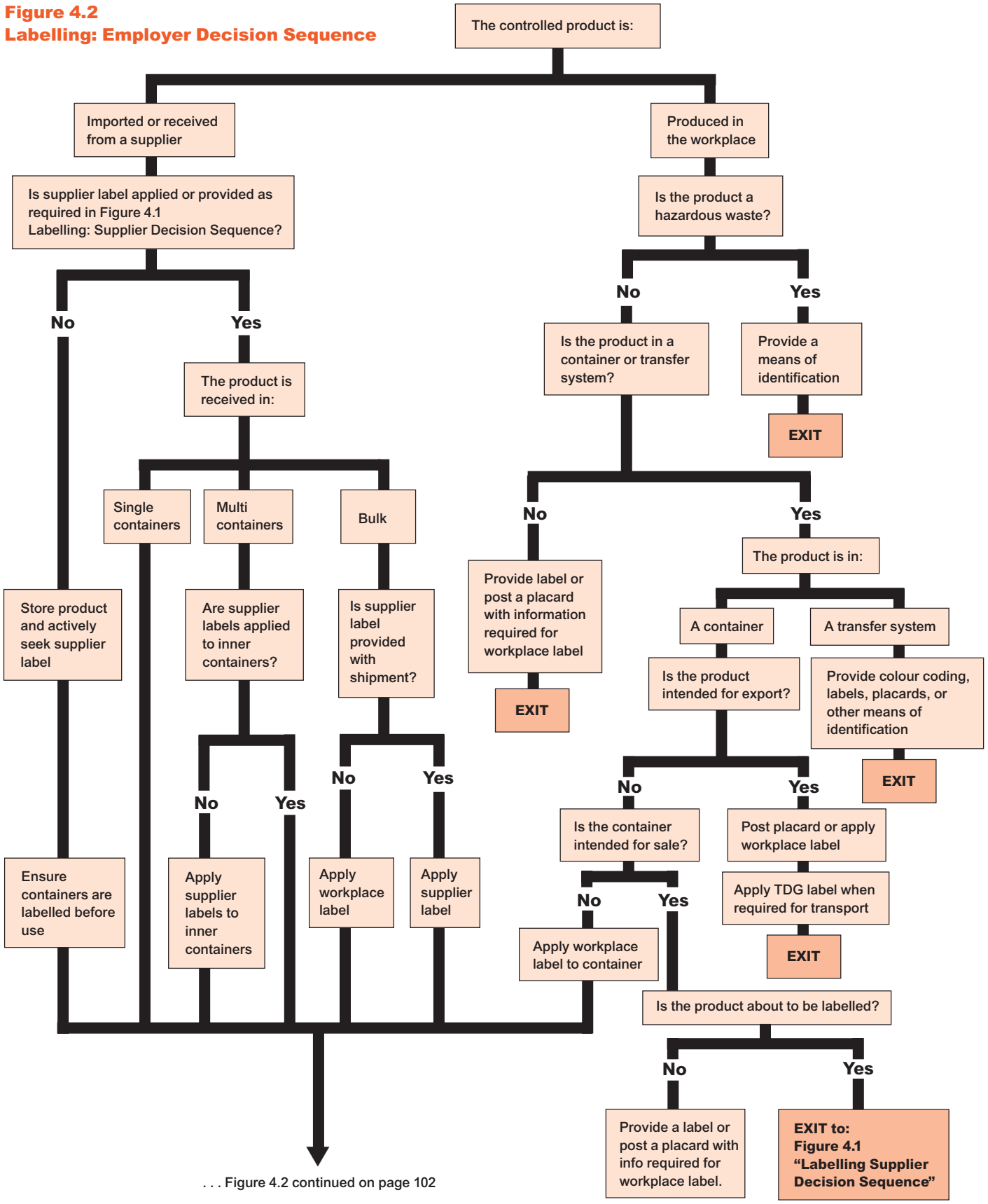
Employer responsibilities for developing and applying labels or other means of identification are summarized in the Decision Tree in Figure 4.2. Parts 4.3.2 and 4.3.3 of this Chapter detail the content, design, and application of workplace labels and other means of identification.

4.2.3 The Worker

The Worker must fulfill these responsibilities:

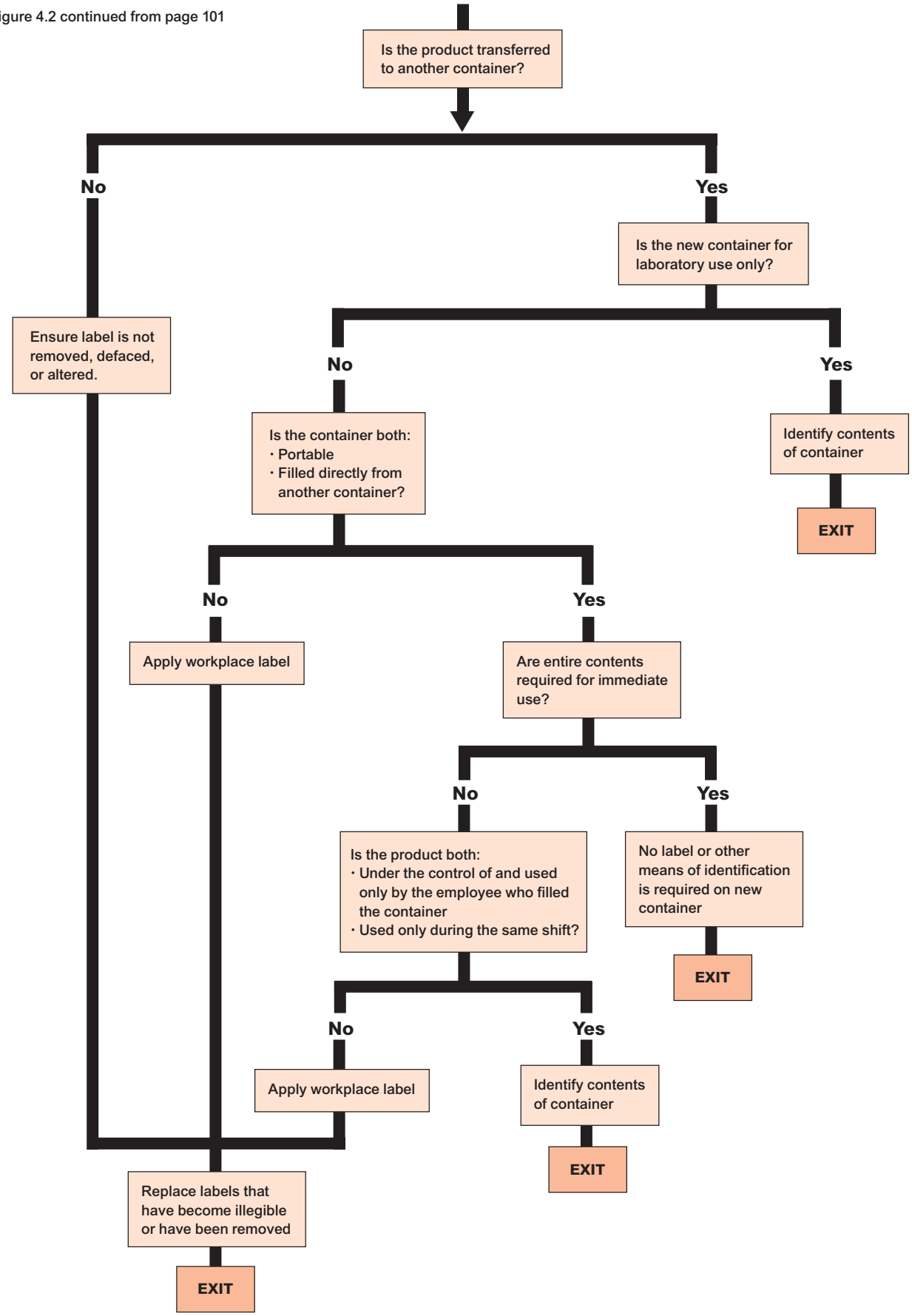
- Know and understand:
  - The content required on supplier labels and workplace labels, including the requirement for information on the availability of an MSDS
  - The significance of information on labels and other means of identification to worker health and safety
  - The procedures that are indicated by information on these labels for the safe use, storage, handling, and disposal of controlled products as well as the procedures to be followed if fugitive emissions are present or an emergency involving a controlled product arises.
- Handle controlled products in accordance with label and identifier alerts
- Follow employer directives to avoid removing, defacing, or altering labels
- Inform employers of illegible or missing labels and other means of identification.

Figure 4.2
Labelling: Employer Decision Sequence



. . . Figure 4.2 continued on page 102

. . . Figure 4.2 continued from page 101



4.3 Label Content, Design, and Location

Requirements for the content and design of labels on controlled products vary depending on:

- The type of label (supplier or workplace label)
- The volume of the container if the product is provided by a supplier
- The weight of the product if the product is meant for laboratory use

The most significant differences in label content and format are those between supplier and workplace labels. Requirements for supplier labels are more stringent than those for workplace labels in that:

- A greater number of content areas must be addressed
- Hazard symbols must be displayed
- A prescribed border must surround the label
- Required information must be disclosed in both official languages

4.3.1 Supplier Labels

In this section, the categories of information that must appear on different types of supplier labels are explained, including details of the information that must appear in each category. The design, colour, application, and revision of the label are also examined.

Content Categories Required on Supplier Labels

Required content

Most WHMIS supplier labels found in commerce display seven categories of information: the product identifier, supplier identifier, a reference to the MSDS, hazard symbols, risk phrases, precautionary measures, and first aid measures.

Different supplier labels

However, some products from laboratory supply houses, laboratory samples, and other products sold in very small containers may be permitted to display labels with fewer categories.

Figure 4.3 lists the circumstances under which different types of supplier labels are permitted and the categories of information required for each type. Figure 4.4 summarizes WHMIS Labelling requirements.

The following points apply for the different types of supplier labels:

Products from Laboratory Supply Houses

Lab products: exemptions

- Products from a laboratory supply house packaged in quantities of less than 10 kg and intended for use in a laboratory are excluded from requirements to display on the supplier label a distinctive WHMIS border, a supplier identifier, and hazard symbols as set out in Schedule II of the *CPR*. **NOTE**: If an MSDS is not available, the label must disclose the required information normally found on the MSDS.
- A *laboratory* is a place devoted to either experimental study in any branch of natural science or the application of scientific principles in testing and analysis. A laboratory includes non-traditional settings such as field testing locations with or without temporary enclosures, production line testing stations, and similar settings.
- A *laboratory supply house* is an organization that supplies products to laboratories.
- The intention that a product be used in a laboratory can be established with a statement on the label, for example, "Intended for Laboratory Use Only." Four grades of chemical are normally produced by laboratory supply houses, and are termed technical, reagent, ACS (American Chemical Society), or analytical grade. Products intended for laboratory use and displaying the modified laboratory supply house label are not to be used outside laboratories.
- The *CPR* does not prohibit a laboratory supply house from providing more than the minimum of information categories shown in Figure 4.3.

Laboratory Samples

Lab samples: definition and exemption

- A *laboratory sample* is a sample of a controlled product intended solely for analysis or research and development in a laboratory, but does not include any sample of a controlled product that is to be used:
  - By the laboratory for testing other products, materials, or substances
  - For educational or demonstration purposes
  - For marketing purposes

  Note: To minimize the likelihood that such a sample would be used inadvertently outside the laboratory, the label for a laboratory sample intended for use in research and development should include the statement:

  Research and Development Sample. For Laboratory Use Only.

  Echantillon pour Recherche et Developpement. Pour Utiliser Seulement Dans un Laboratoire.
- A laboratory sample of a controlled product packaged in a container of less than 10 kilograms, for which an MSDS has not been obtained or prepared, is exempt from requirements to display hazard symbols, risk phrases, and precautionary and first aid statements if other statements and an emergency telephone number are provided as shown in Figure 4.3.
- A laboratory sample must be "of a controlled product," for example, bulk samples taken directly from a solid or liquid controlled product or drawn as a gas into a sample cylinder from a pressurized line.

Lab test samples

- In some cases, samples intended for lab testing will not be subject to WHMIS supplier information requirements, such as:
  - Air samples of decomposition products, oxidized by-products or other altered forms of the controlled product
  - Soil and water samples of unknown composition
  - Samples of poisonous materials that are unlikely to contain a controlled product in a concentration meeting or surpassing cut-off criteria (of 1% or 0.1%) for inclusion in WHMIS.
  - Samples collected and analyzed within one organization. In such cases, samples are not "distributed" by a supplier to an employer and are not required to display a supplier label. If the sample of controlled product is tested in an in-house lab, the sample label requires a product identifier only.
- If a supplier is uncertain if the sample contains a controlled product in sufficient quantity to merit inclusion in WHMIS, the following generalizations apply:
  - If repeated sampling is carried out, the assessment of the sample can be based on previous test results from similar samples
  - If the sample falls into PHAC/HC Risk Group 2, 3, or 4 and is not a diagnostic specimen, then WHMIS applies
- MSDSs on specific infectious organisms may be obtained from the Health Canada Laboratory Center for Disease Control (LCDC) (Ref: Laboratory Biosafety Guidelines)

Figure 4.3
Content Categories Required on Four Types of Supplier Labels

1. Products from Laboratory Supply Houses (Reference: *CPR* 17)

For products that are all of the following:

- From a laboratory supply house
- Packaged in quantities of less than 10 kilograms
- Intended for use in a laboratory

The label must disclose:

- The *product identifier*
- *A statement advising that an MSDS is available*, if the MSDS is available (if an MSDS is not available, the label must disclose the information required on the MSDS)
- *Risk phrases* appropriate to the controlled product or to the Classes, Divisions, or Subdivisions in which the controlled product falls
- *Precautionary measures* to be followed when storing, handling, using, disposing of, or being exposed to the controlled product
- *First aid measures,* where appropriate, in case of exposure to the controlled product.

2. Laboratory Samples (Reference: *CPR* 16)

For laboratory samples that are samples of controlled products for which an MSDS has not been obtained or prepared, and packaged in containers of less than 10 kilograms of controlled product, the label must disclose the following:

- The *product identifier*
- The *supplier identifier*
- The *chemical identity* or generic chemical identity of any ingredient of the controlled product referred to in subparagraphs 13(*a*) (i)-(iv) of the *HPA*, if known by the supplier
- An *emergency telephone number* of the supplier, to appear in the statement "Hazardous Laboratory Sample. For hazard information or in an emergency, call _____/ Echantillon pour laboratoire de produit dangereux. Pour obtenir des renseignments sur les dangers ou en cas d'urgence, composer _____."

3. Products other than products from laboratory supply houses or laboratory samples, in containers more that 100 mL in volume (Reference: *CPR* 19(1) (a)-(e)

The label must disclose:

- The *product identifier*
- The *supplier identifier*
- *A statement that an MSDS is available*
- *Hazard symbols* (as set out in the *CPR*, Schedule II) that correspond to the Classes and Divisions into which the product falls
- *Risk phrases* that are appropriate to the controlled product or the Classes, Divisions or Subdivisions into which the controlled product falls
- *Precautionary measures* to be followed when storing, handling, using, disposing of, or being exposed to the controlled product
- *First aid measures*, where appropriate, in case of exposure to the controlled product.

4. Products other than products from laboratory supply houses or laboratory samples*, in containers 100 mL or less in volume (Reference: *CPR* 19(1)(a)-(d))

The label must disclose:

- The *product identifier*
- The *supplier identifier*
- *A statement that an MSDS is available*
- *Hazard symbols* (set out in the *CPR*, Schedule II) that correspond with the Classes and Divisions into which the product falls;

* **NOTE: The supplier of laboratory chemicals or samples may use labels shown for types 3 and 4 but is not obligated to do so.**

Figure 4.4
Summary of WHMIS Labelling Requirements

Requirements	Supplier Label: (>100 mL)	Supplier Label: (<100 mL)	Laboratory Label: Supply House (<10 kg)	Laboratory Label: Sample (<10 kg)	Workplace Label or Placard
1. Product Identifier	√	√	√	√	√
2. Chemical Identity (hazardous ingredients)				√	
3. Hazard Symbol(s)	√	√			
4. Risk Phrase (s)	√		√		
5. Precautionary Measure(s)	√		√		
6. Safe Handling Procedures					√
7. First Aid Measures	√		√		
8. Supplier Identifier	√	√		√	
9. Reference to MSDS	√	√	√		√
10. Emergency Telephone No.				√	
11. Hatched Border	√	√		√	
12. English	√	√	√	√	
13. French	√	√	√	√	
14. Language of choice					√

Other Products

Other products

Most controlled products distributed in commerce are neither laboratory samples nor products from laboratory supply houses. Labels for such products must disclose certain categories of information, depending on whether they are distributed in containers of more than 100 ml in volume, or containers of 100 ml or less.

CBI

However, under the *HMIRA*, an employer or supplier may apply to withhold two categories of information from such labels:

CPR 19(2), 26, 27

- The product identifier in the form of a chemical name, brand name, common name, generic name, or trade name
- Information that could be used to identify the supplier of a controlled product

If such an application is made, the labels must provide a code name or code number specified by the supplier, and if an exemption is granted, a statement of that fact and the date of the decision to grant the exemption. See Chapter 7, "Confidential Business Information," for a discussion of WHMIS trade secret provisions.

Details of Content Required on Supplier Labels

Details are provided here for the content required within each of the information categories that may appear inside the hatched border of supplier labels: the product identifier, supplier identifier, reference to the MSDS, hazard symbols, risk phrases, precautionary measures, first aid measures and, for lab samples, the emergency telephone number. Any other information must be placed outside the hatched border, including directions for use.

The information that must be disclosed on a label must not be disclaimed or contradicted by any other information not required under the *HPA* and present on the label, MSDS, the controlled product, or the container.

Product identifier

Product Identifier. Includes any of: the common name, chemical name, trade name, generic name, or brand name. If an application is made for an exemption from providing such identifiers under the *HMIRA*, the label must provide a code name or code number specified by the supplier. Product identifiers disclosed on the label must be identical to the product identifiers on the MSDSs.

Supplier identifier

Supplier Identifier. Provides the name of the supplier.

If a controlled product is sold to a distributor for sale or resale, the distributor is not required to disclose the distributor's own supplier identifier if the manufacturer or importer's supplier identifier is disclosed on the label.

If a controlled product is packaged for a distributor by a manufacturer, the manufacturer is not required to disclose the manufacturer's own supplier identifier if the distributor's supplier identifier is disclosed on the label.

For imported products, the foreign manufacturer's name may appear as the supplier identifier.

MSDS reference

Reference to the MSDS. The following statements, or their equivalents, must appear on the WHMIS supplier label, when an MSDS is required or available:

"See Material Safety Data Sheet"

"Consulter la fiche signalètique"

WHMIS symbols

Hazard Symbol. Hazard symbols in WHMIS consist of a variety of pictograms such as the cylinder, flame, or skull and crossbones surrounded by a circular border. Required symbols are shown in Schedule II of the *CPR* and are reproduced in Figure 4.5. Hazard symbols must:

- Except for size and colour, be an exact reproduction of the symbols depicted in Schedule II (with some flexibility allowed for the variable printing quality of computer-generated symbols)
- Be displayed in a colour that will not be confused with a safety mark required by Part V of *the TDG Regulations* (see Figure 4.9)
- Be legible

Colour and legibility are discussed in "Design, Colour, and Application," p. 114.

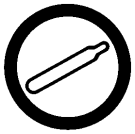
NOTE: WHMIS hazard symbols may be obtained from the Health Canada website referenced in Chapter 8, Resource section.

WHMIS symbols are generally compatible with those required under the *TDG Act,* and the symbol systems of the European Union and the International Labour Organization. Two symbols were introduced for WHMIS: the stylized "R" for Class F and the stylized "T" for Class D-2.

Two additional rules apply to the use of hazard symbols:

- Under Section 19(5) of the *CPR*, the label of a product that falls into both D-1 and D-2 need display only the hazard symbol for D-1, the skull and crossbones.
- A product can be either corrosive or an irritant, but not both, in which case only one symbol (representing either Class E or Class D-2) can be used. However, both the corrosive and stylized "T" symbols may be used when the product causes both burns and chronic health effects (such as cancer or birth defects).

Figure 4.5
WHMIS Class and Division Hazard Symbols

Class and Division Designation		Symbols
Class A	**Compressed Gas**	
Class B	**Flammable and Combustible Material**	
Division 1	Flammable Gases	
Division 2	Flammable Liquids	
Division 3	Combustible Liquids	
Division 4	Flammable Solids	
Division 5	Flammable Aerosols	
Division 6	Reactive Flammable Materials	
Class C	**Oxidizing Material**	
Class D Division 1	**Poisonous and Infectious Material** Materials Causing Immediate and Serious Toxic Effects	
Division 2	Materials Causing Other Toxic Effects	
Division 3	Biohazardous Infectious Materials	
Class E	**Corrosive Material**	
Class F	**Dangerously Reactive Material**	

Risk phrases

Risk Phrase(s). The Risk Phrase(s) disclosed on the supplier label is based on the evaluated hazards of the material. Specifically worded "risk phrases" are not prescribed by the *CPR*.

Examples of acceptable Risk Phrase(s) are provided in Figure 4.6.

These phrases are based on the EU Directive on the Classification, Packaging, and Labelling of Dangerous Substances, June 27, 1967, and the American National Standard for Hazardous Industrial Chemicals — Precautionary Labelling. These documents represent the most comprehensive lists of phrases available. A discussion of these documents is provided in Appendix 4B of this Chapter.

As a general rule, risk phrases are based on professional judgement and reflect the criteria that bring the product into the WHMIS system. For example, an appropriate risk phrase for a product regulated under WHMIS because it is a lung sensitizer (Class D-2) is "Lung Sensitizer. Sensibilisant des poumons."

For a product that falls under WHMIS due to cancer-causing properties, the label will display a risk phrase about the cancer hazard, in addition to the stylized "T" symbol for Class D-2 and precautionary statements. The stylized "T" symbol alone does not identify which of the seven different types of health effects included in the Division was the basis for the decision to include the product in WHMIS Class D-2.

Note: In certain cases, a material may pose a special risk not directly related to the reason that the material is included in WHMIS. For example, isopropyl ether, a flammable liquid (Class B-2), can form explosive peroxides during storage, and merits the additional special risk phrase "May form explosive peroxides. Susceptible de former des peroxides explosifs."

Precautionary measures

Precautionary Measures. The precautionary measures listed on the supplier label are based on the evaluated hazards of the material. Specifically worded "precautionary measures" are not prescribed by the *CPR*.

Figure 4.7 provides examples of acceptable precautionary measures statements. These are intended to describe the precautions to be taken in the storage, handling, use, and disposal of hazardous materials.

Figure 4.6
Examples of Risk Phrases

English	Français
Compressed Gas	Gaz Comprimé
Flammable and Combustible Material	Matière Combustible et Inflammable
Flammable Gas	Gaz Inflammable
Flammable Liquid	Liquide Inflammable
Combustible Liquid	Liquide Combustible
In use, may form explosive vapour-air mixture.	Les vapeurs peuvent former un mélange explosif avec l'air.
Flammable Solid	Solide Inflammable
May form flammable dust-air mixture.	Les poussières peuvent former un mélange explosif avec l'air.
Flammable Aerosol	Aérosol Inflammable
Reactive Flammable Material	Matière Réactive Inflammable
Contact with water liberates flammable gas.	Le contact avec l'eau dégage des gaz inflammables.
Spontaneously flammable in air.	Spontanément inflammable dans l'air.
Oxidizing Material	Matière Comburante
Risk of explosion by shock, friction, fire or other sources of ignition.	Risque d'explosion par le choc, la friction, le feu ou d'autres sources d'ignition.
Contact with combustible material may cause fire.	Le contact avec une matière combustible peut engendrer un incendie.
Explosive when mixed with combustible material.	Explosif lorsque mélangé avec une matière combustible.
Poisonous and Infectious Material	Matière Toxique et Infectieuse
Very Toxic:	Très Toxique:
Rapidly absorbed through skin.	Rapidement absorbé par la peau.
Danger of cumulative effects.	Risque d'entraîner des effets cumulatifs.
Danger of very serious irreversible effects.	Risque d'entraîner de très graves effets irréversibles.
May cause cancer.	Susceptible d'être cancérigène.
May cause heritable genetic damage.	Peut entraîner des dommages génétiques héréditaires.
May cause birth defects.	Peut causer des malformations congénitales.
Danger of serious damage to health by prolonged exposure.	L'exposition prolongée risque d'entraîner de graves dommages à la santé.
Lung sensitizer.	Sensibilisant des poumons.
May cause lung damage.	Susceptible d'entraîner des lésions pulmonaires à retardement.

May cause delayed skin injury.	Susceptible d'entraîner des lesions cutanées à retardement.
May cause delayed eye injury.	Susceptible d'entraîner des lesions aux yeux à retardement.
May cause blindness (not related to corrosivity).	Susceptible d'entraîner la cécité (sans rapport avec le degré de corrosion).
Toxic:	Toxique:
Eye irritant.	Irritant pour les yeux.
Lung irritant.	Irritant pour les poumons.
Skin irritant.	Irritant pour la peau.
Danger of irreversible effects.	Risque d'entraîner des effets irréversibles.
Skin sensitizer.	Sensibilisant de la peau.
Biohazardous Infectious Material	Matière Infectieuse
Corrosive Material	Matière Corrosive
Causes burns.	Provoque des brûlures.
Causes severe burns.	Provoque de graves brûlures.
Liquid or vapour cases burns, which may be delayed.	Liquide ou vapeur susceptible d'entraîner des brûlures à retardement.
Dangerously Reactive Material	Matière Dangereusement Reactive
Risk of explosion by shock, friction, fire or other sources of ignition.	Risque d'explosion par le choc, la friction, le feu ou autres sources d'ignition.
Risk of explosion if heated under confinement.	Risque d'explosion si exposé à la chaleur dans un espace restreint.
Explosive when dry.	Explosif à l'état sec.
Heating may cause an explosion.	Danger d'explosion sous l'action de la chaleur.
Explosive with or without contact with air.	Explosif en contact ou sans contact avec l'air.
May cause fire.	Peut provoquer un incendie.
Reacts violently with water.	Réagit violemment en contact avec l'eau.
Contact with water liberates very toxic gas.	En contact avec l'eau, dégage un gaz très toxique.
Can become highly flammable in use.	Susceptible de devenir très inflammable à l'usage.
Special Risks	Risques Speciaux
Forms very sensitive explosive metallic compounds.	Forme des compositions métalliques explosives et très sensibles.
Explosive when mixed with oxidizing substances.	Peut exploser si mélangé avec des matières comburantes.
May form explosive peroxides.	Susceptible de former des peroxides explosifs.
Contact with acids liberates toxic gas.	En contact avec un acide, dégage un gaz toxique.
Contact with acids liberates very toxic gas.	En contact avec l'acide, dégage un gaz très toxique

Figure 4.7
Examples of Precautionary Statements

English	Français
Keep in a cool place.	Tenir au frais.
Keep contents under … (appropriate liquid to be specified by the supplier).	Conserver le contenu sous … (nom du liquide approprié à préciser par le fournisseur).
Keep under … (inert gas to be specified by the supplier).	Conserver sous … (nom du gaz inerte à être préciser par le fournisseur).
Keep container tightly closed.	Tenir le récipient bien fermé.
Keep container dry.	Tenir le récipient dans un endroit sec.
Keep container in a well-ventilated place.	Tenir le récipient dans un endroit bien aéré.
Do not keep the container sealed.	Ne pas fermer hermétiquement le récipient.
Keep away from … (incompatible materials to be indicated by the supplier).	Tenir éloigné de … (nom des matières incompatibles à être préciser par le fournisseur).
Keep away from heat.	Tenir à l'abri de la chaleur.
Keep away from sources of ignition (heat, sparks, flames)–no smoking.	Tenir à l'écart des flammes et des étincelles – défense de fumer.
Keep away from combustible material.	Tenir à l'écart des matières combustibles.
Handle and open container with care.	Ouvrir et manipuler le récipient avec prudence.
When using, do not smoke.	Ne pas fumer pendant l'utilisation.
Do not empty into drains.	Ne pas jeter les résidus à l'égout.
Never add water to this product.	Ne jamais ajouter d'eau à ce produit.
Bond and ground containers/ when pouring.	Mettre les récipients à la masse lors du transvasement.
Avoid shock and friction.	Eviter le choc et le frottement.
Wear … protective clothing (specify type).	Porter des vêtements protecteurs (spécifier le type).
Wear … gloves (specify type of gloves).	Porter des gants (spécifier le type).
In case of insufficient ventilation, wear NIOSH-approved … respirator (specify type).	En cas de ventilation insuffisante, porter un appareil respiratoire approuvé par NIOSH (spécifier le type).
Wear goggles.	Porter des lunettes de protection.
Wear faceshield.	Porter une visiere de protection.
In case of fire and/or explosion, do not breathe fumes.	En cas d'incendie et/ou d'explosion, évitez d'aspirer les émanations.
In case of fire, use … (indicate the precise type of firefighting equipment. If water increases the risk, add "never use water.)"	En cas d'incendie, utiliser …(Indiquer le type exact d'equipement de lutte contre les incendres. Si l'eau augmente le risque, ajouter: Ne jamais utiliser d'eau).
During fumigation/spraying, wear suitable respiratory equipment.	Pendant les fumigations/vaporisations, se protéger au moyen d'un appareil respiratoire approprié.
Seek immediate medical attention.	Obtenez, immédiatement, des soins médiceux.
In case of accident or if you feel ill, seek medical advice immediately.	En cas d'accident ou de sensation de malaise, consulter immédiatement un médecin.
This gas deadens the sense of smell. Do not depend on odour to detect presence of gas.	Ce gaz diminue l'acuité olfactive. Ne vous fiez pas à votre odorat pouir détecter la présence d'un

First aid

First Aid Measures. The label must disclose, where appropriate, first aid statements that describe the immediate measures to be taken by the victim or co-workers. These first aid measures must be based on the hazard data available on the product and specific to the product, but should not include measures to be taken only by a medical professional.

Telephone number

Emergency Telephone Number (for Laboratory Samples). Emergency telephone number enables users and medical professionals to obtain hazard information on the controlled product.

Design, Colour, and Application

Design and application considerations include: language, layout and borders, colour, legibility, durability, and location of the label on the container:

Requirements for English & French

Language. Information that must be disclosed on the supplier label must be disclosed in both English and French.

CPR 24(3)

Layout and Borders. All content categories required for supplier labels must be placed within a border of the exact design shown in Schedule III of the CPR and reproduced in Figure 4.8, except that:

Distinctive border

- English content may appear within one border and French within another, as long as each label contains all the required hazard symbols
- Curved labels may be used on the neck of gas cylinders to reduce distortion

The requirement for the distinctive border applies to all types of supplier labels except those on controlled products that are from laboratory supply houses, packaged in quantities of less than 10 kg, and intended for use in a laboratory.

Information not required by the *CPR* on the supplier label should not appear within the border. Flexibility in the location of required content categories within the border is permitted. An example of an acceptable supplier label is shown in Figure 4.8.

The corners of the border must be square, not round. Hatch marks must be parallelogram in shape, slanted as shown in Figure 4.8, and marked prominently. Some flexibility permits variations in the spacing between hatch marks and length versus width proportions. Bordering hatch marks may not have words on them. The border may appear either on a label affixed to the container or on the container itself.

Colour

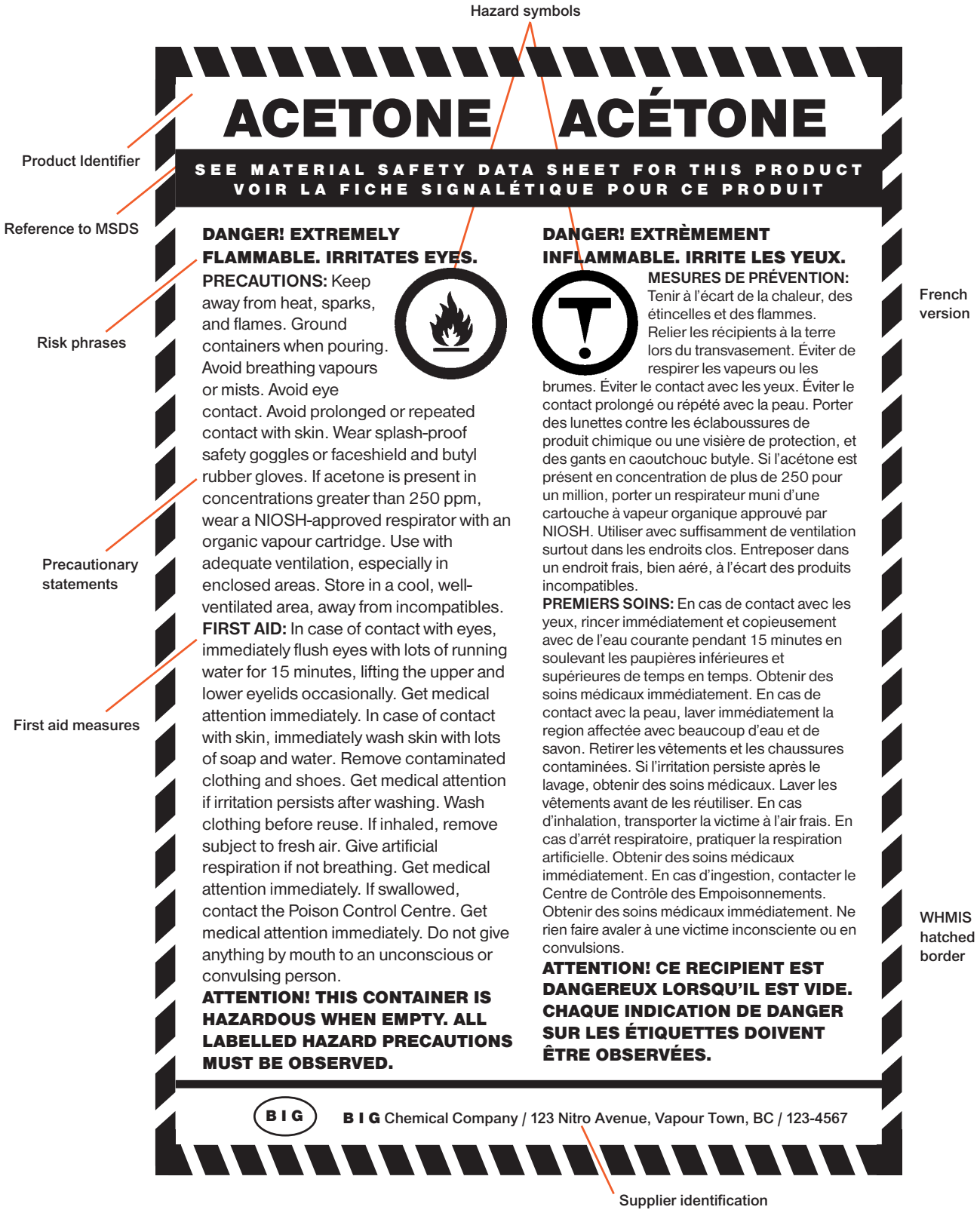
Colour. Letters, numbers, and borders that appear on labels may be in any colour that contrasts distinctly with other markings on the container.

Colour conflicts

Hazard symbols required by the *CPR* must be of a colour that is unlikely to conflict or create confusion with a safety mark required by Part V of the *TDG Regulations.* (See Appendix 4A of this Chapter for a description and picture of TDG safety marks).

Figure 4.8
Acceptable Format for the Supplier Label

Figure 4.8 continued
Acceptable Format for the Supplier Label



An example of a supplier label.

Rules for colour: WHMIS vs TDG

Colour Restrictions:

1. The colour orange must not be used for any WHMIS symbol because it is reserved for TDG Class 1, Explosives.
2. The WHMIS symbol **may** be displayed in the same colour combination required by TDG for the same product.

   For example, the TDG background colour for most flammables is red, and for oxidizers, yellow. These colours may also be used for WHMIS Class B, Flammable and Combustible Material, and Class C, Oxidizing Materials, respectively.

   Similarly, The combination of black on white is permitted for designation of either WHMIS Class D, Poisonous and Infectious Materials, or Class E, Corrosive Material, as this is the combination specified for similar TDG hazard categories.
3. Colours that are not used by TDG may be used for WHMIS symbols.

   For example, TDG does not use the colours brown or purple. These colours may be used for WHMIS symbols.
4. The WHMIS symbol must not be a colour combination that is used in TDG on the same pictogram with a different meaning.

   For example, one TDG colour combination for the cylinder pictogram is green on white, which applies to *non*-flammable, *non*-toxic, *non*-corrosive compressed gases. The pictogram for WHMIS Class A, Compressed Gases, is also the cylinder. The combination of green on white must not be used in WHMIS for any compressed gas that is flammable, toxic, or corrosive.

Rules 1 to 4 permit the use of black on white for all WHMIS hazard symbols with one exception: the cylinder pictogram used to depict a compressed gas that is not corrosive must not be a solid black cylinder on a white background. A black outline of a cylinder is, however, acceptable.

Figure 4.9 summarizes colour restrictions for each of the WHMIS hazard symbols.

Legibility and size

Legibility. The information required on a label must be legible and contrast distinctly with other matter on the container.

Hazard symbols should be large enough to provide a clear warning to workers. The hazard symbol is composed of a pictogram within a circular border. The size of hazard symbols has not been prescribed in the *CPR*. Suppliers may use the Consumer Chemicals and Containers Regulations (*CCCR*) as a guideline. The recommended minimum size of symbol is one that covers 4% of the area of the display panel, or has a diameter of **6 mm**, whichever is larger. The area of the display panel is the area of the front surface in the case of a box, or in a cylindrical container, 40% of the total area, excluding the top and bottom. The size of the symbol need not be more than 50 mm in diameter.

Durability

Durability. The label must be sufficiently durable and resistant under normal conditions of transport, storage, and use to remain attached and legible during the life of the product.

Figure 4.9
Colour Restrictions for WHMIS Hazard Symbols

WHMIS Class	Pictogram in the Hazard Symbol	Restrictions*
A	Cylinder	If product is flammable, poisonous (toxic), or corrosive, do not use a green-white colour combination. If product is not corrosive, do not use a solid black cylinder on white background. However, a black outline of a cylinder with white interior and a white background is acceptable.
B	Flame	Do not use the colour yellow in any colour combination. Do not use blue in any colour combination unless the product emits flammable gases on contact with water.
C	Flame with an "O"	Do not use the colours red or blue in any combination of the two colours or with any other colour.
D	1. Skull and Crossbones	No restriction, except as noted below (*)
	2. Stylized "T"	No restriction, except as noted below (*)
	3. Biohazard	No restriction, except as noted below (*)
E	Corrosive	No restriction, except as noted below (*)
F	Stylized "R" (Dangerously Reactive)	No restriction, except as noted below (*)

*Do not use the colour orange for **any** WHMIS Class because it is reserved for TDG Class 1, Explosives.

Application definition

Application. A label is applied to a controlled product if it is attached to or imprinted, stencilled, or embossed on the controlled product or its container or, in the case of a bulk shipment of a controlled product, if it is included with the bulk shipment in the prescribed manner.

The label applied to a container of a controlled product must be prominently positioned on the part of the container that is displayed under normal conditions of storage and use. The supplier has the basic responsibility for applying WHMIS supplier labels to controlled products. In four situations *involving multi-container shipments*, the supplier need not apply WHMIS labels to:

- An inner container, if the outer container bears a WHMIS supplier label and the purchaser of the controlled product undertakes in writing to apply the WHMIS label to the inner container
- A package liner of the controlled product
- The outer container, if the label on an inner container is visible and legible through the outer container under normal conditions of storage and handling
- The outer container of a controlled product if the outer container has applied to it a label in accordance with *TDG Regulations*, and inner containers bear WHMIS supplier labels.

Note: A controlled product shipped in a single container must have a WHMIS label applied in addition to any necessary TDG markings. Where both supplier and TDG labels appear on a container, the supplier label can be attached beside or be separate from a TDG label. The TDG label must not appear within the border of the WHMIS supplier label.

Revision of Labels

Updating labels

Supplier labels must be revised when new information necessitates a change in any content category on the label. The supplier is not obliged to send updated labels to previous customers in the absence of a sale.

4.3.2 The Workplace Label

Under OSH Regulations, requirements for workplace labels and identifiers are performance oriented and flexible enough to take into account the condition of the controlled product, its intended use, immediacy of use, containment in transfer or reaction systems, and degree of employee control over the product.

Content, Design and Application of Workplace Labels

Three content categories required on all workplace labels are the product identifier, information for the safe handling of the controlled product, and a statement indicating that an MSDS is available for the product.

Guidelines and requirements for the content, design, and location of supplier labels may be used in the development of workplace labels. WHMIS hazard symbols and the distinctive supplier label border may be used but are not required for workplace labels. Figure 4.10 shows an example of an acceptable workplace label.

Figure 4.10
Acceptable Format for the Workplace Label

Example:

Product identifier

The product identifier on the workplace label must be identical to that found on the MSDS of the corresponding controlled product, and should give the brand name, code name, or code number as specified by the supplier if the product is purchased from the supplier; or the chemical name, common name, generic name, or trade name of the controlled product.

Information for safe handling

Information for safe handling means precautions that the worker must observe to minimize the risks of adverse health effect or injury. Alternatively, hazard information about the product can be given as long as, through the worker education and training program, the worker understands the precautions to be taken to guard against the specific hazards.

Availablity of MSDS

If an MSDS is available for the controlled product, the workplace label must include a statement to that effect. For some products, such as consumer products or pesticides, an MSDS may not be available, in which case the statement regarding the MSDS is not required on the workplace label.

The label must be legible and prominently positioned on the part of the container that is displayed under normal conditions of storage and use to provide clear warning to employees who work with the product or in its vicinity.

Alternative symbols

If the employer wishes to provide hazard symbols on workplace labels that differ from those required on WHMIS supplier labels, then the workplace symbols must not cause workers to misunderstand the hazards represented by the product.

For example, the colour and number symbols of the National Fire Protection Association (NFPA) apply to "hazards created by short term exposure ... (in) fire or related emergency conditions." NFPA symbols are not meant to apply to hazards associated with the long-term exposures that are often encountered in the workplace. In addition, NFPA provides only three basic hazard categories—health effects, flammability, and reactivity—compared to six hazard classes for WHMIS. The relationship between NFPA and WHMIS is sometimes unclear, particularly for categories such as WHMIS Class D-2, which covers chronic toxic effects, a health consequence that is not addressed by the NFPA system.

If NFPA symbols are used on workplace labels, workers must also be instructed in the specifics of the symbol system. The understanding by workers of the hazards represented by a controlled product must not be less than that communicated by WHMIS supplier labels and MSDSs.

Revision of Workplace Labels

Updating labels

Workplace labels must be revised when new information becomes available.

Label information must be consistent with the MSDS.

Detailed information on MSDSs is provided in Chapter 5, "The Material Safety Data Sheet."

4.3.3 Other Means of Identification

In some circumstances, the employer is permitted to use a means of identification other than a label to ensure workers recognize the presence of a controlled product. Examples of other means are warning signs, placards, and codes (colour, number, or letter).

The circumstances under which means of identification other than labels may be used, and a description of the appropriate identification, are summarized in Figure 4.11.

Depending on the situation, various means of identification may be appropriate. In circumstance 1 in Figure 4.11, the placard identifier must contain the same information required on a workplace label. However, in Circumstance 5 (transfer and reaction systems), any means of identification combined with worker education is appropriate as long as the worker understands the necessary hazard information. For example, devices such as warning signs, symbols, colour coding, process flow charts, or piping diagrams would all be acceptable if, when combined with worker education, workers are able to identify the contents in the system.

In all circumstances, workplace labels, if appropriately displayed and of legible size, may be substituted for identifiers.

Figure 4.11
Other Means of Identification

Type of Circumstance	Description of Means of Identification
1. Product is any of the following: • Not in a container of any kind • In a container or form intended for export • In a container intended for sale to be labelled at a later time (typically more than one work shift later), but without undue delay.	Post a placard that • Discloses the information required for a workplace label • Is sized for legibility • Is placed in a conspicuous location.
2. Hazardous wastes produced in the workplace	Any means (for example, labels, placards, colour coding of waste containers in combination with worker education, or warning signs with a picture that conveys the appropriate message or that reads "Caution–Hazardous Waste") to ensure worker is aware of both the waste and worker safety.
3. Product transferred to a new container that either: • Will be used only in a laboratory • Is portable, filled directly from a labelled container, under the control of the employee who filled it, and used only by that employee during the shift in which it was filled.	Clearly identify container contents (for example, write the name of the product on the container). NOTE: Products required for immediate use, that is, used at once, without delay, do not require identification.
4. Mixtures and substances undergoing analyses, tests, or evaluations in a laboratory (including products produced in a laboratory for research and development in the same lab).	Clearly identify (for example, use names, number codes, or letters either on containers or adjacent to containers).
5. Product contained in a transfer or reaction system such as a pipe or piping system; a process or reaction vessel; tank car or tank truck; conveyor belt; or similar conveyance.	Any combination of worker education and means of identification (for example, colour coding, labels, placards, piping diagrams). The Canadian General Standards Board (CGSB) has developed a national standard for piping identification (CGSB-24.3-92) based on colour codes and pictograms.

Appendix 4A
Federal Labelling Requirements in Canada – Other than WHMIS

The Hazardous Products Act (Restricted Products)

Transportation of Dangerous Goods Act

Pest Control Products Act

Nuclear Safety and Control Act (Atomic Energy Control Act)

The Explosives Act

The Food and Drugs Act

The Hazardous Products Act (Restricted Products)

Pursuant Regulations	*Consumer Chemicals and Containers Regulations*
Application	Restricted products sold as consumer products
Responsibility for Labelling	Manufacturer or importer
Definition of Restricted Product	Any product, material, or substance included in Part II of Schedule I of the *HPA*.
Definition of Consumer Chemical Product	A chemical product destined for use by a consumer and meeting the *CCCR* hazard criteria of the categories Toxic, Corrosive, Flammable, or Quick Skin-Bonding Adhesive.
Definition of Pressurized Container	Container holding contents under pressure and destined for use by a consumer.
Information Required on Label	• Hazard symbol(s), shown in Figure 4.12. • The signal word *Extreme Danger, Danger,* or *Caution* • Specific hazard statement(s) • Instructions for use • Cautions about non-intended uses (“Do not...”) • First aid treatments
Format	• Bilingual; Mixture of symbols and American National Standards Institute (ANSI) language system • Border, which may include a series of dots or hatched lines
Discussion	The *Hazardous Products Act* legislates requirements for three types of hazardous products: prohibited, restricted, and controlled. Prohibited products may not be imported, advertised, or sold and are listed in Part I of Schedule I of the Act. Restricted products are intended primarily for consumer rather than workplace use. Some examples are: • Bleaches and cleansers for household use containing chlorine and chlorine compounds • Products for household use containing sodium hydroxide, potassium hydroxide, sodium bisulfate, hydrochloric acid, or phosphoric acid • Household polishes and cleaning agents containing petroleum distillates or chlorinated aliphatic hydrocarbons • Glues for household or hobby use containing aliphatic or aromatic hydrocarbon solvents, or ketone solvents

When consumer restricted products are decanted into secondary containers, workplace labels are required. All information is applicable except the statement that an MSDS is available.

Differences between the labels required on restricted and on controlled products include the following:

- Restricted product symbols are based on four types of hazard; WHMIS supplier symbols are based on eight
- WHMIS symbols do not specify degree of hazard;
- Restricted product labels do not require reference to the MSDS

The description of labelling requirements in this section applies only to the *CCCR*. Other consumer labelling requirements under the *HPA* are set out in the *Science Education Sets Regulations, Charcoal Regulations, Liquid Coating Materials Regulations* and *Cellulose Insulation Regulations*. Direct inquiries about the administration of any of these regulations to the nearest office of the Product Safety Bureau, Health Canada. A sample consumer label is shown in Figure 4.13.

Figure 4.12
Restricted Product Symbols

Hazard Symbols			Pictogrammes de Danger		
	Column 1	Column 2		Colonne 1	Colonne 2
Item No.	Description	Symbol	Article	Description	Pictogramme de danger
1.	Toxic		1.	Toxique	
2.	Corrosive		2.	Corrosif	
3.	Flammable		3.	Inflammable	
4.	Explosive		4.	Explosif	

Figure 4.13
Sample Consumer Label

ACETONE

DANGER
POISON

FLAMMABLE **INFLAMMABLE**

CONTENTS MAY BE HARMFUL.

CONTENTS MAY CATCH FIRE.

Do not get in eyes or on skin or clothing. Do not swallow. Do not breathe fumes. Do not smoke. Keep out of reach of children. Use only in a well-ventilated area. Keep away from flames, sparks, and any object that sparks such as a pilot light or electric motor. Wear butyl rubber gloves and goggles.

FIRST AID TREATMENT

Contains acetone. If swallowed, call Poison Control Centre or doctor immediately. If in eyes or on skin, rinse well with water. If on clothes, remove clothes immediately. If breathed in, move person into fresh air

CONTENU PEUT ÊTRE NOCIF.

CONTENU PEUT S'ENFLAMMER.

Éviter tout contact avec les yeux, la peau et les vêtements. Ne pas avaler. Ne pas inhaler les émanations. Ne pas fumer. Tenir hors de la portée des enfants. N'utiliser que dans un endroit bien aéré. Tenir loin des flammes, des étincelles et de tout objet produisant des étincelles, tels une veilleuse, une lampe témoin et un moteur électrique. Porter des gants en caouchouc butyle, et des lunettes.

PREMIERS SOINS

Contient de l'acétone. En cas d'ingestion, appeler immédiatement un centre antipoison ou un médecin. En cas de contact avec les yeux ou la peau, bien rincer avec de l'eau. En cas de contact avec les vêtements, enlever ceux-ci immédiatement. En cas d'inhalation, transporter à l'air frais la personne exposée.

Transportation of Dangerous Goods Act

Pursuant Regulations	*Transportation of Dangerous Goods Regulations* (federal) and associated provincial/territorial legislation
Application	Handling, offering for transport, and transportation of dangerous goods in Canada
Responsibility for Labelling	Shared responsibility between the person(s) offering goods for transport and handling the goods during transport
Definition of Dangerous Goods	Any product, substance(s), or organism included by its nature or the *TDG Regulations* in any of the classes listed in the schedule to the Act (shown in Figure 4.14)
Information Required on Label	• Technical terms for some Classes and Divisions, for example, Explosive, Infectious, Radioactive, and Poison Gas (for trans-border shipments) • Class and, in some cases, Division numbers • Hazard symbols (Product identification numbers are required with placards or panels on large containers pursuant to *TDG Regulations*.)
Format	• (United Nations) UN format • Two or more labels in the event of primary and subsidiary classifications • Standard labels for Classes and Divisions are diamond shaped (square on point), with distinctive colours. Hazard symbols appear in the top half and Class numbers at the base • Labels for special hazards are rectangular
Discussion	The system is designed for product identification and emergency procedures. Legislation establishes nine Classes of dangerous goods and prescribes requirements related to shipping labels, placards and manifests, training programs, and reporting of dangerous occurrences such as chemical spills. Section 4 of the Act requires that "all containers, packaging and means of transport ... display all applicable prescribed safety marks." Appropriate markings are determined by the Classes to which products belong, and Divisions within those Classes. The Regulations provide requirements for safety markings. Where goods are transported in packages, or in containers of 454 litres or less, the consignor must display a label corresponding to the primary classification of the goods. Special labels are required if packages or containers: • Contain magnetized materials to be transported on passenger aircraft • Contain polychlorinated biphenyls • Contain goods prohibited from transportation on passenger aircraft • Have been emptied of dangerous goods but have not been cleaned or purged of residues, so that a hazard still exists Differences between the label systems of TDG and WHMIS include these: • TDG applies to nine Classes, WHMIS to six • TDG is largely a coded label system while WHMIS is descriptive • TDG does not require reference to MSDSs

Hazard symbols in WHMIS are similar but not identical to those used under TDG requirements. All WHMIS hazard symbols feature pictograms within circular borders. TDG uses pictograms without borders but requires their placement on diamond-shaped labels with distinctive colours for designating Classes and Divisions. Figure 4.15 compares the pictograms used to designate Classes and Divisions in each of the two systems. Figure 4.16 shows TDG labels and placards, reproduced with permission from Transport Canada.

See Transport Canada's website at www.tc.gc.ca/tdg/publications/menu.htm

See Section 2.4 in Chapter 2 of this Manual for a comparison of the WHMIS and TDG classification systems.

Figure 4.14
Classes and Divisions of Dangerous Goods

Class 1: Explosives

- 1.1 Substances or articles with a mass explosion hazard
- 1.2 Substances or articles with a fragment projection hazard, but not a mass explosion hazard
- 1.3 Substances or articles that have a fire hazard along with either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard
- 1.4 Substances or articles that present no significant hazard—explosion effects are largely confined to the package and no projection or fragments of appreciable size or range are to be expected
- 1.5 Very insensitive substances that nevertheless have a mass explosion hazard like those substances in 1.1
- 1.6 Extremely insensitive articles with no mass explosion hazard

Class 2: Gases

- 2.1 Flammable gases
- 2.2 Non-flammable, non-toxic gases
- 2.3 Toxic gases

Class 3: Flammable Liquids

Liquids with a closed-cup flashpoint of less than 60.5°C

Figure 4.14
Classes and Divisions of Dangerous Goods Con't

Class 4: Flammable Solids, Substances Liable to Spontaneous Combustion, and Substances that on Contact with Water Emit Flammable Gases

4.1 Solids that under normal conditions of transport are readily ignitable and burn vigorously and persistently, or cause or contribute to fire through friction or from heat retained from manufacturing or processing

4.2 Substances liable to spontaneous combustion under normal conditions of transport, or to spontaneous heating and ignition when in contact with air

4.3 Substances that emit dangerous quantities of flammable gases or become spontaneously combustible on contact with water or water vapour

Class 5: Oxidizing Substances and Organic Peroxides

5.1 Oxidizers – Substances that cause or contribute to the combustion of other material by yielding oxygen or other oxidizing substances.

5.2 Organic Peroxides – Compounds that contain the bivalent "-O-O-" structure, which makes them strong oxidizing agents, possibly liable to explosive decomposition, or sensitive to heat, shock, or friction.

Class 6: Toxic Substances and Infectious Substances

6.1 Solids or liquids that are poisonous through inhalation of vapours, by skin contact, or by ingestion.

6.2 Organisms that are infectious or that are reasonably believed to be infectious to humans or to animals, and the toxins of such organisms.

Class 7: Radioactive Materials

Radioactive materials, within the meaning of the *Nuclear Safety and Control Act,* with activities greater than 70 kBq/kg.

Class 8: Corrosives

Substances that cause visible necrosis of skin or that corrode steel or non-clad aluminum.

Class 9: Miscellaneous Products, Substances, or Organisms

Miscellaneous dangerous goods

Substances that are environmentally hazardous

Dangerous wastes

Figure 4.15
Comparison of Pictograms Used as Hazard Symbols on WHMIS and TDG Labels

Pictogram	Use in WHMIS	Use in TDG
	NOT APPLICABLE	CLASS 1 : EXPLOSIVES Divisions 1–3
	CLASS A: COMPRESSED GASES	CLASS 2: GASES Division 2: Non-flammable, Non-toxic gases
	* CLASS B: FLAMMABLE AND COMBUSTIBLE MATERIALS Division 1–6	CLASS 2, Division 1: Flammable Gases CLASS 3: FLAMMABLE LIQUIDS CLASS 4: FLAMMABLE SOLIDS
	CLASS C: OXIDIZING MATERIAL	CLASS 5: OXIDIZING SUBSTANCES & ORGANIC PEROXIDES
	CLASS D, Division 1: Materials Causing Immediate and Serious Toxic Effect**	CLASS 2, Division 3: Toxic Gas CLASS 6, Division 1: Packing Groups I, II, and III of Toxic Substances
	CLASS D, Division 2: Materials Causing Other Toxic Effects**	NOT APPLICABLE
	CLASS D, Division 3: Biohazardous Infections Material	CLASS 6, Division 2: Infectious Substances
	NOT APPLICABLE	CLASS 7: RADIOACTIVE MATERIALS
	CLASS E: CORROSIVE MATERIAL	CLASS 8: CORROSIVES
	CLASS F: DANGEROUS REACTIVE MATERIAL	NOT APPLICABLE
	NOT APPLICABLE	CLASS 9: MISCELLANEOUS PRODUCTS, SUBSTANCES OR ORGANISMS

* The full TDG symbol also includes a horizontal bar below the pictogram shown

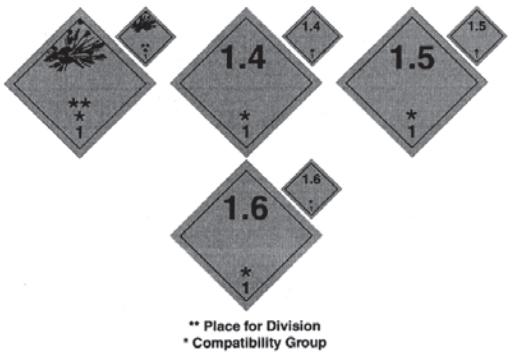
** Where a product meets criteria for inclusion in both Divisions 1 and 2 of Class D, the label may display only the skull and crossbones symbol

Figure 4.16
TDG Labels and Placards

Transport Canada Transports Canada

The Marks of Safety

Canada



CLASS 1 - Explosives

1.1 - A substance or article with a mass explosion hazard.
1.2 - A substance or article with a fragment projection hazard, but not a mass explosion hazard.
1.3 - A substance or article which has a fire hazard along with either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard.
1.4 - A substance or article which presents no significant hazard; explosion effects are largely confined to the package and no projection or fragments of appreciable size or range are to be expected.
1.5 - A very insensitive substance which nevertheless has a mass explosion hazard like those substances in 1.1.
1.6 - An extremely insensitive substance which does not have a mass explosion hazard.
Commonly used in mining and construction operations (example: blasting agents).

CLASS 2 - Gases

2.1 - Flammable Gas.
Commonly used as fuel (example: propane).
2.2 - Non-Flammable, Non-Toxic Gas.
Commonly used in food refrigeration (example: nitrogen).
2.3 - Toxic Gas.
Commonly used in pulp bleaching (example: sulphur dioxide).
2.2 (5.1) - Oxygen and oxidizing gases.

CLASS 3 - Flammable Liquids

A liquid which has a closed-cup flash point not greater than 60.5° C.
Commonly used as fuel (example: gasoline, ethanol, fuel oil (diesel)).

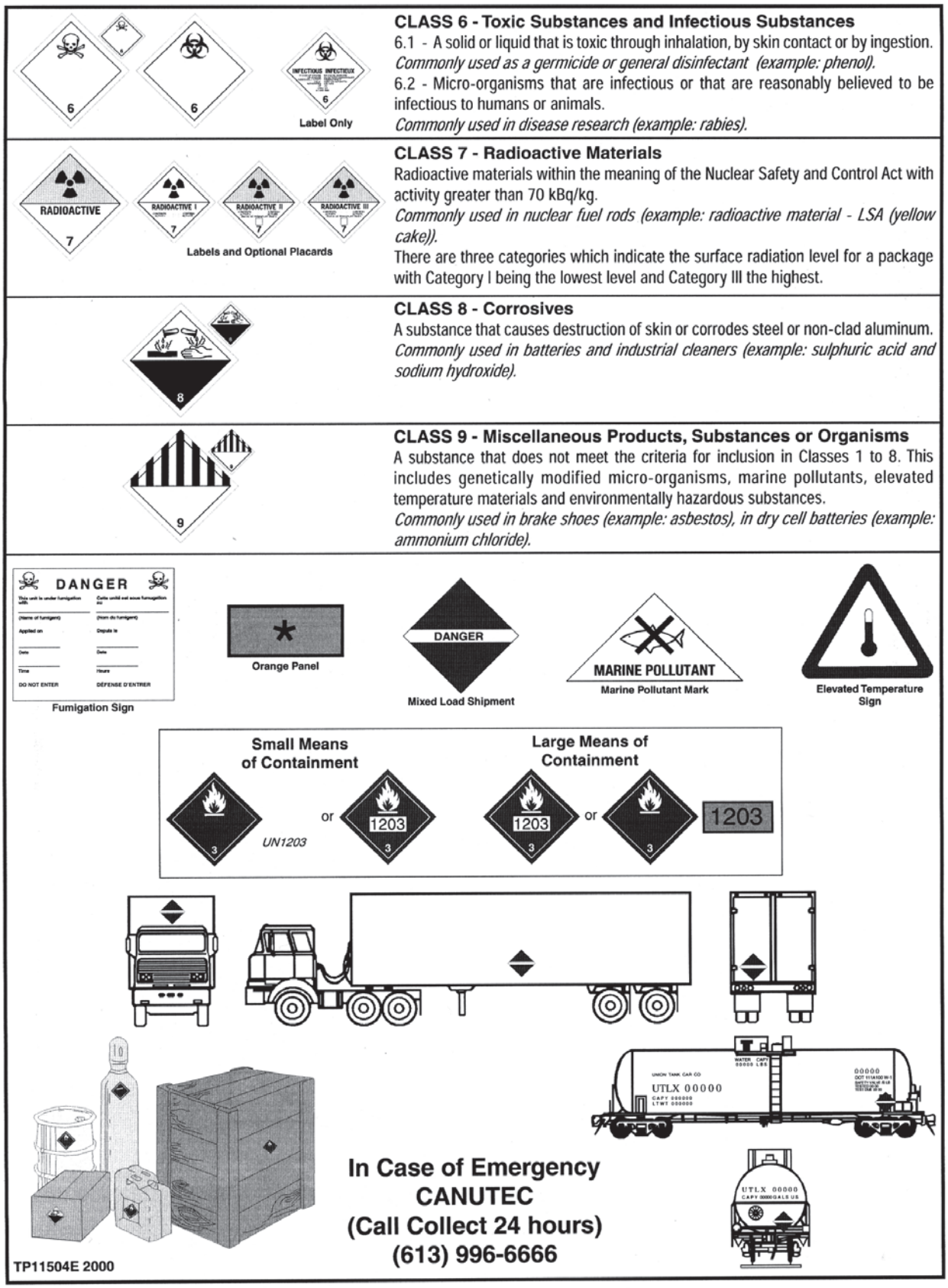
CLASS 4 - Flammable Solids, Substances liable to spontaneous combustion; Substances that on contact with water emit flammable gases (water-reactive substances)

4.1 - A solid that under normal conditions of transport is readily combustible, or would cause or contribute to fire through friction or from heat retained from manufacturing or processing, or is a self-reactive substance that is liable to undergo a strongly exothermic reaction, or is a desensitized explosive that is liable to explode if they are not diluted sufficiently to suppress their explosive properties.
Commonly used in lacquers (example: nitrocellulose).
4.2 - A substance liable to spontaneous combustion, under normal conditions of transport, or when in contact with air, liable to spontaneous heating to the point where it ignites. Commonly used in rocket fuel (example: diethylzinc).
4.3 - A substance that, on contact with water, emits dangerous quantities of flammable gases or becomes spontaneously combustible on contact with water or water vapour.
Commonly used in heat exchangers (valves) (example: sodium).

CLASS 5 - Oxidizing Substances and Organic Peroxides

5.1 - A substance which causes or contributes to the combustion of other material by yielding oxygen or other oxidizing substances whether or not the substance itself is combustible.
Commonly used in fertilizers (example: ammonium nitrate).
5.2 - An organic compound that contains the bivalent "-O-O-" structure which is a strong oxidizing agent and may be liable to explosive decomposition, be sensitive to heat, shock or friction, react dangerously with other dangerous goods or may cause damage to the eyes.
Commonly used in automobile body shops as body filler (example: dibenzoyl peroxide).

Figure 4.16
TDG Labels and Placards Con't



Pest Control Products Act

Pursuant Regulations	*Pest Control Products Regulations*
Application	Pest control products imported to or sold in Canada
Responsibility for Labelling	Manufacturers and distributors of pest control products
Definition of a Pest Control Product	Any product used for the control of any injurious, noxious, or troublesome insect, fungus, bacterial organism, virus, weed, or rodent
Information Required on Label	• Product name and common name of active ingredient • Product class (restricted, commercial, domestic) • Concentrations of the active ingredient(s) • Product registration number • Identification of significant hazards with methods of alleviating the hazards • First aid instructions • Toxicological information • Degree of hazard symbols • Symbols identifying hazards • Signal words to indicate degree of hazard (danger, warning, caution) and nature of hazard (poison, corrosive, flammable, explosive)
Format	Mixed language and UN-type symbols and traffic symbols
Discussion	Section 4(1) of the Act prohibits the importation or sale of products used for pest control unless they are packaged and labelled as prescribed. The Regulations specify label content and format. Differences between labels required under WHMIS and the *PCP Act* are: • PCP label symbols are based on the four types of hazards used for restricted products rather than the eight found in WHMIS • PCP toxicological information is restricted almost entirely to acute health effects • Much of the PCP label is concerned with the effective use of the product rather than the health and safety of workers • the PCP label does not require reference to an MSDS or disclosure of hazardous ingredients other than “actives” A sample label is shown in Figure 4.17.

Figure 4.17
Sample PCP Label

AGRICULTURAL

GRAMOXONE®

LIQUID HERBICIDE WITH WETTING AGENT (Contains Paraquat)

A Non-residual Herbicide for the Control of Many Grasses and Broadleaf Weeds Inactivated on Contact with the Soil

FOR USE ONLY BY FARMERS AND PEST CONTROL OPERATORS
NOT FOR USE BY HOME GARDENERS

DANGER ☠ POISON

DANGER: CORROSIVE TO EYES

CALL A DOCTOR IMMEDIATELY IN CASE OF ACCIDENT

WARNING
READ THE LABEL AND BOOKLET BEFORE USING
Danger - May be fatal if swallowed
- **Never transfer to other containers**
- **Keep out of reach of children and animals**
- **Store tightly closed in original container, and in a safe place**

KEEP OUT OF REACH OF CHILDREN

GUARANTEE: paraquat 200 g per litre (present as dichloride)
REGISTRATION NO. 8661 PEST CONTROL PRODUCTS ACT

ZENECA Agro, a business of ZENECA Corp.
250-3115 12th Street N.E., Calgary, Alberta T2E 7J2

G98/E-7
XAZ167

PRECAUTIONS

DO NOT USE GRAMOXONE® UNDILUTED. The maximum spray concentration used should not exceed 2.5 parts GRAMOXONE to 100 parts water.

DANGER - Corrosive to eyes. **PREVENT** all contact of the concentrate with the skin and eyes.

WEAR CHEMICAL RESISTANT GLOVES, SAFETY GOGGLES, FACE SHIELD, AND LONG-SLEEVED SHIRT AND PANTS OR COVERALLS during mixing/loading and during application via handheld equipment.

Do not apply with a mist blower or high-pressure sprayer producing fine droplets.

AVOID WORKING in spray mist.

AVOID CONTACT with spray solution.

REMOVE HEAVILY CONTAMINATED CLOTHING IMMEDIATELY and wash before re-use.

WASH hands and face thoroughly after spraying and before smoking or taking meals.

DO NOT CONTAMINATE FEEDS, FOODSTUFFS, or **WATER SUPPLIES.**

STORE IN ORIGINAL CONTAINER tightly closed, in a safe place away from children.

FIRST AID

If swallowed, induce vomiting if not already occurring. Get to nearest hospital FAST. THIS IS ESSENTIAL. If delay unavoidable, administer fluids and induce further vomiting. Contact a poison control centre. **If in eyes,** flush with clean water for 15 minutes and get medical attention. **If on skin,** wash thoroughly with water. Remove contaminated clothing immediately; wash before re-use.

TOXICOLOGICAL INFORMATION

If swallowed, give stomach wash-out and test urine and gastric aspirate for paraquat. If positive, give up to 1 litre of adsorbent suspension (activated charcoal) mixed with a purgative ($MgSO_4$, Na_2SO_4 or mannitol). Repeat administration of adsorbent suspension for the next 24 hours, plus purgatives as required. Maintain and monitor electrolyte and fluid status daily. Consider haemodialysis or haemoperfusion, using charcoal column. Delay oxygen as long as possible. **If in eyes,** treat symptomatically, using antibiotics and steroids as necessary.

EMERGENCY TELEPHONE NUMBER

All hours, 1-800-327-8633 (FASTMED) **ONLY** for environmental and health information.

STORAGE

STORE ABOVE 0°C. If crystallization occurs because of storage below 0°C, warm to room temperature, agitate until reconstituted.

SPILL CLEANUP

Wear appropriate protective equipment (gloves, glasses, apron) when attempting to clean up the spill. If the container is leaking, secure leak and place the container into a drum or heavy gauge plastic bag. Contact ZENECA Agro (See EMERGENCY TELEPHONE NUMBER) for further information.

For spills and leaks: Contain the liquid with dikes of inert material (soil, clay, kitty litter etc.). Absorb the spill onto inert material and shovel into a sealable waste container.

On hard surfaces: Sprinkle spill area with detergent and scrub in a small quantity of water with a coarse broom. Let stand 10 minutes then absorb onto an inert material and shovel into the waste container.

On soil: Remove the top 15 cm of soil in the spill area and replace with fresh soil. Dispose of all waste including scrub brush in accordance with provincial requirements. For more information on the disposal of waste and the clean up of spills, contact the Provincial Regulatory Agency or the Manufacturer.

DISPOSAL

Do not reuse this container for any purpose. This is a recyclable container, and is to be disposed of at a container collection site. Contact your local distributor/dealer or municipality for the location of the nearest collection site. Before taking the container to the collection site:

1) Triple- or pressure-rinse the empty container. Add the rinsings to the spray mixture in the tank.
2) Make the empty, rinsed container unsuitable for further use. If there is no container collection site in your area, dispose of the container in accordance with provincial requirements.

For information on the disposal of unused, unwanted product contact the manufacturer or the provincial regulatory agency. Contact the manufacturer and the provincial regulatory agency in case of a spill and for clean-up of spills.

PRODUCT INFORMATION

GRAMOXONE is a non-volatile, fast acting herbicide. It is inactivated on contact with the soil, therefore, has no residual effect in the soil. The herbicidal effect varies with weed species; hence, repeat applications may be necessary upon certain perennial weeds. Annual weeds are generally killed with one application if the weed growth has been completely covered with the spray solution.

GRAMOXONE works rapidly, and rain falling shortly after application normally will not reduce the effectiveness of the treatment. APPLICATIONS MADE ON CLOUDY DAYS, DURING DULL SUNLIGHT OR JUST PRIOR TO OR DURING PERIODS OF DARKNESS WILL GENERALLY INCREASE THE SUBSEQUENT EFFECTIVENESS OF THE TREATMENT.

Thoroughly wet all foliage. For dense weed growth, use the higher rate and the higher volume of water.

NOTE: Do not add AGRAL® 90 as this GRAMOXONE formulation already contains a wetting agent.

CAUTIONS: Avoid application or drift onto crops, ornamental plants, lawns, grazing areas or other desirable growth. Use clean (non-turbid) water for spraying GRAMOXONE. Muddy water will reduce the effectiveness of the chemical. DO NOT APPLY THROUGH MIST BLOWERS. It is important to thoroughly wash equipment after spraying - Use a wetting agent (AGRAL 90 at 60 mL per 100 L of water), flush and spray out, then thoroughly rinse with clean water. When possible, the equipment should be filled with clean water and left overnight. Spray out before storing equipment or using for other materials.

DO NOT APPLY BY AIR.

NOTICE TO USER

This control product is to be used only in accordance with the directions on this label. It is an offence under the Pest Control Products Act to use a control product under unsafe conditions.

DIRECTIONS FOR USE

GRASS AND WEED CONTROL IN FRUIT CROPS AND SHELTERBELTS

Rate and Method of Application: Apply 5.5 L GRAMOXONE in 1,100 L of water per sprayed hectare or 75 mL in 10 L of water per 100 m^2. Of this mixture, 550 mL

This may not be the most current label. At the time printing, all information is believed to be accurate. Always read the label carefully before using.

ZENECA Agro

1

will treat an area l.75 m in diameter around a tree. **Apples and Grapes Only** - For hard-to-kill annual and perennial weeds, add 2.75 L (or 40 mL per 100 m^2) of Tropotox® Plus 64 or Tropotox to the GRAMOXONE spray. Apply as directed for GRAMOXONE except for field bindweed control under grape vines, apply when the field bindweed begins to bloom. Apply as directed spray to the base of trees, bushes, canes, and vines. On all crops listed below, avoid contact with foliage (especially on conifers), fruit, young growing shoots, suckers and green bark.

CROPS

UNDER APPLES, APRICOTS, CHERRIES, CURRANTS, GOOSEBERRIES, HIGH-BUSH BLUEBERRIES, PEACHES, PEARS AND PLUMS – Established one or more years: Repeat application as necessary. **UNDER GRAPE VINES –** Established on trellises: Apply in May or early June and repeat if necessary. An area 1 m by 10,000 m of row equals one hectare. **UNDER BLACKBERRIES, LOGANBERRIES AND RED RASPBERRIES:** Apply early in spring before new shoots emerge or in fall when canes are mature. **UNDER ESTABLISHED SHELTERBELTS:** Repeat application if necessary. For residual control of germinating annual weeds under apples, pears, loganberries, raspberries, highbush blueberries, blackberries and shelterbelts, GRAMOXONE can be tank mixed with Princep® Nine-T®. Use the appropriate rates for each crop and observe the precautions and limitations listed on the Princep Nine-T label.

Inter-row Spraying in Strawberries to Control Excess Plants and Weeds: To obtain narrow strawberry rows in the planting year, or from just after harvest to fall in renovated plantings, apply 5.5 L of GRAMOXONE in 550 to 1,100 L of water per hectare to give thorough coverage of foliage. Determine width of the strawberry row to be retained and use shields to keep spray off the desired strawberry plants. Thus, the spray will be applied only to the area between the rows killing excess strawberry plants and weeds. In renovated plantings, 2 applications may be required - one just after harvest and one again in the fall. Apply on a calm day and use a spray nozzle arrangement and low pressure to avoid spray drift around the shields.

FILBERTS and HAZELNUTS (Green Suckers): As a directed spot treatment at the base of each tree, apply 75 mL of GRAMOXONE in 10 L of water on green suckers to runoff.

For inter-row general weed and green sucker control performed in one operation using a boom sprayer, apply 2.8 to 5.6 L of GRAMOXONE in 550 to 1,100 L of water per hectare.

For residual control of germinating annual weeds, apply GRAMOXONE at 5.0 L per hectare tank mixed with Princep Nine-T, at 2.0 to 2.5 kg per hectare. Apply under trees established one year or more. Apply only one (1) application per year, by ground. Consult the Princep Nine-T label for additional information regarding choice of rate (as determined by soil type), precautions, restrictions and directions for mixing and application.

Weed Control by Stale Seed Bed Technique for Vegetables and Field Crops: Pre-emergent to crop. Post emergent to weeds: For weed control in beans (all types) beets, carrots, cole crops, corn, cucumbers, onions, peas, potatoes, soybeans, and turnips, prepare a seed bed at least 2 to 4 weeks before seeding to stimulate weed growth. Seed without further cultivation and with a minimum disturbance of soil. To burn off emerged weeds apply 2.75 to 5.5 L GRAMOXONE in 300 to 1,100 L of water per hectare prior to or after seeding. Do not apply later than 3 days before crop emergence. Use 5.5 L rate when weeds are above 5 cm in height and higher volume of water on dense weed growth.

Inter-row Directed Chemical Weeding of Vegetable, Field and Established Nursery Crops: For weed and grass control between the rows after weed emergence, use equipment and nozzles designed to prevent spray contact with the green foliage or other green parts of plants. Apply 2.75 to 5.5 L GRAMOXONE in 300 to 550 L of water per hectare. Use 4.25 to 5.5 L when weeds are above 5 cm in height and higher volume of water on dense weed growth.

ASPARAGUS: Apply a GRAMOXONE spray to emerged broadleaf weeds and grasses prior to, or after the cutting season. Do not apply to emerged spears which are to be used for human consumption. Apply 2.75 to 5.5 L GRAMOXONE in 300 to 1,100 L of water per hectare. Use 5.5 L rate when weeds are above 5 cm in height and higher volume of water on dense weed growth. For residual control of germinating annual weeds, GRAMOXONE may be tank mixed with Princep Nine-T at 2.5 to 3.75 kg/ha either 7 days before first cutting and/or after last harvest. Observe all precautions on the Princep Nine-T label. **Do not spray the asparagus fern.**

WEED CONTROL IN POTATOES: Apply 2.75 to 4.25 L in 300 to 550 L of water per hectare to control emerged quackgrass, annual grasses and broadleaf weeds. To control emerged seedling annual grasses and seedling annual broadleaf weeds only, apply l.5 L in 300 to 550 L of water per hectare. Grasses and weeds germinating after spraying will require cultivation for control. For all rates of use, apply to potato varieties as follows: Netted gem (Idaho baker, russett or burbank) and Cherokee, apply up to ground crack only (potato tops about to emerge). For other varieties, apply up to time first potato tops have reached 5 to 8 cm in height (this height is less than it often appears to the eye when observing an emerging field).

GRAMOXONE - Tank mixed with residual herbicides - For residual control of annual broadleaf weeds and annual grasses tank mix with one of the following:*

Product	Rate
Lorox® L	2.25 - 4.5 L/ha
Patoran™ 400 FL	2.5 - 7.0L/ha
Afesin® 2EC	5.5 - 8.0 L/ha
Lexone® DF	0.83 - 1.2 kg/ha
Lexone® L	1.3 - 1.8 L/ha
Sencor® 500 FL	1.1 - 1.75 L/ha

*Refer to the label of the residual herbicide used for specific rates on your soil type.

Apply to emerged weeds and grasses up to and including ground crack using the lower rate of residual herbicide on light soils and the higher rate on heavier and high organic matter soils. **Do not apply these tank mixes after ground crack when tops have emerged as excessive injury may result.** If quackgrass is present, use 2.75 to 4.25 L of GRAMOXONE per hectare with the residual herbicide.

NOTE: OBSERVE ALL PRECAUTIONS AND USE DIRECTIONS FOR THE RESIDUAL HERBICIDE USED.

NOTE: Application to exposed or emerged potato foliage will cause temporary injury and chlorosis. Do not apply to emerged potato foliage in the evening, or when potatoes are under moisture stress due to extremely dry soil conditions or to early potatoes. The use of poor or diseased seed and cut seed with one eye will make potatoes more susceptible to injury by post- emergence GRAMOXONE sprays. Treatment with GRAMOXONE alone will normally eliminate several cultivations, but has no residual action and will not control growth of weeds which may take place following the application of GRAMOXONE.

ESTABLISHED ALFALFA FOR DEHYDRATION, HAY AND FORAGE: Apply GRAMOXONE spray immediately (not later than 5 days) after cutting established alfalfa to control or suppress broadleaf weeds and grasses (including quackgrass) and release the alfalfa. Do not use a residual herbicide in the season prior to GRAMOXONE application. Apply 2.75 to 5.5 L/ha in 300 to 1,000 L of water.

ESTABLISHED BIRDSFOOT TREFOIL FOR SEED: For improved seed yields and control of wild carrot, quackgrass and other broadleaf weeds and grasses, spray GRAMOXONE at 2.75 to 5.5 L/ha in 300 to 500 L of water when the trefoil is 8 to 16 cm high and actively growing.

ESTABLISHED BIRDSFOOT TREFOIL FOR HAY AND FORAGE: Apply GRAMOXONE at 2.75 to 5.5 L/ha in 300 to 500 L of water immediately following the first cutting (within 5 days) in early June to control or suppress broadleaf weeds and grasses (including quackgrass) and release the legume.

Weed Control in Roughland Pasture Renovation with Birdsfoot Trefoil: Apply a 2,4-D treatment in August to control perennial weeds prior to seeding with birdsfoot trefoil. Prior to full germination of birdsfoot trefoil in the spring, apply 5.5 L of GRAMOXONE in 300 to 550 L of water per hectare to control grasses and annual weeds. This spray should be applied when the grasses are 5 to 10 cm high (early to mid-May) to give adequate suppression/kill to allow establishment of the trefoil. Rotation grazing should be practiced in the establishment year to lessen injury to young seedlings.

PASTURE RENOVATION – MINIMUM TILLAGE: Apply 2,4-D or a 2,4-D based treatment in August prior to treatment to control perennial broadleaf weeds. In May, after 5 to 10 cm of new growth has appeared apply 2.75 to 5.5 L of GRAMOXONE in 300 to 500 L water per hectare to control annual weeds and grasses immediately prior to seeding trefoil or alfalfa with suitable sod seeding/minimum tillage equipment.

ZERO-TILLAGE CORN: For control or suppression of emerged weeds and grasses (including quackgrass) in corn stubble and suppression of non-ploughed grass sod (pastures) apply 2.75 to 5.5 L of GRAMOXONE plus 1.7 kg of Atrazine 90-W, or 3.0 L of Atrazine 500 FL as a tank mix in 325 L to 500 L of water per hectare just prior to or immediately after planting the corn. The addition of atrazine improves the residual control of weeds and grasses. This treatment should be used in conjunction with special zero-tillage corn planters. Consult local agricultural authorities for recommendations on seed and fertilizer application rates for zero-tillage planting of corn. Application of recommended post-emergence herbicides may be required to control late germinating annual and perennial broadleaf weeds and annual grasses which may survive the pre-planting treatment.

CONSERVATION TILLAGE SOYBEANS: For burndown and residual control of many annual weeds in reduced tillage (minimum tillage), ridge-tillage (till-planting), strip-tillage or no-till (zero-till) cropping systems, apply GRAMOXONE at 2.5 L/ha tank mixed with one of the following herbicides:

Product	Rate	Comments
Sencor® 500F	1.1 to 2.25 kg/ha	Apply after planting but no later than 3 days prior to crop emergence.
Sencor 75DF	0.75 to 1.5 kg/ha	
Sencor Solupak	0.75 to 1.5 kg/ha	Apply when weeds are less than 4 cm in height.
Pursuit®	312 to 420 mL/ha	Apply preplant, up to 30 days before planting.

Consult the Sencor or Pursuit label for additional information regarding precautions, restrictions, and directions for mixing and application.

CONIFER CONTROL: Mix 5 to 10 L of GRAMOXONE with 1,000 L of water and apply with hydraulic sprayer to give thorough coverage of the conifers. Thorough coverage is essential for best results. Spray any time between mid-May and late September.

SPECIES CONTROLLED: Balsam fir, black spruce, cedar, red pine, scotch pine and tamarack.

CONTROL OF MIXED STANDS OF CONIFERS AND DECIDUOUS BRUSH: Mix 5 to 10 L of GRAMOXONE with 1,000 L of water and add 10 L of Tordon™ 101 or brushkiller composed of a mixture of 2.5 kg active of 2,4-D and 2.5 kg active of 2,4-DP. Apply with a hydraulic sprayer to give thorough coverage of all brush species present. Thorough coverage is essential for best results. Time spraying to coincide with foliage growth of deciduous species.

NOTE: Only those deciduous species normally controlled by the above rates of Tordon 101 or 2,4-D + 2,4-DP alone will be controlled by the mixture with GRAMOXONE. Defoliation of all deciduous species will occur but resistant deciduous species will regrow.

TURF RENOVATION: The turf to be renovated should be mowed and thoroughly raked to remove all dead and cut vegetation. When green growth is 3 to 5 cm high, apply GRAMOXONE at the rate of 125 mL per 10 L of water per 100 m^2 (or 12 L in 1,000 L of water per hectare). When the old turf is dead, cultivate the top 5 cm to cover dead grass, thoroughly rake surface to remove all remaining debris. Level and re-seed or lay sod.

WEED CONTROL IN NON-CROP LAND (Industrial Sites and Rights-of-Way): GRAMOXONE will provide a rapid top-kill of weeds and grasses when applied as a foliar spray. Apply 5.5 to 11 L of GRAMOXONE in 550 to 1,100 L of water per hectare thoroughly wetting all foliage. Use higher rates of GRAMOXONE and higher volumes of water for dense weed growth.

CHEMICAL MOWING: For rapid scorch of weeds and grasses, apply 2.75 L of GRAMOXONE in 550 to 1,100 L of water per hectare thoroughly wetting all foliage. This rate may also be used with some residual herbicides to improve the initial top kill of the residual herbicide.

FOR CHEMICAL MOWING AND WEED CONTROL IN NON-CROP LAND (Industrial Sites and Rights-of-Way): GRAMOXONE may be added to tank mixes of certain residual herbicides where immediate top kill and long-term sterilization is required. The use of such combinations for the above two uses, should be based on previous experimental experience and recommendations on the label of the residual herbicide.

NOTICE TO USER: This control product is to be used only in accordance with the directions on this label. It is an offence under the Pest Control Products Act to use a control product under unsafe conditions.

NATURE OF RESTRICTION: This product is to be used only in the manner authorized; consult local pesticide regulatory authorities about use permits which may be required.

RESTRICTED USE

CATTAILS, BULRUSHES AND EMERGED GRASSES: To control cattails (*Typha* spp.), bulrushes (*Scirpus* spp.) and emerged grasses, apply 5.5 to 11 L of GRAMOXONE in 850 to 1,100 L of water per hectare thoroughly wetting the leaves. Apply the spray mixture to cattails and bulrushes when plants are flowering and to other grasses when necessary to control growth. Repeat treatments may be required if growth reappears. When GRAMOXONE is applied at the above rates, the following waterweeds may also be controlled: Duckweed (*Lemna minor*), pondweeds (*Potamogeton* spp.) and bushy (water) naiad (*Najas flexilis*).

LIMITATION: Do not use treated water for at least 7 days after treatment for swimming, human or animal consumption. For irrigation: Do not use for at least 5 days after treatment.

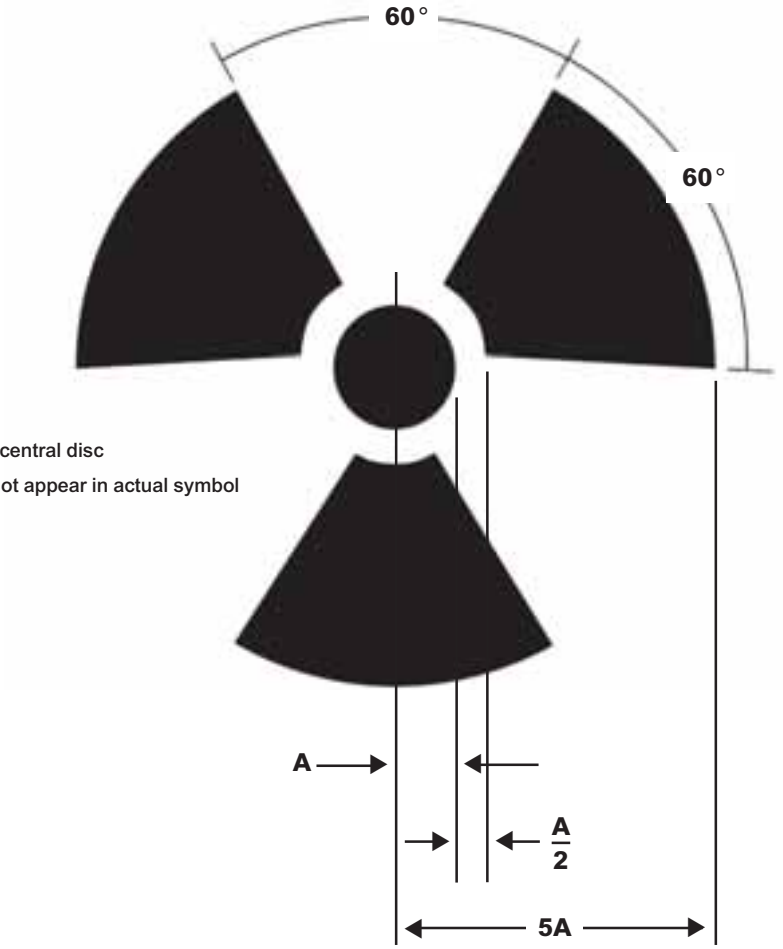
NOTICE TO BUYER

Seller's guarantee shall be limited to the terms set out on the label and subject thereto, the buyer assumes the risk to persons or property arising from the use or handling of this product and accepts the product on that condition.

Nuclear Safety and Control Act (formerly Atomic Energy Control Act)

Pursuant Regulations	*Atomic Energy Control Regulations* *Transport Packaging of Radioactive Materials Regulations*
Application:	The transport and use of nuclear substances (prescribed radioactive materials)
Responsibility for Labelling	• *Within a facility or worksite:* any person who uses a container to store or otherwise hold radioactive prescribed substances • *During transport:* the person who causes radioactive material to be transported
Definition of Nuclear Substance	A substance prescribed by the Nuclear Safety and Control Act
Information Required on Label	At a Nuclear Facility or Other Worksite: Under the *AEC Regulations*, labels must be applied to containers when radioactive contents exceed the amounts defined in Schedule I of the Regulations. Labels must specify: • The words *RADIATION – DANGER – RAYONNEMENT* • The radiation symbol shown in Figure 4.18 and set out in Schedule III of the *AEC Regulations* • Information about the nature, form, quantity, and date of measurement of the radioactivity of the substance in the container Such a label is not required if the container: • Forms part of the machinery attached to the manufacturing or processing equipment of a nuclear facility • Contains a quantity of radioactive substance less than that shown in Schedule I of the *AEC Regulations* • Is used temporarily to store radioactive isotopes under the supervision and in the presence of an atomic radiation worker • Is used exclusively for shipping substances containing radioactive isotopes and labelled in accordance with the requirements of the *Transport Packaging of Radioactive Materials Regulations* For Shipment of Radioactive Materials: Under the *Transport Packaging of Radioactive Materials Regulations*, any package, packaging, or transport container containing radioactive material shall bear safety marks in accordance with the categories and requirements of Schedule VI of the Regulations. • Labels must be of a format consistent with the activity category of the material, and provide: • The name and mass number of the radionuclide or its chemical symbol • The activity of the contents • Prescribed code letters if the material is low activity material • A transport index
Discussion	WHMIS does not apply to nuclear substances. Labels required pursuant to *AEC* and *Transport Packaging of Radioactive Materials Regulations* are largely coded rather than descriptive and do not include reference to an MSDS. Note: Because the definition of nuclear substances under the *NSC Act* does not include nonradioactive components of radionuclide mixtures, WHMIS applies to non-radioactive controlled products used as carrier materials in these mixtures.

Figure 4.18
Radiation Symbol



A = Radius of central disc

Note: Construction lines do not appear in actual symbol

The Explosives Act

Pursuant Regulations	*Explosives Regulations*
Application	Manufacture and sale of explosives. (Note: The *Explosives Regulations* also deal with the packing and road transport of explosives. However, the *TDG Regulations* are intended to supersede requirements of the *Explosives Regulations* in these areas.)
Responsibility for Labelling	Manufacturer
Definition of Explosive	Any substance that is made, manufactured, or used to produce an explosion or detonation or a pyrotechnic effect and includes gunpowder, propellant powders, blasting agents, dynamite, detonating cord, lead azide, detonators, ammunition, rockets, fireworks, safety flares, or other signals. (Note: For transport, the definition of explosives under the *TDG Regulations* applies.)

Section 6 of the Regulations divides explosives into seven Classes:

- Gunpowder
- Nitrate Mixture
- Nitro-compound
- Chlorate Mixture
- Fulminate
- Ammunition
- Fireworks

Information Required on Label	Section 45 of the Regulations covers requirements for marking outer packages containing explosives. The following items and other markings and serial numbers that may be required must be affixed to the package in conspicuous characters by means of a brand or securely attached label or mark: • The word *EXPLOSIVE* • The number of the Class and Division to which the explosive belongs • The name of the manufacturer or sender of the explosive Some exceptions to this requirement include: • For Class 3 and 4 explosives, a date of manufacture must be provided • For safety fuses or gunpowder, the word *EXPLOSIVE* and the number and Class of the Division may be omitted • For manufactured fireworks, the word *EXPLOSIVE* must be replaced by the word *FIREWORKS*
Discussion	WHMIS does not apply to explosives. Labels required for explosives are largely coded rather than descriptive and do not include reference to an MSDS.

Food and Drugs Act

Pursuant Regulations	*Food and Drug Regulations* *Cosmetic Regulations*
Application	Drugs, cosmetics, foods, and devices in Canadian commerce
Responsibility for Labelling	Manufacturer and distributor
Information Required on Label	For drugs, labels must include: • The name of the manufacturer or distributor of the drug • Common names if any • Drug identification numbers • Quantities and common names for medicinal ingredients • Adequate directions for use • The expiration date of the drug For cosmetics (changes pending; contact Health Canada for information), labels must provide: • The name and principal address of the manufacturer or distributor • Common or generic name • Warnings of skin hypersensitivity with hair dyes that contain paraphenylenediamine or other coal tar products • A warning of explosive hazard (as required by the *Hazardous Products Regulations*) if the cosmetic is packaged in a metal dispensing container designed to release contents under pressure through a manually operated valve
Format	Mixed language and UN-type symbol
Discussion	Differences between labels required under the *Food and Drugs Act* and WHMIS include: • FDA labelling requirements are not directed specifically to the workplace but are concerned with movement through commerce • FDA labels do not include reference to material safety data sheets • FDA labels do not require the use of hazard symbols except where a cosmetic is packaged in a pressurized dispensing container • Hazardous ingredients, risk phrases, and precautionary statements are almost never provided, particularly with cosmetics

Appendix 4B
Labelling Requirements and Standards outside Canada

Toxic and Hazardous Substances - Hazard Communication Standard 29CFR 1910.1200, Occupational Safety and Health Administration (U.S.A.)

European Union Directive on Dangerous Substances

Standard System for the Identification of the Fire Hazards of Materials - National Fire Protection Association Standard 704

American National Standard for Hazardous Industrial Chemicals - Precautionary Labelling (ANSI Standard Z129.1 - 1994)

Toxic and Hazardous Substances Hazard Communication Standard 29CFR 1910.1200 Occupational Safety and Health Administration (U.S.A.)

Application	Workplaces in the United States
Responsibility for Labelling	Manufacturer or employer
Hazardous Substance Definition	Hazards are broken down into three general categories: • *Physical/Chemical*, for corrosive, explosive, flammable, and oxidizing substances • *Acute Health*, for highly toxic and toxic chemical hazards based on LD_{50} values, sensitizers and irritants • *Chronic Health*, for carcinogens, reproductive toxicity hazards, and agents that endanger life, diminish mental alertness, or cause other chronic problems like pulmonary or liver conditions and toxicity
Information Required on Label	• Common name of substance present above a specified concentration • One of eighteen hazard warnings ranging from flammable to carcinogen • Chemical Abstracts Service number • Handling and emergency precautions
Format	Language format, data sheets
Discussion	Chemical manufacturers, importers, or distributors must ensure that each container of hazardous chemicals leaving the workplace is “labelled, tagged or marked” with the: • Identity of the hazardous chemical(s) • Appropriate hazard warnings • Name and address of the chemical manufacturer, importer, or other responsible party Employers must ensure that each container of hazardous chemicals in the workplace is “labelled, tagged or marked” with the: • Identity of the hazardous chemical(s) • Appropriate hazard warnings • Labels need not refer to MSDSs

European Union Directive on Dangerous Substances

Application	Legislation protecting public and workers in the EU
Responsibility for Labelling	Supplier
Hazardous Substance Definition	A substance is "dangerous" if it is explosive, oxidizing, flammable, toxic, harmful, corrosive, or irritant
Information Required on Label	• The name of the substance • The name and address of the manufacturer, importer, or distributor • Hazard type (five Classes—explosive, oxidizing, flammable, toxic and harmful, corrosive and irritant substances) • Particular risks, for example, "very toxic in contact with the skin" • Safety precautions, for example, "wear suitable protective clothing"
Format	• Combination of language plus six EU symbols • Sixty-five uniform risk (R) phrases prescribed • Sixty-two standard safety (S) precaution phrases prescribed
Discussion	The EU Directives are similar to the UN recommendations in terms of symbols and classification systems, although a number of differences exist between the EU and other systems. The directive is amended and adapted to remain current with technical progress

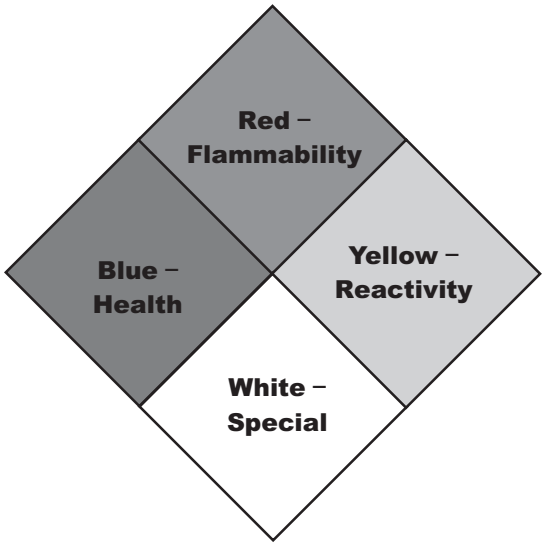
Examples of Risk Phrases	
Flammable Substances	Extremely (highly) flammable Flammable Spontaneously flammable in air Extremely flammable liquefied gas Contact with water liberates highly flammable gases
Oxidizing Substances:	Contact with combustible material may cause fire Explosive when mixed with combustible material
Toxic Substances:	(Very) toxic if swallowed (in contact with skin, by inhalation) Danger of very serious irreversible effects Danger of serious damage to health by prolonged exposure Harmful if swallowed (in contact with skin, by inhalation) Possible risk of irreversible effects May cause sensitization by inhalation
Irritants	Irritating to skin (to eyes, to respiratory system) May cause sensitization by skin contact Risk of serious damage to the eyes
Corrosive	Causes severe burns Causes burns
Other Properties	Explosive when dry Forms very sensitive explosive metallic compounds Heating may cause an explosion Explosive with or without contact with air Reacts violently with water Explosive when mixed with oxidizing substances In use, may form flammable/explosive vapour-air mixture May form explosive peroxides Contact with water liberates toxic gas Contact with acids liberates (very) toxic gas Risk of explosion if heated under confinement
Examples of Precautionary Phrases:	Keep under ... (inert gas to be specified) Take off immediately all contaminated clothing Do not empty into drains Never add water to this product Take precautionary measures against static discharge Avoid shock and friction To clean the floor and all objects contaminated by this material use ... (to be specified by the manufacturer) In case of accident or if you feel unwell, seek medical advice Keep temperature not exceeding ... °C (to be specified by the manufacturer) Keep wetted with ... (appropriate material to be specified by the manufacturer) Keep only in original container Do not mix with ... (to be specified by manufacturer) Avoid exposure–obtain special instructions before use

For further information on EU labelling legislation, see *Legislation on Dangerous Substances*, Consolidated Text of Council Directive 67/548/EEC, Volume 1 (details and address in Chapter 8, "Resources").

Standard System for the Identification of the Fire Hazards of Materials National Fire Protection Association (NFPA) STANDARD 704

Application	Guideline only for firefighters during fire emergencies
Hazardous Substance Definition	Flammable liquids, gases, and volatile solids
Information Required on Label	• Identification of hazard: *Health, Flammability, Reactivity,* and *Special Hazards* (such as radioactivity and reactivity with water) • Degree of severity of hazard 0–4 (five Divisions) • Colour code used to identify the type of hazard. Blue signifies health hazard, red signifies a flammability hazard, yellow signifies a reactivity hazard
Format	Colour, code format
Discussion	The NFPA system is a code system intended primarily to provide protection for emergency response personnel, and does not provide descriptive information on the hazardous substance. The health hazard rating is based on the concept that a firefighter will normally receive a single exposure of short duration, that is, a few seconds up to 60 minutes. In contrast, workers routinely working with hazardous materials can be exposed for the duration of their working lives. If the NFPA system is used on workplace labels, a strong training program must be provided by the employer to ensure that workers are aware at all times of the meaning of colours, the relative hazard inferred by numbers, the code descriptors appropriate to each number, and the differences between the WHMIS and NFPA systems. Worker understanding of the hazards represented by a product must not be less than that communicated by WHMIS supplier labels and MSDSs. See Figure 4.19 for label formats and code descriptions. Refer to Chapter 8, "Resources," for the address for the NFPA.

Figure 4.19
Sample NFPA Label



NFPA Rating Summary		
Health Hazard (Blue)		
4	Danger	May be fatal on short exposure. Specialized protective equipment required.
3	Warning	Corrosive or toxic. Avoid skin contact or inhalation
2	Warning	May be harmful if inhaled or absorbed
1	Caution	May be irritating
0		No unusual hazard
Flammability (Red)		
4	Danger	Flammable gas or extremely flammable liquid
3	Warning	Flammable liquid flash point below 100 °F
2	Caution	Combustible liquid flash point of 100 °F to 200 °F
1		Combustible if heated
0		Not combustible
Reactivity (Yellow)		
4	Danger	Explosive material at room temperature
3	Danger	May be explosive if shocked, heated under confinement or mixed with water
2	Warning	Unstable or may react violently if mixed with water
1	Caution	May react if heated or mixed with water but not violently
0	Stable	Not reactive when mixed with water
Special Notice Key (White)		
4	W	Water reactive
3	Oxy	Oxidizing agent

American National Standard for Hazardous Industrial Chemicals Precautionary Labelling, ANSI Standard Z129.1-1994

Application	Industrial workplace, recommendation only
Responsibility for Labelling	Manufacturer
Hazardous Substance Definition	A chemical or mixture of chemicals that is toxic, highly toxic, irritant, corrosive, a strong oxidizer, a strong sensitizer, combustible, flammable, extremely flammable, dangerously reactive, or pressure-generating, or that otherwise may cause substantial personal injury or illness, during or as a direct result of any customary or reasonable foreseeable handling
Information Required on Label	• Identification of primary hazardous ingredients • Signal word – *Danger! Warning! Caution!* and statement of hazards • Precautions, for example, *Keep away from Heat, Sparks & Open Flame!* • First aid treatment and notes to physician • Instructions in case of fire, spill, or leak • Instructions for container handling and storage • For highly toxic chemicals, the word *poison* and skull and crossbones symbol
Format	Language format
Discussion	The ANSI Standard was developed by a technical committee of the Chemical Manufacturers' Association (U.S.) and relies strongly on simple phrases to provide label warnings. This simplicity and directness can reduce the confusion that is sometimes found with the colour and code formats of the NFPA. However, the system does not require the preparation of MSDSs. See Figure 4.20 for a sample label.
Risk Phrases	• ANSI suggests that the relative degree of severity of an immediate hazard be specified (in diminishing order) with the signal words *DANGER!, WARNING!,* and *CAUTION!* • ANSI suggests that if a product has more than one hazard, only the signal word corresponding to the greatest immediate hazard be used. • ANSI suggests that if signal words for delayed hazard are used, the words be different from those used for immediate hazard. • ANSI recommends that statements of hazard cover each hazard present in connection with the customary or reasonably foreseeable handling, use, or misuse of the chemical. Statements for immediate hazard should precede those for delayed hazard. Most serious immediate hazards should be placed first and delayed hazards should be grouped.

Examples of Risk Phrases

Hazard	Risk Phrase[1]
Highly toxic (by absorption)	DANGER! MAY BE FATAL IF ABSORBED THROUGH SKIN.
Strong sensitizer (lungs)	(DANGER! OR WARNING!)[2] May cause (severe)[3] allergic respiratory reaction
Physiologically inert vapour or gas	CAUTION! (Vapour) (Gas)[2] reduces oxygen available for breathing.
Known human carcinogen	CANCER HAZARD (Contains material which)[4] can cause cancer. Risk of cancer depends on duration and level of exposure.[5]
Probable human carcinogen	SUSPECT CANCER HAZARD (Contains material that)[6] may cause cancer. Risk of cancer depends on duration and level of exposure
Substance known to be teratogenic to humans	BIRTH DEFECT HAZARD (Contains material that)[7] can cause birth defects.

1 This material is reproduced with permission from American National Standard (Z129.1-1994), copyright 1995 by the American National Standards Institute. Copies of this standard may be purchased from the American National Standards Institute (see Chapter 8, "Resources," for the address).
2 Select appropriate word.
3 Use word or phrase where appropriate.
4 Phrase to be used for mixtures. Specific chemical component may be identified.
5 Use phrase when appropriate
6 Phrase to be used for mixtures. Specific chemical component may be identified.
7 Use phrase when appropriate.

Examples of Precautionary Statements

Circumstance or Hazard	Precautionary Statement[1]
Metal Drums(with Class B liquids)	• Drum should be grounded and bonded to receiving container(s) when being emptied.
Plastic Containers with Liquids	• Never use pressure to empty; drum is not a pressure vessel. • Keep container out of sun and away from heat.
Fibre Drums	• Do not drop onto, or slide across, sharp objects.
Inhalation	• Avoid breathing (dust, vapour, mist, etc.). • Use ventilation adequate to keep exposures below exposure limits. • Do not enter places where used or stored until adequately ventilated. Use only with adequate ventilation and in closed systems. • This gas deadens the sense of smell. Do not depend on odour to detect presence of gas.
Elimination of Ignition Sources	• Use explosion-proof electrical (ventilating and lighting) equipment. Do not smoke or use matches or lighters during use until all vapours (odours) are gone. • Static charges can accumulate during shipping, unloading, pouring or conveying. To avoid fire or explosion, ground and bond container and receiving equipment (and ground personnel) before transferring material.

1 This material is reproduced with permission from American National Standard (Z129.1-1994), copyright 1995 by the American National Standards Institute. Copies of this standard may be purchased from the American National Standards Institute (see Chapter 8, "Resources," for the address).

Figure 4.20
Sample Labels Based on ANSI Standard Z129.1–1994

HAZARD
Oxidizer
Irritant, Moderate Skin

Chemical Name
DANGER

STRONG OXIDIZER
CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE
MAY CAUSE SKIN IRRITATION

Keep away from contact with clothing, other combustible materials and skin.
Remove and wash contaminated clothing promptly.
Store in tightly closed container.
Wash thoroughly after handling.
FIRST AID: In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Wash clothing and thoroughly clean shoes before reuse.
Call a physician if irritation develops and persists.
In case of fire, flood with water.
Before using, read Material Safety Data Sheet (MSDS) for this chemical

HAZARDS OF MIXTURE:
Flammable Liquid that is Water-immiscible (F.P. 105 °F (40.6 °C), B.P. 210 °F (99 °C))
Irritant, Moderate Respiratory and Skin
Nervous System Effects (Delayed Hazard Based on Generally Accepted, Well Established Evidence in Humans)
Component A Contributes Substantially to Hazard, Component B Does Not.

WARNING!

FLAMMABLE LIQUID AND VAPOR
MAY CAUSE RESPIRATORY TRACT AND SKIN IRRITATION

ATTENTION! CONTAINS "A," WHICH CAN CAUSE NERVOUS SYSTEM EFFECTS

Keep away from heat, sparks, and flame.
Avoid breathing vapour or mist.
Avoid contact with skin and clothing.
Use with adequate ventilation.
Keep container closed.
Wash thoroughly after handling.

FIRST AID: If inhaled, remove patient to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. **Call a physician.**
In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention immediately if irritation develops and persists. Wash clothing and thoroughly clean shoes before reuse.
In case of fire, use water spray (fog), foam, dry chemical or CO_2
Residual vapors may explode on ignition; do not cut, drill, grind, or weld on or near this container.
Flash Point = 105 °F (40.6 °C). OSHA Storage Class II.
For additional information, see Material Safety Data Sheet (MSDS) for this material.

Appendix 4C
Supplier Label Checklist

Product Identifier:

☑ Information present as required.

☒ Information missing or incomplete.

A. VERIFY CLASSIFICATION OF PRODUCT			
 ❒ Class A	 ❒ Class B1 ❒ Class B2 ❒ Class B3 ❒ Class B4 ❒ Class B5 ❒ Class B6	 ❒ Class C	 ❒ Class D1A ❒ Class D1B
 ❒ Class D2A ❒ Class D2B	 ❒ Class D3	 ❒ Class E	 ❒ Class F

B. INFORMATION REQUIREMENTS	COMMENTS
❒ Product Identifier	
❒ WHMIS Hazard Symbols	
❒ Risk Phrases *(specific)*	
❒ Precautionary Statements *(specific)*	
❒ First Aid Measures *(specific)* ❒ Inhalation ❒ Eye Contact ❒ Skin Contact ❒ Ingestion	
❒ Supplier Identifier	
❒ Reference to the MSDS	
C. OTHER REQUIREMENTS	
❒ WHMIS Hatched Border	
❒ English and French *(within border)*	
❒ Colour *(not in conflict with TDG)*	
❒ Legible	

Liste de Contrôle du Fournisseur

Identificateur du produit:

☑ Information present as required ☒ Renseignements manquants ou incomplets

A. VERIFIER LA CLASSIFICATION DU PRODUIT			
 ❒ Classe A	 ❒ Classe B1 ❒ Classe B2 ❒ Classe B3 ❒ Classe B4 ❒ Classe B5 ❒ Classe B6	 ❒ Classe C	 ❒ Classe D1A ❒ Classe D1B
 ❒ Classe D2A ❒ Classe D2B	 ❒ Classe D3	 ❒ Classe E	 ❒ Classe F

B. RENSEIGNEMENTS EXIGÉS	COMMENTAIRES
❒ Identificateur du produit	
❒ Symboles de danger du SIMDUT	
❒ Phrases indiquant un risque *(spécifiques)*	
❒ Énoncés de précaution *(spécifiques)*	
❒ Mesures de premiers soins *(spécifiques)* ❒ Inhalation ❒ Contact avec les yeux ❒ Contact avec la peau ❒ Ingestion	
❒ Identificateur du fournisseur	
❒ Référence à la FS	
C. AUTRES EXIGENCES	
❒ Bordure hachurée du SIMDUT	
❒ Anglais et français *(à l'intérieur de la bordure)*	
❒ Couleur *(non en conflit avec le TMD)*	
❒ Lisible	

CHAPTER 5

The Material Safety Data Sheet

5

GUIDE TO CHAPTER 5

APPENDICES

5.1 Introduction

5.1.1 What Is a Material Safety Data Sheet?

Definition

A material safety data sheet is a technical document that provides detailed and comprehensive information on the following aspects of a controlled product:

- Health effects of acute or chronic exposure to the product
- Hazard evaluation related to the product's storage, handling, use, and disposal
- Measures to protect workers at risk of overexposure
- Emergency procedures

The MSDS is a document, in hard copy or electronic format, that meets the availability, design, and content requirements of WHMIS legislation. The legislation provides for flexibility of design and wording, but requires that a minimum number of information categories be completed and that all hazardous ingredients meeting certain criteria be listed, subject to exemptions granted under the *HMIRA*.

5.1.2 The Purpose of the MSDS

Purpose

The MSDS is the second element of the WHMIS information delivery system, and supplements the alert information provided on labels. The third element of the system is the education and training of workers in hazard information on controlled products, including instruction in the content and significance of information on the MSDS.

The MSDS is an essential starting point in the development of a worksite program for the safe use of controlled products. It serves as:

- A technical information reference
- A starting point for the implementation of control measures to protect workers
- A document that can be distributed to persons in work areas where the product is used and to those with responsibilities related to MSDS content, for example, health and safety coordinators and committees, first aid personnel, and fire response teams
- A key element of worker education and training
- A simple means for updating a program when revisions to MSDSs become available

An MSDS cannot represent all the information needed for the safe use of a product. Product use and the potential for worker exposure vary from one work location to another. The variety of required protective measures cannot be anticipated through one data sheet. Therefore, the development of jobsite instructional materials and written work procedures, based on the MSDS, may be necessary to provide plainly written direction to workers.

An MSDS is not a document that is meant to be read once and filed. The MSDS must be incorporated into an *active* program of worker protection.

5.2 Responsibility for the Production and Availability of MSDSs

The supplier and employer each have responsibilities that must be met to ensure the proper implementation of the WHMIS MSDS system.

5.2.1 The Supplier

The supplier is required to meet these responsibilities:

Preparing MSDSs

- Develop or obtain an MSDS for each controlled product imported or sold for use in a workplace as required by Sections 13(*a*) and 14(*a*) of the *HPA* and Part I of the *CPR*. This applies to all products except:

Exemptions

CPR 10

- Products from a laboratory supply house, packaged in quantities of less than 10 kg, intended for laboratory use, and labelled as per the *CPR* (that is, labels display all information required for an MSDS)

CPR 9

- Laboratory samples, packaged in quantities of less than 10 kg and labelled as per the *CPR*, as shown on page 105 of this manual

If laboratory samples are intended for research and development, and an MSDS is required, the MSDS need not disclose the chemical identity of ingredients if the generic chemical identity is disclosed.

Ensuring accuracy and completeness

- Ensure that the MSDS for a controlled product:
  - Discloses information that is current and complete at the time of sale.
  - Shows a date of no more than **three years** before the date of sale or importation, and is updated when this period expires or as soon as new information becomes available
  - Is available in both English and French at the time of sale.

Supplying MSDSs

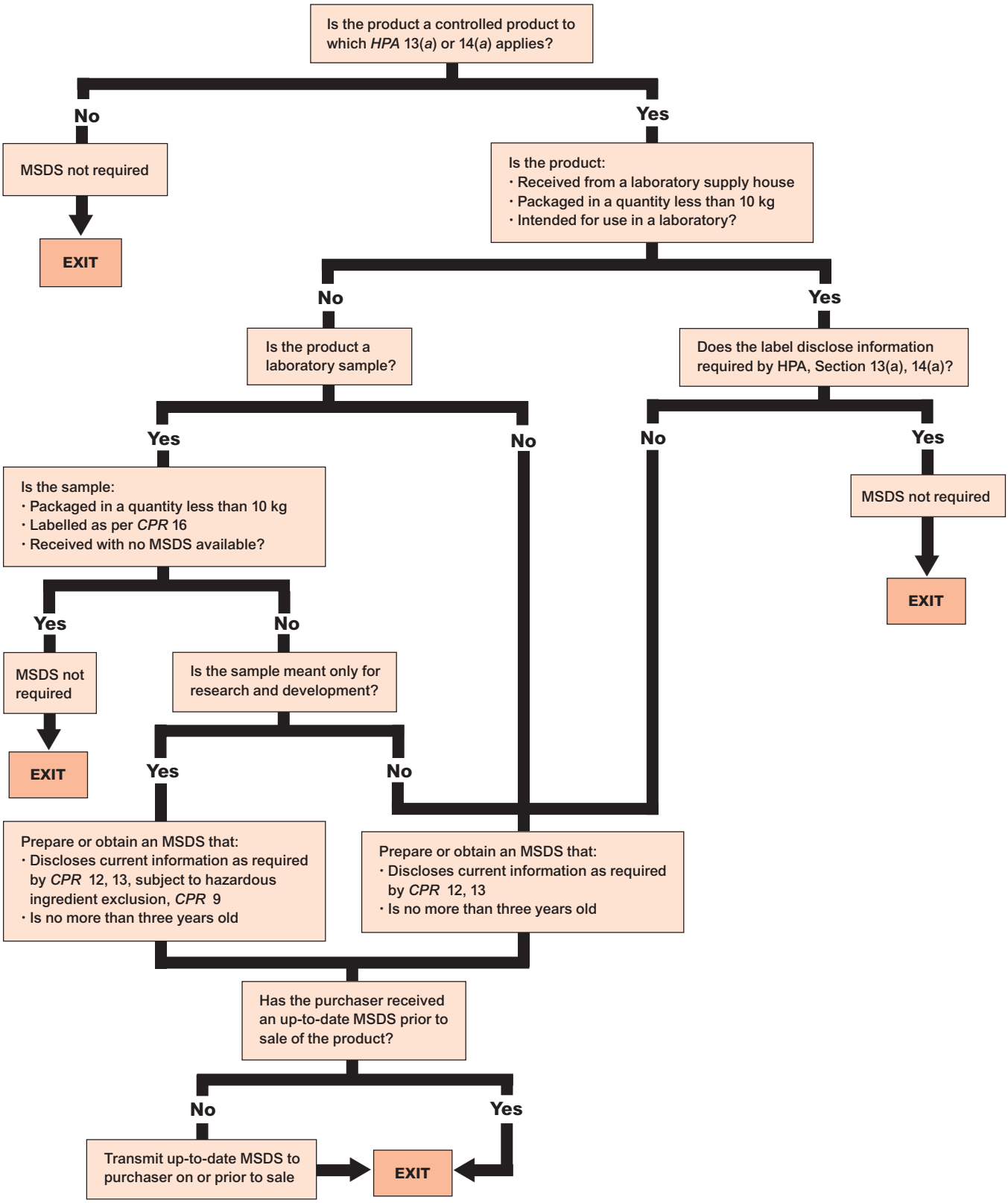
- Transmit to the purchaser, on or prior to the date of sale of a controlled product, a copy of a current MSDS, unless the purchaser has already received it. The MSDS must be provided in the official language or languages requested by the purchaser.

Disclosing information

- Identify, subject to the *HMIRA*, at the request of an inspector:
  - Any person to whom a controlled product is sold
  - Any user of a controlled product
  - The source of information for any toxicological data used to prepare any MSDS pursuant to paragraph 13(*a*) of the *HPA*, or obtained or prepared by the supplier pursuant to paragraph 14(*a*) of the Act.
- Provide any information in the supplier's possession (referred to in paragraph 13(*a*) of the Act) to any physician or nurse who requests that information for diagnosis or medical treatment in an emergency.

Supplier responsibilities for developing and providing MSDSs are summarized in the Decision Tree in Figure 5.1.

Figure 5.1
The MSDS: Supplier Decision Sequence



5.2.2 The Employer

The employer must fulfil these responsibilities:

Checking MSDSs

- Ensure that an up-to-date and complete supplier MSDS is obtained from a supplier the first time a controlled product is received in the workplace.
- Determine the date of preparation for each MSDS received.

Updating and preparing MSDSs

- Obtain from a supplier an up-to-date supplier MSDS for each MSDS at the worksite that was prepared more than three years earlier.
- Add any new hazard information to the supplier MSDS, on the basis of the ingredients already disclosed on the document, if the supplier is unable to provide an updated MSDS (if, for example, the supplier has gone out of business or no longer produces the material in question).
- Prepare an MSDS that discloses the information required by WHMIS legislation if the employer produces a controlled product (other than a fugitive emission or intermediate products formed and consumed during reaction inside a vessel) in the workplace.
- Update each employer-prepared MSDS, in both these circumstances:
  - As soon as is practical when new hazard information becomes available to the employer
  - At least every **three years**

  Fulfil supplier responsibilities for providing current and properly prepared MSDSs, if the employer directly imports controlled products for workplace use or sale.
- Produce a new MSDS, if the employer or worker adds an ingredient to a bulk chemical purchase (for example, a specific additive to bulk fuel). The new MSDS must disclose the new ingredient and any change to information on the MSDS, particularly to sections on health hazards. If the new additive is already present in the bulk material, and the amount added is small (less than 0.1%), a new MSDS will not be required.

Ensure availability

- Ensure that copies of all MSDSs required for the workplace are readily available at the worksite to:
  - Workers who may be exposed to the controlled product
  - The joint health and safety committee, if any, or to a health and safety representative, if any

NOTE: *Readily available* generally means that the worker has the right to read the MSDS before using the product. *Readily available* implies that a paper or electronic file of MSDSs is accessible to any worker.

If MSDSs are available on a computer terminal, the employer must keep the terminal in working order, make the MSDSs readily available upon request, and provide training on accessing computer-stored MSDSs to employees and members of the health and safety committee or the health and safety representative at these worksites. At least one person capable of accessing computer-stored MSDSs must be present on each shift.

In some organizations, workers can call up an MSDS from central storage in a computer operated by an external different agency. These MSDSs must be accessible within a few minutes for emergency response or first aid. If the central computer is accessible only during normal working hours, then an on-site file of MSDSs must be kept for products (for example, cleaning compounds) used during the “off” shifts. A centralized MSDS service is effective only if the employer maintains inventory control and either provides current MSDSs for all controlled products used onsite or ensures that the MSDSs provided by the service comply with legislation.

Providing education and training

- Ensure that a worker who works with a controlled product or in proximity to a controlled product is instructed in:
  - The content required on an MSDS
  - The purpose and significance of information on the MSDS

Instruction must ensure that workers know procedures for the safe storage, handling, use, and disposal of controlled products including procedures to follow in the event of an emergency involving a controlled product. Refer to Chapter 6 of this manual for information on "Worker Education and Training."

Disclosing information

- Provide information in the employer's possession on any controlled product in the workplace, including confidential business information, to a doctor or nurse who requests information on the product to make a medical diagnosis or give medical treatment in an emergency.

When the supplier has made an MSDS available to an employer, the employer may provide an MSDS that differs in format from the supplier MSDS, or that contains additional hazard information, as long as:

- The MSDS provided by the employer contains no less content than the supplier MSDS, unless a claim for exemption is filed in accordance with the *HMIRA*
- The supplier MSDS is also available at the workplace and the employer-provided MSDS indicates this fact

Employer produced MSDSs

Employer-produced MSDSs have the advantage of specificity: employers can include local regulatory requirements (for example, exposure limits and waste disposal requirements) and information on hazards and control measures specific to the circumstances at the worksite.

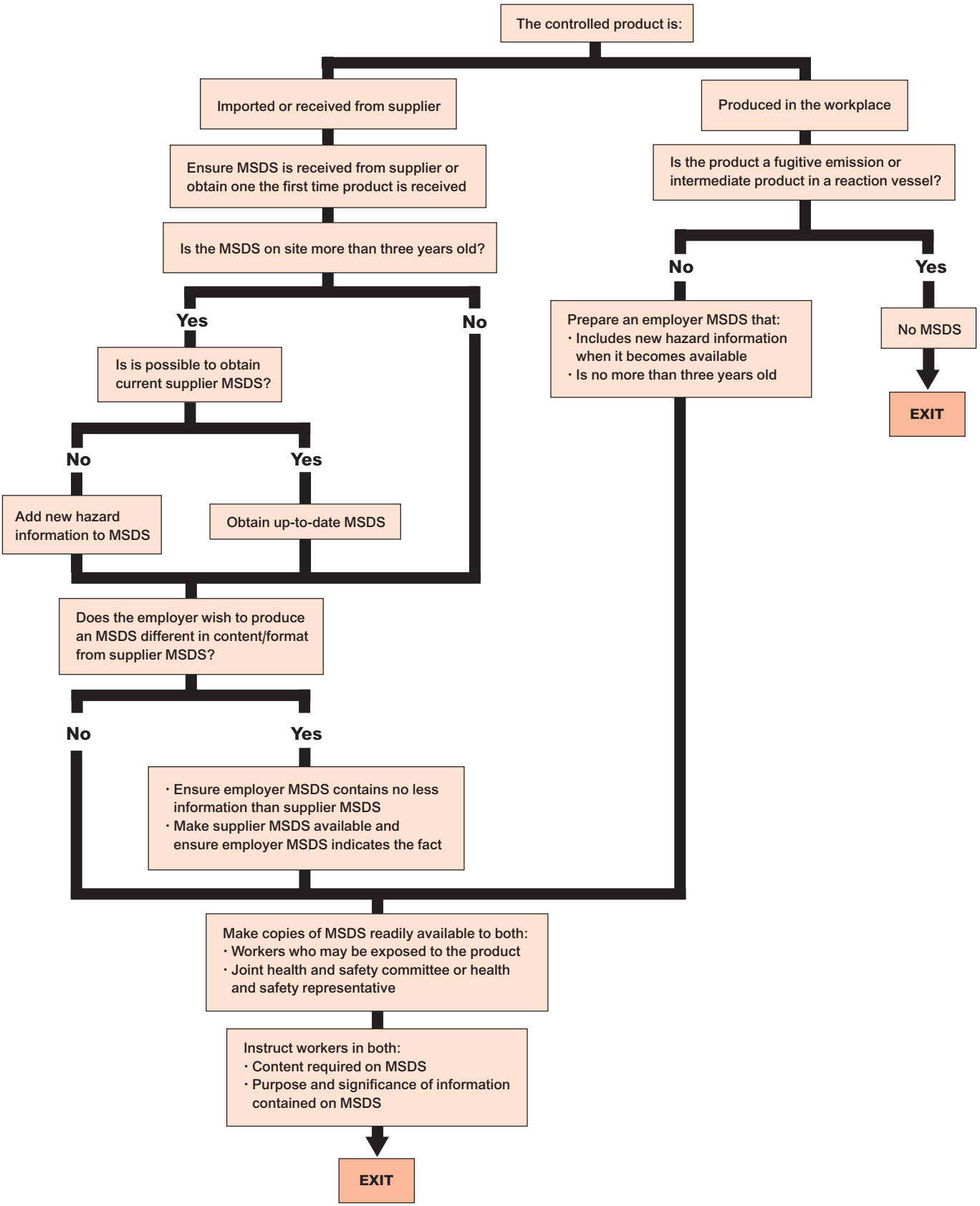
Employer responsibilities for preparing and providing MSDSs, as well as instructing workers, are summarized in the Decision Sequence in Figure 5.2.

5.2.3 The Worker

The worker has no direct responsibilities for preparing and supplying MSDSs. However, certain workers do play roles regarding provision of information on MSDSs at the worksite:

- The health and safety representative, or members of the joint health and safety committee, must have ready access to all MSDSs required at that workplace. Information from the MSDS may be used to advise on safe work procedures with a controlled product.
- The worker(s) trained (as required by WHMIS) to use the terminal if MSDSs are available on a workplace computer terminal must be prepared to make an MSDS available when needed.
- The joint health and safety committee or health and safety representative may discuss instruction on MSDSs during consultation (to be held at least annually) with the employer about instruction provided to employees on controlled products. (See Chapter 6, "Worker Education and Training.")

Figure 5.2
The MSDS: Employer Decision Sequence



5.3 MSDS Content, Design, and Completion

5.3.1 Content Categories and Information Items

A supplier MSDS must provide at least nine categories or sections of content displaying certain items of information. The categories must have the following, or similar, headings:

1. **Product Information:**
   Product identifier, product use, manufacturer and supplier names, addresses, and emergency telephone numbers
2. **Hazardous Ingredients:**
   A list of ingredients as required under *HPA* 13(*a*)(i) to (iv)
3. **Physical Data:**
   Parameters such as physical state, odour, or boiling point that physically characterize the product
4. **Fire and Explosion Hazard:**
   Characteristics of the substance that indicate the likelihood of its ignition under various conditions, and information on the means of extinction
5. **Reactivity Data:**
   Information on the chemical instability of the product and chemicals with which it may dangerously react
6. **Toxicological Properties:**
   Information on likely routes of entry to the body and the short-term (acute) and long-term (chronic) health effects from product exposure
7. **Preventive Measures:**
   Specific personal protective equipment, handling procedures, and engineering controls to be used during the product's shipping, storage, use, and disposal, and in emergency circumstances of leaks, spills, or other releases
8. **First Aid Measures:**
   Specific first aid measures related to acute effects of overexposure to the product
9. **Preparation Information:**
   Identification of those responsible for the MSDS and date of preparation

Figure 5.3 lists items of information (identified in Schedule I of the *CPR*) that must be included in the nine major sections on the MSDS. In addition, the MSDS must show any other hazard information about the controlled product of which the supplier is aware or ought reasonably to be aware.

The use of the ILO, ISO or EC 16-heading MSDS is acceptable in Canada, provided that all information items are addressed. An example is given in Appendix 5B, "The 16-section MSDS."

Figure 5.3
Types of Information on the MSDS (as listed in Schedule I of the *CPR*)

Category/Section	Information Item
Product Information	• Product identifier • Product use • Manufacturer's name, street address, city, province, postal code, and emergency telephone number • Supplier identifier and the supplier's street address, city, province, postal code, and emergency telephone number • Product identification number (PIN)
Hazardous Ingredients	• Information required by *HPA* 13(*a*)(i) to (iv) or *HPA* 14(*a*) • CAS number • LD_{50} (species and route) • LC_{50} (species and route)
Physical Data	• Physical state (gas, liquid, or solid) • Odour and appearance • Odour threshold • Vapour pressure • Vapour density • Evaporation rate • Boiling point • Freezing point • pH • Specific gravity • Coefficient of water/oil distribution
Fire or Explosion Hazard	• Conditions of flammability • Means of extinction • Flashpoint and method of determination • Upper flammable limit (% by volume) • Lower flammable limit (% by volume) • Auto-ignition temperature • Hazardous combustion products • Explosion data – sensitivity to mechanical impact • Explosion data – sensitivity to static discharge

Figure 5.3 Con't

Reactivity Data	• Conditions under which the product is chemically unstable • Names of any incompatible substances or classes of substances • Conditions of reactivity • Hazardous decomposition products
Toxicological Properties	• Route of entry, including skin contact, skin absorption, eye contact, inhalation, and ingestion • Effects of acute exposure to product • Effects of chronic exposure to product • Exposure limits • Irritancy of product • Sensitization to product • Carcinogenicity • Teratogenicity • Reproductive toxicity • Mutagenicity • Names of toxicologically synergistic products
Preventive Measures	• Specific personal protective equipment to be used • Specific engineering controls to be used • Procedures to be followed in case of leak or spill • Waste disposal • Handling procedures and equipment • Storage requirements • Special shipping information
First Aid Measures	• Specific first aid measures
Preparation Information	• Name and phone number of group, department, or party responsible for preparation of MSDS • Date of preparation

5.3.2 Design of the MSDS

Performance-based design

The design of the MSDS is performance based; that is, the supplier may adopt any design as long as all the necessary information specified in the *CPR* is provided. Section 12 of the *CPR* specifies that MSDS information be provided under nine headings. As an administrative policy, MSDSs using 16 headings, arranged in the order specified, that have been adopted by the ILO, ISO (Organization for International Standardization) and ANSI are acceptable. For example, the OSHA form-20 does not meet these standards, while the ANSI and ILO 16-section MSDSs are acceptable in Canada.

Information items may appear in the section to which they are assigned (as shown in Figure 5.3) or in any other appropriate section, except in two cases:

- Hazardous ingredients must always be listed in the "Hazardous Ingredients" section.
- The name and phone number of the group, department, or party responsible for the preparation of the MSDS, and the date of preparation, must always appear in the "Preparation Information" section.

Information disclosed under one heading is not required to be disclosed under another.

Headings

Acceptable headings

CPR 12(1)

Each of the nine categories/sections of information shown in Figure 5.3 must be identified by a heading identical or similar to that shown. For example, the section "Product Information" may display either the heading "Product Information" or the similar heading "Product Identification and Use." The headings may be given different emphases; that is, some may appear as subheadings, as long as all appear.

Unacceptable practices include:

Unacceptable headings

- Combining two headings into one, unless the information contained under the combined heading includes required subheadings similar to those shown in Figure 5.3. For example, if "Toxicological Properties" and "First Aid Measures" were combined into the single heading "Toxicological and First Aid Information," then the subheadings "Toxicological Properties" and "First Aid Measures" or similar subheadings must also appear.
- Replacing a required heading with a variety of other headings. For example, it is not permissible to replace the heading "Preventive Measures" with the headings "Special Protection Information," "Special Precautions," and "Spill or Leak Procedures."

Languages

Language requirements

CPR 24

The supplier MSDS must be available in English or French at the time of sale. The supplier must provide an MSDS in the official language or languages requested by the purchaser. If no preference is stated, the MSDS should be provided in the language used in the course of the business transaction. A request for an MSDS in both languages can be met by having both languages appear either together on one MSDS or separately on two.

Use of Symbols

WHMIS symbols

The MSDS may also include a copy of the hazard symbol(s) depicting the class(es) to which the product belongs. This addition would reinforce the link between label and MSDS intended by the WHMIS system and could assist with prompt recognition of primary hazard(s).

Example of an Acceptable Format

Design of the 9-section MSDS

To assist suppliers and employers, acceptable formats for the MSDS are provided in Appendix 5A, "The 9-section MSDS" and Appendix 5B, "The 16-section MSDS." In the basic (9-section) format:

- The sequence of sections follows a natural process of:
  - Identification and recognition of the product (Sections 1–3)
  - Evaluation of the risk (Sections 2–6)
  - Preventive measures (Section 7)
  - First aid measures (Section 8)
- Information sections that will likely be used together in the workplace are clustered in the same area of the sheet, for example, Sections 3 (Fire and Explosion Hazard) and 4 (Reactivity); Sections 6 (Toxicological Properties) and 8 (First Aid Measures)

Note: One disadvantage of the form MSDS is the limitation on space. Many suppliers and employers use a longer or open-ended format to permit easy inclusion of all required information. MSDSs should be as short and simple as possible, but still disclose all the pertinent information.

5.3.3 Completing the MSDS

This Part describes the general requirements for filling out MSDSs and the specific information expected for every information item listed in Schedule I of the *CPR* (and shown in Figure 5.3). Discussion of information items is organized section by section, for each of the nine sections of the MSDS using the 9-section format shown in Appendix 5A "The 9-section MSDS." For more information on Toxicological disclosure, refer to the WHMIS Information Bulletin #12, "Guidelines for Disclosure of Toxicological Information on an MSDS," published by Health Canada in June, 1997.

General Requirements

Consistency of information

- The information provided on the MSDS must incorporate and be consistent with all applicable information derived from classification of the product. Classification information can include:

Sources of information

  - Results from testing carried out on the product in accordance with Sections 34 to 66 of the *CPR*

    Evaluation and scientific judgement based on test results on the product or on similar products, including the use of classification lists and, where appropriate, documentation for the lists
  - Information of which the supplier is aware or ought reasonably to be aware, for Class D: Poisonous and Infectious Material

The supplier should be aware of information sources such as those available from CCOHS and CSST (Quebec), the CHEMINFO and Registry of Toxic Effects of Chemical Substances (RTECS) databases, and from relevant publications of regulatory agencies, industry or trade associations, and labour organizations related to occupational health and safety. Chapter 8 of this manual lists information sources and addresses of information agencies.

Disclosure of ingredients

- Subject to the *HMIRA*, the MSDS must disclose the identity of all ingredients in a controlled product falling within the criteria set out in paragraph 13(a) of the *HPA*.

  No headings or subheadings may be left blank. All information items listed in Figure 5.3 must be disclosed if they are available and applicable. If an item of information is not available or applicable, the MSDS must indicate that fact, in English with the words "not available" or "not applicable," and in French with "pas disponible" or "sans objet," as the case may be.

Use of "not available," "not applicable"

  Short forms of these statements are allowed as long as the distinction between the two is clear. For example, in English, the ambiguous abbreviation *n.a.* is unacceptable because it can mean either *not available* or *not applicable; n.av.* (not available) and *n.ap.* (not applicable), however, are acceptable. In French, the short forms *p.d.* and *s.o.* are acceptable. Short forms and abbreviations should be defined on the MSDS.

Available means that the person responsible for preparing the MSDS has the information or can obtain it. While the supplier need not test the product, information will often be available because the product has already been tested to determine if it meets some of the criteria. In addition, a reasonable search of the available literature must be undertaken; see Chapter 8, "Resources."

Applicable information is any information relevant to the safe handling, storage, use, or disposal of the product. Professional judgement must be used when determining applicability. For example, the belief that "vapour pressure" is not applicable to solids can be wrong. If a solid is assigned a low exposure limit, even a very small vapour pressure may be of concern. For example, if the vapour of the solid quinone filled an air space to its equilibrium vapour pressure, as might occur if quantities were spilled in an unventilated storage area, the concentration of quinone in air would be 300 times higher than the short-term exposure limit recommended by the ACGIH.

Units of measure

- Units of measurement must be identified where appropriate. For example, if an exposure limit for a vapour in air is 200 parts per million, the unit abbreviation ppm must be provided to avoid confusion with a second common unit of measurement, milligrams per cubic metre (mg/m^3).

Specificity of information

- Information should be as specific as possible. For example, if protective gloves are required when handling a product, the type of glove should be indicated. Gloves are available in a variety of materials (for example, neoprene, polyvinyl chloride, butyl rubber, or fluoroelastomer), which have different capabilities to resist chemical penetration. Information on preferred materials and, where appropriate, glove design is needed to properly assist the employer. The employer must adapt information from the MSDS to the specific circumstances of the workplace.

Interpretation of information

- If information on toxicological properties contradicts other toxicological data, the MSDS must include enough information to ensure that nobody is misled about the hazard. The general impression the information conveys must be taken into account.

  For example, if results from toxicity testing of a product are inconclusive or conflicting, this fact must be disclosed on the MSDS without implying that the product poses no hazard.

  General impressions can be created by style as well as by wording. For example, if a product is rated as carcinogenic to humans by IARC, but only as a suspect carcinogen by ACGIH, the higher rating (IARC) should be disclosed.

Disclaimers and contradictory information

- Information required on the MSDS must not be disclaimed or contradicted by other information that is not required but is also disclosed. Disclaimer statements are not required on a MSDS. An unacceptable disclaimer statement is:

  "Although this product meets the carcinogenicity criteria there is no proof that it causes cancer."

  NOTE: Disclaimer statements **do *not* diminish in any way** the responsibility of a supplier under the *HPA* to provide accurate information.

SECTION 1 — Product Information

Product Identifier		WHMIS Classification *(optional)*	
Product Use			
Manufacturer's Name		Supplier's Name	
Street Address		Street Address	
City	Province	City	Province
Postal Code	Emergency Telephone	Postal Code	Emergency Telephone

Section 1 provides product and manufacturer/supplier identification and a description of product use. This section is particularly useful for organizing MSDSs for quick retrieval and for contacting the manufacturer or supplier in emergencies.

Product Identifier

This item identifies the product by the generic name, trade name, brand name, common name, chemical name, code name, or code number specified by the supplier.

The identifier on the MSDS must be identical to the identifier on the product label. In certain cases, a generic MSDS (that is, a single MSDS that applies to more than one product) may be permitted. The generic MSDS should list the product identifiers for all of the different products to which the MSDS applies. (See Part 5.3.4 of this Chapter, "The Generic MSDS").

Product Use

This item specifies the product use(s) intended by the manufacturer or supplier. Uses other than those intended may pose a risk to workers. For example, a solvent meant for degreasing tanks may pose a significant risk to workers if used manually, due to the product's tendency to evaporate easily.

In some cases, items of information such as "Engineering Controls" or "Handling Procedures and Equipment," which appear in Section 7 of the MSDS on "Preventive Measures," will be based in part on product use.

Manufacturer Identifier—Name, Address, and Emergency Telephone Number

This item includes the name of the manufacturer and the location of the principal place of business.

If a supplier imports a controlled product for the supplier's own use, the supplier is not required to disclose the name and contact particulars of the manufacturer.

If a controlled product is packaged for a distributor by a manufacturer, the manufacturer is not required to disclose the name and contact particulars of the manufacturer, if the name and contact particulars of the distributor are disclosed.

The manufacturer emergency telephone number must be disclosed if it is available.

The MSDS must be updated when the emergency telephone number or other manufacturer identifiers are changed.

Supplier Identifier—Name, Address and Emergency Telephone Number

The supplier identifier discloses the name of the supplier of the controlled product. If the supplier is also the manufacturer, the manufacturer identifier data can be duplicated here, otherwise the supplier identifier will be distinct from the manufacturer identifier.

If a controlled product is sold to a distributor for sale or resale, the distributor is not required to disclose the name and contact particulars of the distributor, as long as the name and contact particulars of the manufacturer are disclosed.

A distributor who purchases a controlled product from another supplier is not required to add to the MSDS any particulars of the distributor as supplier. A distributor may, however, add distributor identifier information as long as it does not obscure supplier information required on the MSDS or confuse the reader.

The supplier emergency telephone number must be disclosed if it is available.

The MSDS must be updated when the emergency telephone number or other supplier identifiers are changed.

Optional Information Items

Five items of information not required in this section by the *CPR,* which the supplier or employer may wish to include, are technical chemical name, chemical family, chemical formula, molecular weight, and synonyms.

Technical Chemical Name

The technical chemical name is the scientific name of either a product that is a single chemical substance or the primary active ingredient in a product.

The technical name should follow the format of the nomenclature used by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS), or be a name that clearly identifies the chemical.

This information provides a technically accurate name that permits a comprehensive search of scientific literature. For example, in the plastics and fibreglassing industries, the product commonly called styrene has the IUPAC name *phenylethene*.

Note: The technical chemical name may appear in other areas of the MSDS to provide required information at those locations, as the product identifier for example, or, more commonly, as a means of identifying hazardous ingredients.

Chemical Family

The chemical family refers to the group to which a chemical belongs. A chemical family is a group of chemicals with similar component(s) in their structures and, consequently, somewhat similar chemical properties. Examples include acids, caustics, hydrocarbons, aldehydes, ketones, and amines.

A knowledge of chemical family may help determine patterns of chemical reactions, health effects on humans, antidotes for poisoning, or decomposition products. For example, the solvent acetone belongs to the ketone family. Ketones are highly reactive, flammable chemicals that have similar effects on humans including irritation of the eye, nose, and throat, and in high concentrations, narcosis.

Chemical Formula

A chemical formula shows the relative numbers of atoms of the different elements that make up a molecule of the compound.

Chemical formulas reflect the make-up of the chemical and the nature of its reactions. For example, the chemical formula for the solvent 1,1,1-trichloroethane is CH_3CCl_3. The chemical formula of this solvent can be used to predict that it will form the irritant products hydrochloric acid and phosgene on thermal decomposition.

Molecular Weight

The molecular weight of a chemical is calculated by adding the atomic weights of all the elements that make up the molecule. Gases and vapours with molecular weights exceeding 29 (the molecular weight of air) will likely sink on initial release in air, while those with molecular weights less than 29 will rise.

Note: Normally, gases and vapours eventually disperse evenly in air, irrespective of molecular weight. For example, one molecule of chlorine gas contains two atoms of chlorine, each with an atomic weight of 35.48, making the molecular weight of chlorine gas 70.96. Substantially heavier than air, chlorine gas will sink when first released, but gradually spreads uniformly into the air.

Synonyms

Additional names apart from the product identifier or chemical name will assist with the search for the hazard properties of the product. For example, the dry-cleaning solvent tetrachloroethylene has the synonyms perchloroethylene, perc, carbon dichloride, and ethylene tetrachloride.

SECTION 2 — Hazardous Ingredients

Hazardous Ingredients *(specific)*	**%**	**CAS Number**	**LD_{50} of Ingredient** *(specify species and route)*	**LC_{50} of Ingredient** *(specify species)*

Section 2 provides information on the identity and concentration of hazardous ingredients in a controlled product, and gives estimators of acute toxicity for these ingredients.

Chemical Identity and Concentrations of Ingredients:

The *HPA* requires that the exact chemical identity (IUPAC nomenclature or specific common name for a chemical; the name of the active biological organism for a biohazardous infectious material) of a pure substance, or the identity and concentration of any ingredient in a controlled product that is a mixture, be disclosed if the pure substance or ingredient is any of the following:

- A controlled product
- An ingredient included in the IDL and present in a concentration equal to or greater than the concentration specified on the list
- An ingredient that the supplier has reasonable grounds to believe may be harmful to any person
- An ingredient for which the toxicological properties are not known to the supplier

Section 4 of the *CPR* exempts controlled products (other than a complex mixture or an ingredient of a controlled product that is a complex mixture) from the application of Sections 13(*a*) and 14(*a*) of the *HPA* in either of two cases:

- The ingredient is present in a concentration of less than 0.1 % **by weight** if the ingredient is classified as Class D-2A, Very Toxic Material, as any of the following as defined in Sections 53-57 of the *CPR*:
  - Teratogen
  - Embryotoxin
  - Carcinogen
  - Reproductive toxin
  - Respiratory tract sensitizer
  - Mutagen
- The ingredient is present in a concentration of less than 1% **by weight** for any ingredient other than those classified as Class D-2A as outlined above, unless it is included in the *Ingredient Disclosure List* and the concentration specified is 0.1%.

Requirements to disclose ingredients may be waived in other specific circumstances:

- A controlled product is (or contains) a naturally occurring "complex mixture" such as turpentine, for which the identity and concentration of the ingredients in the mixture need not be disclosed if the generic name of the mixture and its concentration are disclosed. A complex mixture is a combination of *many chemicals,* with a *commonly known generic name,* that is either a naturally occurring substance, a fraction resulting from a separation of a naturally occurring mixture, or product resulting from a chemical modification of such a mixture. Examples are turpentine and compressed atmospheric air. Gasoline, to which various additives have been included, is not considered a complex mixture, nor is a synthetic mixture of gases that approximates atmospheric air.
- A lab sample is sold or imported solely to be tested for research and development, and the generic chemical identity of the ingredients are disclosed on the MSDS.
- An exemption has been granted pursuant to the *HMIRA*.
- A controlled product is (or contains) a flavour or fragrance for which the identity and concentration of the ingredients in the mixture need not be disclosed if the generic chemical identities and concentrations of the ingredients are disclosed.

If ingredients are not always present in the controlled product in the same concentrations, percentage disclosure ranges can be used as follows:

0.1–1%	10–30%
0.5–1.5%	15–40%
1–5%	30–60%
3–7%	40–70%
5–10%	60–100%
7–13%	

Ranges other than those listed may be used as long as both the upper and lower limits fall within any one of the specified ranges. If the concentration of ingredients in a series of controlled products covered by the same MSDS varies from batch to batch over a greater range than specified because of changes in raw materials or the location of withdrawal of the product from a process stream, and the hazard information for that series of products is otherwise the same, the supplier may disclose on the MSDS more than one range provided the reason for such disclosure is also given.

Percentage concentrations and concentration ranges reported on the MSDS must be one of the following ratios:

- The weight of the ingredient or complex mixture to the weight of the controlled product
- The volume of the ingredient or complex mixture to the volume of the controlled product
- The weight of the ingredient or complex mixture to the volume of the controlled product
- The mole percentage concentration

The MSDS must disclose which ratio is being used—weight/weight, volume/volume, weight/volume, or mole percentage concentration.

Note: While concentrations (and concentration ranges) in the list of hazardous ingredients reported on the MSDS may be expressed in any one of the four ratios, the concentration cutoffs of 1% and 0.1% used to determine whether an ingredient must be disclosed are based solely on a weight/weight ratio.

CAS Number

Registry numbers are assigned to chemical substances by the CAS Division of the American Chemical Society. For those chemicals on the IDL, the CAS number is given in column II of the list.

LD_{50} of the Ingredients

The LD_{50} is a measure of acute lethality that means, in a laboratory animal study, the single dose of a substance—expressed as the weight of a substance per unit weight of the body of the test animal—that is expected to cause the death of 50% of an animal population (for example, rats, rabbits, mice) when administered by a defined route (either oral or dermal). Lethal effects vary with both species and route.

CPR 12 (10) If the product is a mixture and the LD_{50} is determined by testing the mixture, the supplier **must** disclose the mixture LD_{50} in place of the LD_{50} of the ingredients.

The LD50 is an indicator of acute toxicity based on non-human mammals. It must be interpreted carefully in relation to the likelihood of human acute health effect and must never be considered an indicator of the likelihood of chronic effects.

LC_{50} of the Ingredients

CPR 44

The LC_{50} is a measure of acute lethality and means, in a laboratory animal study, the concentration of a substance in air or other medium that, administered over a specified period of time, is expected to cause the death of 50% of a defined animal population. LC_{50} in WHMIS are based on four-hour exposure periods. If test data is not available for four-hour periods, LC_{50} may be determined from other periods of exposure and adjusted to a four-hour equivalent with the formula on page 42 of this manual. As with LD_{50}, lethal effects vary with the species.

CPR 12 (10)

If the product is a mixture and the LC_{50} is determined by testing the mixture, the supplier **must** disclose the mixture LC_{50} in place of LC_{50} of the ingredients of the mixture.

The LC50 is an indicator of acute toxicity based on non-human mammals. It must be interpreted carefully in relation to the likelihood of human acute health effect, and must never be considered an indicator of the likelihood of chronic effects.

Note: If more than one LC_{50}/ LD_{50} are available for a tested mixture or ingredient, disclosure of the lowest value (lowest value in rat tests, or the lowest value found for another species if these are lower than those found in rats) is recommended.

WARNING! LC_{50} must never be confused with Exposure Limits. LC_{50} are indicators of the potential for extreme acute effect in a product, that is, death. Exposure limits are far lower than LC_{50} and are considered levels to which most workers can be exposed, day after day, without likelihood of adverse effect.

SECTION 3 — Physical Data

Physical State	Odour and Appearance		Odour Threshold (ppm)
Specific Gravity	Vapour Density (air = 1)	Vapour Pressure (mmHg)	Evaporation Rate
Boiling Point (°C)	Freezing Point (°C)	pH	Coefficient of Water/Oil Distribution

This section describes the physical characteristics of the product that are useful for recognising its presence, understanding its response to changes in the physical environment, and designing ventilation systems and emergency procedures.

Physical State

The physical state of the product refers to its form as a gas, liquid, or solid at room temperature. The physical state may also be a gel, powder, or paste. The product's physical state is important in determining containment needs for the product, and helps predict the response of the product to changes in temperature and pressure.

Odour and Appearance

A description of odour should include the *quality* of odour (for example, almond-like, fruity, sharp, sweet), its *intensity* (that is, strong, weak, mild, faint) and *irritant properties* rather than odour acceptability (pleasant, unpleasant). The *Harper List of Terms for Scaling Odour Quality*, which contains 44 odour categories, may be used for descriptions (see Chapter 8, "Resources," for this reference).

Appearance refers to characteristics such as *colour* (including colourless), *surface texture* (for example, greasy, waxy, soft) and *degree of aggregation* (for example, finely divided particulate, flaky, granular). Liquids can be described by their viscosity (that is, as being gelatinous, viscous, thick, or thin).

Odour Threshold

The odour threshold is the lowest airborne concentration of a chemical that can be perceived by the sense of smell, and is normally expressed as ppm or percent but may also be expressed in mg/m^3.

The odour threshold may be useful in evaluating the product's *warning properties*, which can be rated roughly as good, fair, or poor.

Rating Odour Thresholds

Warning Properties	Odour Threshold Level
Good	Odour threshold is less than 1/10 of exposure limit
Fair	Odour threshold is between 1/10 of exposure limit and three times above it (and the exposure limit is not a ceiling limit, nor could exposure up to three times the limit cause serious or irreversible health effects)
Poor	Odour threshold is three times or more above exposure limit.

Examples: Methyl bromide, which has an odour threshold between 80 mg/m^3 and 4,000 mg/m^3 and a TLV of 4 mg/m^3 (ACGIH TLV and BEI, 1999), has poor warning properties. Methyl methacrylate, with an odour threshold ranging from 0.2–1.4 mg/m^3 and a TLV of 410 mg/m^3 (ACGIH TLV and BEI, 1999), has good warning properties.

Odour threshold must be used with caution as a warning property, because individual sensitivities to odour vary; the human response to odour is not directly proportional to odourant concentration, and some odourants (such as hydrogen sulphide) may de-sensitize the sense of smell (olfactory fatigue).

If a product is a mixture of ingredients with different odour thresholds, professional judgement should be used to determine which one(s), when reported, provide the greatest level of protection.

Properly used, odour thresholds may be considered when selecting respiratory protection.

Vapour Pressure

Vapour pressure is the pressure exerted by a saturated vapour above a liquid or volatile solid in a closed container at 20°C (unless a different temperature is specified), and is commonly measured in millimetres of mercury (mmHg). One atmosphere equals 760 mmHg pressure. (1 mmHg is also called a "torr.")

Vapour pressure is one measure of the ability of a substance to form a vapour. Materials with high vapour pressures can be hazardous, particularly in enclosed, unventilated areas. Solids (for example, iodine) as well as liquids can have significant vapour pressures.

Given the vapour pressure at normal temperature (20°C), the concentration (in ppm) of the vapour in air under saturated conditions is estimated by the formula:

$$\frac{\text{Vapour Pressure (mmHg)}}{760\ \text{mmHg}} \times 10^6$$

Vapour Density

Vapour density refers to the weight of a given volume of a vapour or gas, compared to the weight of an equal volume of air. Vapour density is equal to the molecular weight of the gas or vapour divided by 29 (the molecular weight of air). Products lighter than air have vapour densities less than one (for example, helium, methane); those heavier than air have densities greater than one (for example, chlorine, carbon dioxide). The tendency of a gas to rise or fall in air depends not only on density, but also on temperature, air turbulence, and time. In normal circumstances a gas released into air will eventually mix evenly with it.

Vapour density can help determine air-testing strategies and ventilation procedures.

Evaporation Rate

The evaporation rate describes how quickly a particular material vapourizes (evaporates) in air relative to butyl acetate, ether, or another specified solvent, and may be classified as fast, medium, or slow. Because ether evaporates quickly compared to butyl acetate, the chemical used for comparison must be listed. Evaporation rates are useful for estimating the rate of onset of vapour hazard when a liquid or aerosol is exposed to air, which may have implications for potential health and fire hazards.

Classifying Evaporation Rates

Compared to normal butyl acetate — NBuAc (which is assigned a rate of 1.0) evaporation rates can be classified as:

FAST if rate is greater than 3.0
Examples: Methyl Ethyl Ketone (3.8), Hexane (8.3)

MEDIUM if rate is 0.8 to 3.0.
Examples: 95% Ethyl Alcohol (1.4), MIBK (1.6)

SLOW if rate is less than 0.8.
Examples: Xylene (0.6), Mineral Spirits (0.1)

Boiling Point

The boiling point marks the temperature at which a liquid becomes a gas, that is, the temperature at which the vapour pressure equals atmospheric pressure. Ranges may be disclosed for mixtures. Boiling points are determined at a pressure of 760 mmHg pressure unless otherwise indicated, and are significant because of the sudden volume change that occurs in the product and the extent of its presence in air as the boiling point is reached. Care must be taken to keep stored liquids below their boiling points.

Freezing Point (Melting Point)

The freezing or melting point is the temperature at which solid and liquid phases of a product are in equilibrium at a pressure of 760 mmHg. Volume changes that occur at the freezing point may rupture containers. Fluids are more difficult to contain than solids.

pH

pH numerically expresses the extent of acidity or alkalinity of a product, where 7 represents neutrality on a scale from 0 to 14. pH values lower than 7 indicate acidity (pH 0 to 3, high acidity); and greater than 7, alkalinity (pH 11 to 14, high alkalinity). The pH scale is logarithmic and one pH unit represents a factor of 10. pH is one predictor of the corrosive qualities of a product.

Specific Gravity

Specific gravity is an expression of the relative density of material. It is the ratio of the weight of a volume of the product to the weight of an equal volume of water at a specified temperature. An insoluble product with a specific gravity greater than one will sink in water, while a product whose specific gravity is less than one will float.

Coefficient of Water/Oil Distribution

The coefficient of water/oil distribution is the ratio of a product's partitioning between "oil" and water when they are in contact. (In technical terms, it is called the "water-octanol partition coefficient" because the laboratory test to determine the coefficient is done with n-octanol).

A value of less than 1 indicates better solubility of the substance in oils and greases than in water. Such a product may be absorbed through the skin. A value greater than 1 indicates greater solubility in water than oils. This type of product could be absorbed by mucosal tissue of the eyes or lungs. This information can be useful when assessing first aid requirements, and selecting personal protective equipment.

The coefficient may also contribute to a general understanding of the affinity of the product for fatty tissue (called lipophilic properties) and the development of clean-up procedures for contaminated water bodies.

Optional Information Items

Two items of information not required by the *CPR*, but which the supplier or employer may want to include on the MSDS are *percent volatile* and *solubility in water*.

Percent Volatile (By Volume)

Percent volatile expresses the percentage of a liquid or solid (by volume) that will evaporate at ambient temperature. For example, butane is 100% volatile.

Solubility in Water (20°C)

The solubility in water gives the percentage concentration of material by weight in a saturated water solution at 20° C. Less than 0.1% is considered NEGLIGIBLE; 0.1–1% is SLIGHT; 1–10% is MODERATE; and more than 10% is APPRECIABLE. Solubility has implications for measures ranging from personal hygiene practices to spill clean-up procedures and fire-extinguishing agents. Water-soluble materials are easily absorbed by the mucous membranes of the nose and throat.

SECTION 4 — Fire and Explosion Data

Flammability ❒ Yes ❒ No	If yes, under which conditions?	
Means of Extinction		
Flashpoint (°C) and Method	Upper Flammable Limit *(% by volume)*	Lower Flammable Limit *(% by volume)*
Autoignition Temperature (°C)	Explosion Data — Sensitivity to Impact	Explosion Data — Sensitivity to Static Discharge
Hazardous Combustion Products		

Section 4 is for information for fire and explosion prevention, and design of emergency procedures. This section is particularly important when flammables, solvents, organic peroxides, explosives, metal dusts, and other unstable substances are used. If the product is not flammable or explosive, information in this section must state that fact.

Flammability

If the product meets the criteria for inclusion in class B, flammable and combustible materials, describe the conditions under which ignition could occur.

Means of Extinction

This item lists the types of extinguishers suitable for use on the burning product.

Standard firefighting agents include water, water fog, foam, alcohol foam, carbon dioxide, and dry chemical. For some chemicals, special materials are available.

Type A Fires from ordinary solid combustibles
Type B Fires from flammable liquids
Type C Fires from electrical equipment
Type D Fires from combustible metals

Special procedures to follow during firefighting, including personal protective equipment, because of unusual hazards of the product should be disclosed in this section. For example, calcium carbide, some reactive metals, and concentrated corrosives react dangerously with water. Compressed gas cylinders may explode in a fire unless cooled. A fine water spray may be necessary to prevent breakage or rupturing of some containers.

Flashpoint (°C) and Method

The flashpoint is the minimum temperature, under specified test circumstances, at which a liquid gives off enough vapour to ignite in the presence of a source of ignition such as an open flame or spark.

Flashpoints have been determined in both enclosed (termed *closed-cup*, or *cc*) and non-enclosed (termed *open-cup*, or *oc*) test systems. Flashpoints determined by closed-cup methods tend to be lower than those by open-cup methods. The lower the flashpoint of the material, the greater the hazard of vapour ignition.

Schedule IV of the *CPR* sets out four closed-cup methods for flashpoint determination, the appropriate method depending on the viscosity of the product and its use.

Flammable Limits in Air (Upper Flammable Limit [UFL] and Lower Flammable Limit [LFL]):

The UFL and the LFL are the upper (maximum) and lower (minimum) concentrations of a gas or vapour in air, between which an explosion or propagation of flame will occur when an ignition source is present. Flammable limits are sometimes termed *Explosive Limits*.

Limits are expressed in percent by volume of the gas or vapour in air. Above the UFL, the mixture is too rich to burn, and below the LFL, too lean. Both the flammable limits and the range of flammability (the UFL minus the LFL) are important factors to consider when evaluating and controlling fire hazard. The LFL can be used to determine the dilution ventilation required to reduce an explosive atmosphere to a level below the flammable range. If an atmosphere is above the flammable range, the UFL indicates the level below which the atmosphere will become explosive.

Auto-ignition Temperature

The auto-ignition temperature is the lowest temperature at which a vapour or gas will ignite, in the absence of a spark or flame. This is an important factor in areas where gases or vapours may be exposed to high temperatures or hot surfaces.

Hazardous Combustion Products

Hazardous products likely to be produced during burning or combustion of the product are identified in this section. Examples of such products include carbon monoxide, hydrogen cyanide, and chemical asphyxiants; various acid gases, aldehydes, and other chemicals with irritant or corrosive properties; and toxic monomers released from the thermal decomposition of plastics. Note: Hazardous combustion products should not be confused with hazardous decomposition products (Section 5).

Explosion Data - Sensitivity to Impact

This item allows a description of how likely the product is to explode as a result of mechanical impact caused, for example, by jarring during transport. Chemicals such as metal azides and acetylides are sensitive to physical shock.

Explosion Data: Sensitivity to Static Discharge

Gases, vapours, and dusts vary in ease of ignition when exposed to static discharge. Many flammable gases are easily ignited. For example, hydrogen sulphide and hydrogen have ignition energies of 0.07 and 0.017 millijoules, respectively. A number of flammable liquids yield vapours with ignition energies in the range 0.1–10.0 millijoules (one exception is carbon disulphide, which ignites with only 0.009 mJ of energy.) The minimum ignition energies for many dusts fall between 10 and 50 millijoules.

Some authorities distinguish three levels of risk: High Risk (less than 0.5 mJ), Moderate Risk (0.5–10 mJ), and Low Risk (more than 10 mJ). This section alerts workers to ground or bond containers of products that are sensitive to static discharge.

SECTION 5 — Reactivity Data

Chemical Stability ❒ Yes ❒ No	If no, under which conditions?
Incompatibility with Other Substances ❒ Yes ❒ No	If yes, which ones?
Reactivity, and Under What Conditions?	
Hazardous Decomposition Products	

This section provides information on the stability of the product and its likelihood of dangerous reaction with other chemicals. This information has implications for handling procedures and storage arrangements and may be useful in the prevention and control of fires or explosions.

Chemical Stability

A chemical is unstable if, either in the pure state or as produced or transported, it will vigorously polymerize, decompose, condense, or become self-reactive under *physical* conditions of shock, vibration, pressure, or temperature.

Some peroxides, azides, and various explosives are chemically unstable. The physical conditions that cause adverse reactions must be avoided when such materials are stored and handled.

Incompatibility

Two substances are incompatible if, when combined, they react dangerously and produce toxic or corrosive by-products, excessive heat, or explosions.

For example, strong mineral acids are incompatible with caustics; sodium is incompatible with water; flammable substances are incompatible with oxidizers.

Incompatible substances must be handled and stored to minimize the likelihood of contact.

Reactivity

This category includes information on reactivity other than those covered under “Chemical Stability” and “Incompatibility,” and the conditions under which reactivity can occur. For example, a monomeric product that is chemically stable in the presence of an inhibitor may violently polymerize if the inhibitor content is reduced. Such a reaction could cause a container to break and residual product to be spilled.

Hazardous Decomposition Products

This category must list dangerous products released if the substance is exposed to aging, heating, or oxidation, or is allowed to react. Examples include the formation of peroxides from various ethers and unsaturated cyclic compounds over time and the hydrolysis of chlorinated chemicals to release hydrogen chloride gas. Hazardous decomposition products differ from hazardous combustion products. Combustion products are produced when a substance is burned or exposed to extreme heat.

If aging is a factor, a shelf life and product test information should be provided where applicable in Section 7, "Preventive Measures."

SECTION 6 — Toxicological Properties

Routes of Entry ❒ Skin Contact ❒ Skin Absorption ❒ Eye Contact ❒ Inhalation ❒ Ingestion	
Effects of Acute Exposure to Product	
Effects of Chronic Exposure to Product	
Exposure Limits *(value, source, date)*	Irritancy *(if yes, explain)* ❒ Yes ❒ No
Sensitization *(if yes, explain)* ❒ Yes ❒ No	Carcinogenicity *(if yes, explain)* ❒ Yes ❒ No
Reproductive Toxicity *(if yes, explain)* ❒ Yes ❒ No	Teratogenicity *(if yes, explain)* ❒ Yes ❒ No
Mutagenicity *(if yes, explain)* ❒ Yes ❒ No	Synergistic Products *(if yes, explain)* ❒ Yes ❒ No

This section provides information on how a material is likely to enter the body and what short- and long-term health effects an exposed worker is likely to experience, including symptoms of exposure and aggravating effects on pre-existing medical conditions. Information in this section is an important determinant of the preventive and first aid measures to be disclosed; (see sections 7 and 8).

NOTE: If toxicological data provided on one part of the MSDS can be interpreted to qualify or contradict other toxicological data on the sheet, the MSDS must include sufficient details of toxicological studies to prevent misunderstanding of the nature and extent of the hazard posed by the controlled product.

Route of Entry

All primary routes of entry or areas of localized effect on the surface of the body should be indicated.

Some chemicals are capable of causing dermal effects on the skin, eyes, or mucosal surfaces. For example, many corrosives will cause localized skin or eye irritation or burns, and should be designated SKIN CONTACT and EYE CONTACT, respectively.

Products that contribute to the overall exposure of a worker by absorption through the skin, including mucosal membranes, are designated SKIN ABSORPTION. In its annual publication, *Threshold Limit Values and Biological Exposure Indices,* the ACGIH identifies chemicals with significant skin absorption properties with the notation SKIN. Many phenols, amines, alkyl lead compounds, and pesticides belong in this category.

If the product, as manufactured or under conditions of use, is likely to exist in an airborne state such as a fume, dust, fibre, mist, vapour, or gas, then INHALATION will be one route of entry. For example, liquids with high vapour pressures and rates of evaporation will often pose inhalation hazards.

Effects due to inhalation may result from short-term (acute) exposure (for example, to hydrogen sulphide), or long-term (chronic) exposure (for example, to free silica), or both (for example, to toluene diisocyanate).

INGESTION is listed as a route if a product is likely to cause adverse health effects when swallowed, for example, when transferred from contaminated fingers to the mouth during eating or drinking.

Routes of entry are important from a preventive viewpoint. Inhalation hazards often require air contaminant controls such as ventilation or, as a last resort, respiratory protection; dermal hazards call for skin protection; and ingestion hazards, for personal hygiene and other measures.

Effects of Acute Exposure to Material

Effects of acute exposure refer to adverse health effects resulting from short-term exposure to the material, as either a single exposure or multiple exposures occurring within a short time, usually 24 hours or less.

For example, an acute exposure to the chemical asphyxiant carbon monoxide can, depending on the dose, induce symptoms ranging from headache and dizziness to coma and death. In contrast, an acute exposure to a product such as free silica is unlikely to induce immediate adverse health effects, although short-term inhalation of very high concentrations of fine silica-containing dust may cause long-term health problems such as silicosis or lung cancer.

Recommended first aid procedures should correlate with the potential effects of acute exposure to the controlled product.

Effects of Chronic Exposure to Material

These effects refer to health effects resulting from repeated exposure to the substance over a relatively long period of time. For example, recurrent exposure to low levels of carbon monoxide may initiate or enhance heart problems, particularly in individuals with predisposing conditions of heart disease, and repeated exposure to free silica in air may cause the lung disease, silicosis.

Exposure Limits

Exposure limits are the maximum levels of exposure to an airborne substance as recommended by bodies such as the ACGIH or NIOSH (National Institute for Occupational Safety and Health), or as legislated by a health and safety regulatory agency. Exposure limits generally represent conditions to which, it is believed, nearly all workers may be repeatedly exposed, daily, without adverse effect.

Because exposure limits may vary from one jurisdiction to another, supplier MSDSs should indicate the type of limit and source specified and include a statement advising employers to check with the local regulatory agency for the limit in effect in their areas. Employer-produced MSDSs should provide the exposure limit adopted by the local regulatory agency.

The ACGIH has defined three types of exposure limits:

- *Threshold Limit Value – Time-Weighted Average (TLV–TWA).* The time-weighted average concentration for a normal 8-hour work day or 40-hour work week to which almost all workers can be repeatedly exposed without adverse effect.
- *Threshold Limit Value – Short-Term Exposure Limit (TLV–STEL).* The maximum concentration to which workers can be periodically exposed for up to 15 minutes without suffering from irritation, chronic or irreversible tissue damage, or narcosis of sufficient degree to increase accident proneness, impair ability for self-rescue, or greatly reduce work efficiency.
- *Threshold Limit Value – Ceiling (TLV–C).* The concentration that must not be exceeded at **any** time. This limit applies to primary irritants or fast-acting substances for which the TLV–TWA is inappropriate.

If a product is a mixture, the supplier should provide exposure limits (where they exist) for the ingredients, particularly for the major ingredient(s) in the mixture and those having the lowest exposure limits.

If ingredients in a liquid mixture have similar toxic effects, TLV for the mixture (TLV_{mix}) may be calculated with the following equation, where f_i is the fraction of the i^{th} ingredient in the mixture with a $TLV_{i:}$

$$TLV_{mix} = \sum_{i=1}^{n} \frac{1}{f_i / TLV_i}$$

Exposure limits not only represent the maximum conditions of exposure believed to be safe for most workers, but also, when evaluated in relation to odour thresholds (see Section 3 of the MSDS), provide an estimate of the warning properties of the material.

Irritancy of Product

Provide information here on the *primary irritant* qualities of the material, that is, its capability to cause localized effects such as irritation, reddness, or swelling at the site of contact on the skin, eyes, or mucosal areas. Indicate the severity of irritation as mild, moderate, or severe. Chemical families that generally exhibit primary irritant qualities include amines and ketones.

This information is important for the selection of skin and eye protection and emergency wash facilities.

Sensitizing Capability of Product

A sensitizer is a substance that on first exposure likely causes little or no reaction in persons or test animals, but that on repeated exposure may cause a marked response not necessarily limited to the contact site. Skin sensitization is the most common form of sensitization in the industrial setting, although respiratory sensitization is also known. Isocyanates are an example of a family of sensitizers.

Appropriate dermal and respiratory protective controls must be disclosed on the MSDS to prevent sensitization of workers.

Carcinogenicity

This item describes the cancer-causing properties of the product. The substances included by reference to the following are considered to be carcinogens:

- Sections A1, A2, or A3 of the *Threshold Limit Values and Biological Exposure Indices*, as published by the ACGIH and amended periodically (Note: The CPR has not been amended to refer to the revised ACGIH categories.)
- Groups 1 or 2 in the *IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans*, as published periodically by IARC.

Information in this subsection may indicate, consistent with descriptors in each publication, the status of evidence, for example, “recognized carcinogen,” “suspect carcinogen,” “probably carcinogenic,” or “limited evidence of carcinogenicity.” If one agency ranks a product higher in carcinogenic potential than the other agency, the higher ranking is disclosed. See Chapter 2 for further information.

Information available from agencies such as the CCOHS, CSST, NTP (National Toxicology Program (U.S.)), or the EPA should also be disclosed, if this information is available to the supplier and applicable to the controlled product.

Teratogenicity and Embryotoxicity

Teratogenicity and *embryotoxicity* refer to the capability of a product to produce injuries in offspring of pregnant women exposed to the product at a concentration that has no adverse effect on the mother. For the MSDS, any indication of an adverse effect on fetal development or reproductive parameters, irrespective of the effect on the pregnant female, should be disclosed. Injuries include death, malformation, permanent metabolic or physiological dysfunction, growth retardation, or psychological or behavioural alteration that occurs during pregnancy, at birth, or in the postnatal period. The embryonic stage of the human fetus, during the first two to eight weeks of development, is particularly at risk of injury from such products. Methyl mercury is an example of a teratogen.

Reproductive Toxicity

Substances that cause reproductive toxicity (that is, sterility or adverse effect on reproductive capability) are included in Class D. Reproductive toxicity has implications for the capability to produce offspring as well as for teratogenicity and embryotoxicity.

Mutagenicity

Mutagenicity is the capability of a product to cause mutations in the genetic material of living cells. Changes to reproductive (germ) cells may result in heritable genetic effects. Changes to non-reproductive (body or somatic) cells may be associated with increased risk of other effects such as cancer. Males or females of a species may be at risk of adverse effect upon exposure to a product that is mutagenic to the species. Results of tests on bacteria, insects, and cells, as well as *in vivo* tests on living mammals and epidemiology studies on human populations, must be disclosed on the MSDS.

Synergistic Materials

The MSDS must list materials that interact with the controlled product to produce a toxic effect greater than the sum of effects of the material and the controlled product acting separately.

For example, carbon tetrachloride and ethanol together cause greater liver damage than either does alone. Exposure to asbestos and cigarette smoke has also been shown to produce a risk of lung cancer far greater than the sum of risks for exposure to either agent alone.

Optional Information Items

Two items of information not required on the MSDS, but which the employer may wish to provide here are the LD_{50} and LC_{50} for the product as a whole if the product is a mixture for which lethality tests have *not* been carried out. The lethality can be estimated from the lethality of the ingredients.

Note: If a product is a mixture that has already been tested to determine the LD_{50} or LC_{50} of the whole mixture that figure *must* be reported on the MSDS; it is *not optional*.

LD_{50} of the Product

The LD_{50} is a measure of acute lethality, and refers to the single dose of the substance that is expected to cause the death of 50% of a defined animal population in a laboratory study.

If the LD_{50} of the whole mixture has not been determined by testing, then the mixture LD_{50} is estimated as follows, based on components present in the mixture in proportions of 1% or more:

- If the acute lethalities are known for all such components, the LD_{50} for the mixture is the sum of those lethalities, as determined by the formula on page 41 of this manual
- If the acute lethalities are not known for all such components, the acute lethality of the mixture is assumed to be that of the most acutely lethal component

The route of exposure (oral or dermal) and species of test animal (for example, rat, mouse, rabbit) must be specified because lethal effects vary accordingly. Individual lethalities added to estimate a whole mixture lethality must be based on the same route of exposure, where possible, and one animal species.

LC_{50} of the Product

The LC_{50} is also a measure of acute lethality, and refers to the concentration of the substance in air that, when administered for a specified period by means of inhalation, is expected to cause the death of 50% of a defined animal population.

LC_{50}s in WHMIS are based on four-hour exposures. LC_{50}s determined in other exposure periods are adjusted to a four-hour equivalent by the formula given in Section 44 of the *CPR*. (Also see page 43 of this manual).

If the LC_{50} of the mixture as a whole has not been determined by testing, then the mixture's LC_{50} is determined as follows, based on components present in the mixture in proportions of 1% or more:

- If the acute lethalities are known for all such components, the LC_{50} for the mixture is the sum of those lethalities, as determined by the formula on page 41 of this manual
- If the acute lethalities are not known for all such components, the acute lethality of the mixture is assumed to be that of the most acutely lethal component.

The animal species must be specified as lethality will vary from one species to the next. The additive determination of acute lethality for a mixture based on the lethalities of its components should be based on results for one animal species.

SECTION 7 — Preventive Measures

Personal Protective Equipment	❒ Gloves	❒ Respirator	❒ Eye	❒ Footwear	❒ Clothing	❒ Other
If checked, specify type						
Engineering Controls *(specify, such as ventilation, enclosed process)*						
Leak and Spill Procedure						
Waste Disposal						
Handling Procedures and Equipment						
Storage Requirements						
Special Shipping Information					PIN	

This section provides clear direction on measures to protect worker health and safety during the transportation, storage, use, and disposal of the product, as well as emergency procedures related to accidental release. Information must be as specific as possible to ensure proper implementation of workplace health and safety programs. Employers must adapt information from the MSDS to the specific circumstances in each workplace.

Personal Protective Equipment

Workers must be protected by clothing and equipment designed specifically to protect against the particular hazards identified in the MSDS:

Gloves – Specify if contact with the hands is likely to be hazardous and whether the product is a primary irritant, sensitizer, or a substance capable of absorption through dermal tissue. Provide direction on the appropriate chemically resistant material (for example, neoprene, fluorocarbon, PVA, or natural rubber) and, where appropriate, glove design (for example, wrist, gauntlet).

Respiratory Equipment – Specify if the product is likely to constitute an inhalation hazard, in either normal circumstances or emergency situations, including any requirements for respiratory equipment. Selection of the proper respirator will be based on nature of the air contaminant, its warning properties and irritant qualities, and the level of exposure. See CSA Standard Z94.4-M1993 "Selection Care and Use of Respirators" for assistance. (See Chapter 8, "Resources," for reference.

Specify the appropriate type of unit (that is, disposable, cartridge or canister air filtering, powered air-purifying respirators (PAPRs), self-contained breathing apparatus (SCBA)), design of facepiece (half facepiece, full facepiece), and for air-filtering respirators, the type of filter (dust, mist, fume, acid gas, vapour). Respirators must meet standards of appropriate agencies (such as NIOSH, or occupational safety and health jurisdictions).

Note: A single respirator is not appropriate for all exposure situations. For example, in conditions immediately dangerous to life and health (IDLH), air-filtering respirators must not be used. IDLH levels for a controlled product, if known, should be included in this section.

Example:

A controlled product is an acid gas, with eye irritant properties, an exposure limit of 25 ppm, and an IDLH level of 300 ppm. An appropriate MSDS statement would be:

"Use respirator approved by NIOSH/MSHA — full face piece with cartridges (acid gas) for exposures up to 10X exposure limit; SCBA or supplied air with egress bottle above 300 ppm or other IDLH conditions."

Eye Protection – Specify if the product is likely to pose a hazard to the eyes. Provide information on the design (spectacles, eyecup, monogoggle, face shield), lens material, and circumstances of use. See CSA Standard Z94.3-M1982 "Industrial Eye and Face Protectors" for information on selection of eyewear (see Chapter 8, "Resources," for reference).

Footwear – Specify if the product might constitute a hazard to the lower leg and feet due to skin absorption, irritation or sensitization, and if the material can cause deterioration of normal footwear or constitute a slipping hazard. Specify the appropriate material and tread for the footwear, as well as the recommended height on the lower leg.

Clothing – Specify if the chemical might constitute a hazard through skin contact or absorption. Describe the appropriate type of clothing (for example, apron, vest, coveralls, chemically resistant suit) and material (that is, neoprene, nylon, PVC, polyurethane).

Other – Specify any other necessary protective items such as devices for thermal comfort and glove-jacket fastening devices.

Engineering Controls

This item provides information on recommended engineering controls such as ventilation, process enclosure, or process equipment design. Recommendations for ventilation systems may include dilution air volumes, preferred air movers, duct velocities, or duct material. Distinguish between local exhaust ventilation and general ventilation. See *Industrial Ventilation: A Manual of Recommended Practice,* published by the ACGIH, for technical information (see Chapter 8, "Resources," for reference).

Note: Engineering controls are usually preferred over the use of personal protective equipment as they control the problem at the source.

Leak and Spill Procedure

This item lists safe procedures to be followed in the event of leaks, spills, or other releases of the substances, including the appropriate:

- Protective equipment for emergency workers
- Neutralizing, adsorbing, or other control materials
- Safety procedures to take with the specific product, for example, a requirement to keep upwind of a leak, or to use only vacuum cleaning equipment fitted with high efficiency particulate air (HEPA) filters, etc.

Waste Disposal

Waste disposal information includes details related to:

- Waste container design
- Identifiers on waste containers consistent with WHMIS
- Preferred or required disposal locations
- Safe procedures for handling wastes, for example, "Do not burn," "Neutralize with (specify)," and "Provide charcoal adsorption."
- Agency(ies) to contact regarding disposal requirements. A statement about disposal of wastes in accordance with applicable environmental regulations should be included.

Handling Procedures and Equipment

Particular procedures and equipment may be needed for protection against primary and special hazards of the controlled product. Procedures must be consistent with precautionary measures on the product label. For example, with picric acid, "Do not allow to become dry during storage, handling, or use;" with strong corrosives, "Dilute by adding [the product] to water, NOT by adding water to [the product]."

Storage Requirements

Specific information may be essential for safe storage regarding:

- Temperature
- Control of ignition sources
- Separation of incompatible products
- Limits to shelf life
- Procedures to test for hazards; for example, describe the test for formation of explosive peroxides from some ethers
- Special storage information (for example, picric acid must be stored under water because it becomes explosive when dry; or, containers must be kept upright).

Special Shipping Information

This item details information related to the safe shipment of the product. Consider factors such as sensitivity to shock or sensitivity to temperature. The supplier may include reference to the TDG Class and Division.

Product Identification Number (PIN)

This item identifies the product by a PIN, a four-digit number identifying pure chemicals and groups of chemicals to help locate hazard information. The PIN to be disclosed is in respect of the product, not the ingredients in the product. PINs can be of UN or NA (North American) origin.

UN, and in some cases NA, numbers are used on labels and placards to identify dangerous goods in transport. Both UN and NA PINs can be found in Schedule II of the *TDG Regulations*. Emergency information on chemicals is organized by UN/NA numbers in the *Emergency Response Guide for Dangerous Goods* issued by CANUTEC, the Canadian Transport Emergency Centre.

SECTION 8 — First Aid Measures

Inhalation
Ingestion
Skin Contact
Eye Contact

This section provides information necessary for the safe evacuation and immediate treatment of a person experiencing acute effects of overexposure to the controlled product. Information is meant for use by workers on site, including first aid personnel. The measures described will normally expand on, and must always be consistent with, first aid measures on the label.

Specific Measures

This item outlines the steps for immediate treatment of an affected person. The form of treatment will vary with the degree of exposure to the product and its route of entry. *Separate procedures for the management of each route of entry (that is, inhalation, skin contact or absorption, and ingestion) will be necessary for most substances.* Steps should be organized in chronological order of importance. The first step in any first aid sequence is to safely remove the worker, wherever possible, from the source of contamination.

Also provide instructions to ensure the safety of first aid personnel (for example, respirators, gloves), and information on available antidotes or other forms of treatment that personnel at receiving facilities for the injured person (that is, hospitals, clinics) may need. Information on the signs and symptoms of sub-acute effects or early warning symptoms of chronic effects may also be of assistance.

NOTE: Space limitations on the MSDS may require that more complete written procedures be developed at the workplace for use by first aid personnel.

Example:

Acetone–First Aid

Inhalation: Remove source of contamination or move victim to fresh air.

Ingestion: If conscious, have victim rinse mouth thoroughly with water; do not induce vomiting; have victim drink 240–300 mL of water. Obtain medical attention immediately.

Skin contact: Flush with water for 15 minutes.

Eye Contact: Immediately flush contaminated eye(s) with lukewarm, gently flowing water for 20 minutes, while holding eyelids open. Obtain medical attention immediately.

SECTION 9 — Preparation Information

Prepared by *(group, department, etc.)*	Telephone Number	Preparation Date

This section requires the disclosure of information regarding the preparation of the MSDS. The *CPR* requires that MSDSs be kept current and that the date of preparation be no more than three years old.

5.3.4 The Generic MSDS

When the chemical composition of a group of controlled products is similar, a single, generic MSDS may, in some cases, be produced to apply to the entire group of products. For example, a generic MSDS might be permissible for a series of coloured paints if the only difference between products is the pigment used.

However, if for any product in the group, either of the following conditions exist, those differences must be disclosed on the generic MSDS:

- The concentration of one or more ingredients in one product falls into different reporting ranges than the same ingredient(s) in other products in the group
- Any other difference exists in the hazard information required to be disclosed on the product

For example, if the pigment used in a yellow-coloured paint is more toxic than other paints in the group, a note on the generic MSDS is required stating the yellow paint has the "following additional hazards..."

Reporting ranges are discussed on page 167.

Note: The concentration of ingredients in a series of controlled products covered by the same MSDS may vary from batch to batch over a range greater than those specified in the *CPR* because of changes in raw materials or the location of product withdrawal from a process stream. If this occurs, and the hazard information for that series of products is otherwise the same, the supplier may disclose more than one range on the MSDS provided the reason for such disclosure is also given.

The supplier must list the product names that appear on the labels for all the products to which the generic MSDS applies.

A generic MSDS must comply with all applicable requirements of the *CPR* and, to be effective, will be in a format that can be readily comprehended in the workplace. An example of a generic MSDS is shown in Appendix 5C, "The Generic MSDS."

Appendix 5A
The 9-section MSDS

The 9-section MSDS Checklist
Example of the 9-section MSDS Format
Example of a Completed 9-section MSDS

9-SECTION MSDS CHECKLIST

Review of 54 Items Required by *Controlled Products Regulations* (Schedule I)

Product Name: _____

☒ Missing or incorrect information
[ ] Optional Information (not required by *CPR*)

[WHMIS Class(es)]:

INFORMATION TO BE DISCLOSED ON AN MSDS					COMMENTS
1. Product Information					
❑ Manufacturer's name, street address, city, province, postal code, emergency telephone number					
❑ Supplier identifier, supplier's street address, city, province, postal code, and emergency telephone number					
❑ Product identifier					
❑ Product use					
2. Hazardous Ingredients					
Hazardous Ingredients (specific)	%	CAS#	LD_{50}	LC_{50}	
❑	❑	❑	❑	❑	
❑	❑	❑	❑	❑	
❑	❑	❑	❑	❑	
❑	❑	❑	❑	❑	
❑	❑	❑	❑	❑	
3. Physical Data					
❑ Physical state (gas, liquid, or solid)					
❑ Odour and appearance					
❑ Odour threshold (ppm)					
❑ Specific gravity					
❑ Vapour density (air = 1)					
❑ Vapour pressure (mmHg)					
❑ Evaporation rate					
❑ Boiling point (°C)					
❑ Freezing point (°C)					
❑ pH					
❑ Coefficient of water/oil distribution					

4. Fire or Explosion Hazard		COMMENTS
❑ Conditions of flammability		
❑ Means of extinction		
❑ Flashpoint (^{o}C) and method of determination (open-cup or closed-cup)		
❑ Upper flammable limit (% by volume)		
❑ Lower flammable limit (% by volume)		
❑ Autoignition temperature (^{o}C)		
❑ Hazardous combustion products		
❑ Explosion data – sensitivity to mechanical impact		
❑ Explosion data – sensitivity to static discharge		
5. Reactivity Data		
❑ Conditions under which the product is chemically unstable		
❑ Name of any substance or class of substance with which the product is incompatible		
❑ Conditions of reactivity		
❑ Hazardous decomposition products		
6. Toxicological Properties		
Route of entry: ❑ Skin contact ❑ Skin absorption ❑ Eye contact ❑ Inhalation ❑ Ingestion		
❑ Effects of acute exposure to product		
❑ Effects of chronic exposure to product		
❑ Exposure limits	Value (Date)	
❑ ACGIH		
❑ OSHA		
❑ Other		
❑ Irritancy of product		
❑ Sensitization of product		

Toxicological Properties continued…	COMMENTS
❑ Carcinogenicity ❑ IARC (1, 2A, or 2B) ❑ ACGIH (A1, A2, or A3)	
❑ Reproductive toxicity	
❑ Teratogenicity	
❑ Mutagenicity	
❑ Name of toxicologically synergistic products	
7. Preventive Measures	
Specific personal protective equipment: ❑ Respirator ❑ Gloves ❑ Eye protection ❑ Clothing ❑ Other	
Specific engineering controls to be used ❑ General ❑ Local exhaust ❑ Other (specify)	
❑ Procedures to be followed in case of leak or spill	
❑ Waste disposal	
❑ Handling procedures and equipment	
❑ Storage requirement	
❑ Special shipping information PIN	
8. First Aid Measures	
Specific First Aid Measures ❑ Inhalation	
❑ Eye Contact	
❑ Skin Contact	
❑ Ingestion	
9. Preparation Information	
❑ Name and phone number of the preparer	
❑ Date of preparation	

LISTE DE CONTRÔLE DE LA FS (9 SECTIONS)

Examen de 54 articles requis par les règles de produits contrôlés (annexe 1)

Identificateur du produit: _____

☒ renseignements incorrects ou manquants
[ ] renseignements optionnels (non requis par *RPC*)

[Classification SIMDUT]:

RENSEIGNMENTS À DIVULGUER SUR LA FICHE SIGNALÉTIQUE					COMMENTAIRES
1. Renseignements sur le produit					
❑ Nom du fabricant, adresse, ville, province, code postal, n° de téléphone d'urgence					
❑ Nom du fournisseur, adresse, ville, province, code postal, n° de téléphone d'urgence					
❑ Identificateur du produit					
❑ Usage du produit					
2. Ingrédients dangereux					
Ingrédients dangereux (précises)	%	Numéro CAS	DL_{50}	CL_{50}	
❑	❑	❑	❑	❑	
❑	❑	❑	❑	❑	
❑	❑	❑	❑	❑	
❑	❑	❑	❑	❑	
❑	❑	❑	❑	❑	
3. Caractéristiques physiques					
❑ État physique (gaz, liquide, ou solide)					
❑ Odeur et apparence					
❑ Seuil d'odeur (ppm)					
❑ Densité					
❑ Densité de la vapeur (air = 1)					
❑ Tension de vapeur (mmHg)					
❑ Taux d'évaporation					
❑ Point d'ébullition (°C)					
❑ Point de congélation (°C)					
❑ pH					
❑ Coefficient de répartition eau/huile					

4. Risques d'incendie ou l'explosion		COMMENTAIRES
❑ Conditions d'inflammabilité		
❑ Moyens d'extinction		
❑ Point d'éclair (°C) et méthode (coupe ouverte ou fermée)		
❑ Seuil maximal d'inflammabilité (% en volume)		
❑ Seuil minimal d'inflammabilité (% en volume)		
❑ Température d'auto-inflammation (°C)		
❑ Produits de combustion dangereux		
❑ Données sur l'explosion – Sensibilité aux chocs		
❑ Données sur l'explosion – Sensibilité aux décharges électrostatiques		
5. Données sur la réactivité		
❑ Conditions d'instabilité chminique		
❑ Nom des substances ou des catégories de substances avec lesquelles le produit est Incompatible		
❑ Conditions de réactivités		
❑ Produits de décomposition dangereux		
6. Propriétés toxicologiques		
Voies d'administration: ❑ Contact avec la peau ❑ Absorption par la peau ❑ Contact avec les yeux ❑ Inhalation ❑ Ingestion		
❑ Effets de l'exposition aiguë au produit		
❑ Effets de l'exposition chronique au produit		
❑ Limites d'exposition	valeurs, (date)	
❑ ACGIH		
❑ OSHA		
❑ Autre		
❑ Propriété irritante		
❑ Sensibilisation		

Propriétés toxicologiques continued…	COMMENTAIRES
❑ Cancérogénicité ❑ CIRC (1, 2A, or 2B) ❑ ACGIH (A1, A2, or A3)	
❑ Effects toxiquessur la reproduction	
❑ Tératogénicité	
❑ Mutagénicité	
❑ Nom des produits toxicologiquement synergiques	
7. Mesures préventives	
Dispositifs de protection personnelle (préciser le type): ❑ Respirateur ❑ Gants ❑ Yeux ❑ Vêtements ❑ Autre	
Mécanismes techniques particuliers à utiliser ❑ Général ❑ Échappement local ❑ Autre (spécifiez)	
❑ Mesures à prendre en cas de fuite ou de déversement	
❑ Élimination des résidus	
❑ Méthodes et équipement our la manutention	
❑ Exigences en matiére d'entrposage	
❑ Renseignements spéciaux en matiére d'expédition ❑ NIP	
8. Mesures de premiers soins	
Premiers soins particuliers à administrer ❑ Inhalation	
❑ Contact avec les yeux	
❑ Contact avec la peau	
❑ Ingestion	
9. Renseignements sur la préparation	
❑ Préparé par (Groupe, Service), Numéro de téléphone	
❑ Date de préparation (date originale ou date de la dernière révision)	

MATERIAL SAFETY DATA SHEET — 9 Sections

SECTION 1 — PRODUCT INFORMATION

Product Identifier		WHMIS Classification *(optional)*	
Product Use			
Manufacturer's Name		Supplier's Name	
Street Address		Street Address	
City	Province	City	Province
Postal Code	Emergency Telephone	Postal Code	Emergency Telephone

SECTION 2 — HAZARDOUS INGREDIENTS

Hazardous Ingredients ***(specific)***	**%**	**CAS Number**	**LD_{50} of Ingredient** ***(specify species and route)***	**LC_{50} of Ingredient** ***(specify species)***

SECTION 3 — PHYSICAL DATA

Physical State	Odour and Appearance		Odour Threshold (ppm)
Specific Gravity	Vapour Density (air = 1)	Vapour Pressure (mmHg)	Evaporation Rate
Boiling Point (°C)	Freezing Point (°C)	pH	Coefficient of Water/Oil Distribution

SECTION 4 — FIRE AND EXPLOSION DATA

Flammability ❒ Yes ❒ No	If yes, under which conditions?	
Means of Extinction		
Flashpoint (°C) and Method	Upper Flammable Limit (% by volume)	Lower Flammable Limit (% by volume)
Autoignition Temperature (°C)	Explosion Data — Sensitivity to Impact	Explosion Data — Sensitivity to Static Discharge
Hazardous Combustion Products		

SECTION 5 — REACTIVITY DATA

Chemical Stability ❒ Yes ❒ No	If no, under which conditions?
Incompatibility with Other Substances ❒ Yes ❒ No	If yes, which ones?
Reactivity, and under what conditions?	
Hazardous Decomposition Products	

57M2 (R6/99) SAMPLE FORMAT PROVIDED BY THE WORKERS' COMPENSATION BOARD OF BRITISH COLUMBIA

Please continue on reverse side

Product Identifier

SECTION 6 — TOXICOLOGICAL PROPERTIES

Route of Entry ❒ Skin Contact ❒ Skin Absorption ❒ Eye Contact ❒ Inhalation ❒ Ingestion	
Effects of Acute Exposure to Product	
Effects of Chronic Exposure to Product	
Exposure Limits (value, source, date)	Irritancy *(if yes, explain)* ❒ Yes ❒ No
Sensitization *(if yes, explain)* ❒ Yes ❒ No	Carcinogenicity *(if yes, explain)* ❒ Yes ❒ No
Reproductive Toxicity *(if yes, explain)* ❒ Yes ❒ No	Teratogenicity *(if yes, explain)* ❒ Yes ❒ No
Mutagenicity *(if yes, explain)* ❒ Yes ❒ No	Synergistic Products *(if yes, explain)* ❒ Yes ❒ No

SECTION 7 — PREVENTIVE MEASURES

Personal Protective Equipment	❒ Gloves	❒ Respirator	❒ Eye	❒ Footwear	❒ Clothing	❒ Other
If checked, specify type						
Engineering Controls *(specify, such as ventilation, enclosed process)*						
Leak and Spill Procedure						
Waste Disposal						
Handling Procedures and Equipment						
Storage Requirements						
Special Shipping Information						PIN

SECTION 8 — FIRST AID MEASURES

Inhalation
Ingestion
Skin Contact
Eye Contact

SECTION 9 — PREPARATION INFORMATION

Prepared by (Group, Department, etc.)	Telephone Number	Preparation Date

FICHE SIGNALÉTIQUE – 9 Sections

SECTION 1 – IDENTIFICATION ET UTILISATION DU PRODUIT

[ ] renseignements optionnels

Identificateur du produit		**[Classification SIMDUT]**	
Usage du produit			
Nom du fabricant		**Nomdu fournisseur**	
Adresse		**Adresse**	
Ville	**province/état**	**Ville**	**province/état**
Code postal/zip	**N° de téléphone d'urgence**	**Code postal/zip**	**N° de téléphone d'urgence**

SECTION 2 –INGRÉDIENTS DANGEREUX

Ingrédients dangereux (précises)	%	Numéro CAS	DL_{50} (Préciser l'espéce et la voie d'administarion	CL_{50} (Préciser l'espece)

SECTION 3 – CARACTÉRISTIQUES PHYSIQUES

État physique	**Odeur et apparence**		**Seuil d'odour (ppm)**
Densité	**Densité de la vapeur (air = 1)**	**Tension de la vapeur (mmHg)**	**Taux d'évaporation**
pH	**Point d'ébullition (ºC)**	**Point de congélation (ºC)**	**Coefficient de répartition eau/huile**

SECTION 4 – RISQUES D'INCENDIE OU D'EXPLOSION

Inflammable ❑ Oui ❑ Non	**Si oui, indiquez dans quelles conditions**	
Moyens d'extinction		
Point d'éclair (ºC) et méthode (coupe ouverte ou fermée)	**Seuil maximal d'inflammabilité (% en volume))**	**Seuil minimal d'inflammabilité (% en volume)**
Autoignition Temperature (°C)	**Données sur l'explosion – Sensibilité aux chocs**	**Données sur l'explosion – Sensibilité aux décharges électrostatiques**
Produits de combustion dangereux		

SECTION 5 – DONNÉS SUR LA RÉACTIVITÉ

Stabilité chimique ❑ Oui ❑ Non	**Si non – indiquez dans quelles conditions**
Incompatibilité avec d'autres substances ❑ Oui ❑ Non	**Si oui – indiquez avec lesquelles**
Réactivité et dans quelles conditions	
Produits de décomposition dangereux	

1

Identificateur du produit

SECTION 6 – RENSEIGNEMENTS TOXICOLOGIQUES

Voie d'entrée ❑ Contact avec la peau ❑ Absorption par la peau ❑ Contact avec les yeux ❑ Inhalation ❑ Ingestion	
Effets de l'exposition aiguë	
Effets de l'exposition chronique	
Limites d'exposition (valeurs, source, date)	**Propriété irritante du produit (si oui, expliqué)** ❑ Oui ❑ Non
Sensibilisation (si oui, expliqué) ❑ Oui ❑ Non	**Cancérogénicité (si oui, expliqué)** ❑ Oui ❑ Non
Toxicité reproductive (si oui, expliqué) ❑ Oui ❑ Non	**Tératogénicité (si oui, expliqué)** ❑ Oui ❑ Non
Mutagénicité (si oui, expliqué) ❑ Oui ❑ Non	**Noms des produits/effets synergiques (si oui, expliqué)** ❑ Oui ❑ Non

SECTION 7 –MESURES PRÉVENTIVES

Équipement de protection personnelle ❑ Gants ❑ Respirateur ❑ Yeux ❑ Chaussures ❑ Vêtements ❑ Autre	
Si l'une des cases ci-haut est cochee, préciser le type	
Mesures techniques de prévention (telles que la ventilation, le circuit fermé)	
Mesures en cas de fuite accidentelle	
Élimination des déchets	
Méthodes et équipement de manutention	
Consignes d'entreposage	
Renseignements spéciaux sur l'expédition	**PIN**

SECTION 8 – MESURES DE PREMIERS SOINS

Inhalation
Ingestion
Contact avec la peau
Contact avec les yeux

SECTION 9 – RENSEIGNEMENTS SUR LA PRÉPARATION DE LA FS

FS préparée par	Numéro de téléphone	Date de préparation de la FS

MATERIAL SAFETY DATA SHEET — 9 Sections

SECTION 1 — PRODUCT INFORMATION

Product Identifier: Acetone			WHMIS Classification *(optional)*: B2, D2B
Product Use: Solvent, general-purpose cleaning of adhesives, contact cements, printing inks, gums, waxes, resins, greases, and oils			
Manufacturer's Name: Happy Chemical Company		Supplier's Name: Big Chemical Company	
Street Address: 5556 Helium Lane		Street Address: 123 Nitro Avenue	
City: Gaseous Bay	Province: BC	City: Vapour Town	Province: BC
Postal Code: X0X 0X0	Emergency Telephone: (604) 234-5678	Postal Code: X5X 5X5	Emergency Telephone: (604) 345-6789

SECTION 2 — HAZARDOUS INGREDIENTS

Hazardous Ingredients *(specific)*	%	CAS Number	LD_{50} of Ingredient *(specify species and route)*	LC_{50} of Ingredient *(specify species)*
Acetone	99-100	67-64-1	5,800 mg/kg (oral, rat)	30,000 ppm (inhal.,4 hrs.)

SECTION 3 — PHYSICAL DATA

Physical State: Liquid	Odour and Appearance: Clear, colourless liquid with mildly pungent, sweet and fruity odour		Odour Threshold (ppm): 62 (average)
Specific Gravity: 0.791 at 20 °C	Vapour Density (air = 1): 2.0	Vapour Pressure (mmHg): 24-24.7 1 kPa	Evaporation Rate: 5.6 (n-butyl acetate=1)
Boiling Point (°C): 56.2	Freezing Point (°C): -94.6	pH: n/a	Coefficient of Water/Oil Distribution: 0.58

SECTION 4 — FIRE AND EXPLOSION DATA

Flammability: ☒ Yes ☐ No	If yes, under which conditions? Flammable liquid	
Means of Extinction: Carbon dioxide, dry chemical powder, "alcohol" foam, polymer foam. Water may be ineffective because it will not cool acetone below its flashpoint.		
Flashpoint (°C) and Method: -18 °C (cc)	Upper Flammable Limit (% by volume): 12.8% at 25 °C	Lower Flammable Limit (% by volume): 2.5% at 25 °C
Autoignition Temperature (°C): 465 °C	Explosion Data — Sensitivity to Impact: No	Explosion Data — Sensitivity to Static Discharge: Yes
Hazardous Combustion Products: Carbon monoxide and carbon dioxide		

SECTION 5 — REACTIVITY DATA

Chemical Stability: ☒ Yes ☐ No	If no, under which conditions?	
Incompatibility with Other Substances: ☒ Yes ☐ No	If yes, which ones? Acids (for example, nitric acid);	
	Strong oxidizing agents (for example, hydrogen peroxide);	
	Bases (for example, sodium hydroxide)	
Reactivity, and under what conditions? Attacks many forms of plastics and rubber, including rayon		
Hazardous Decomposition Products: Carbon monoxide from prolonged exposure to sunlight		

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Please continue on reverse side

Product Identifier	Acetone

SECTION 6 — TOXICOLOGICAL PROPERTIES

Route of Entry: ☒ Skin Contact ☐ Skin Absorption ☒ Eye Contact ☒ Inhalation ☒ Ingestion

Effects of Acute Exposure to Product: Irritation; possible effects on central nervous system (CNS); at air concentrations above 8,000 ppm may cause drowsiness, incoordination, loss of reflexes, unconsciousness, and respiratory failure

Effects of Chronic Exposure to Product: Dermatitis. No significant harmful effects from oral or inhalation exposures.

Exposure Limits (value, source, date) 250 ppm, 8-hour exposure limit (WorkSafeBC)	Irritancy *(if yes, explain)* ☒ Yes ☐ No Severe eye irritant, skin and respiratory irritant
Sensitization *(if yes, explain)* ☐ Yes ☒ No	Carcinogenicity *(if yes, explain)* ☐ Yes ☒ No
Reproductive Toxicity *(if yes, explain)* ☐ Yes ☒ No	Teratogenicity *(if yes, explain)* ☐ Yes ☒ No
Mutagenicity *(if yes, explain)* ☐ Yes ☒ No	Synergistic Products *(if yes, explain)* ☒ Yes ☐ No Chlorinated solvents, ethyl alcohol

SECTION 7 — PREVENTIVE MEASURES

Personal Protective Equipment: ☒ Gloves ☒ Respirator ☒ Eye ☐ Footwear ☐ Clothing ☐ Other

If checked, specify type: Butyl rubber gloves. NIOSH-approved respirator with organic vapour cartridge for air concentrations up to 2,500 ppm. Splash-proof chemical safety goggles or face shield.

Engineering Controls *(specify, such as ventilation, enclosed process)*: Use mechanical ventilation to reduce exposure. Use non-sparking and grounded ventilation system.

Leak and Spill Procedure: Eliminate all ignition sources. Wear adequate protective equipment. Contain spill with absorbent material and place in a suitable covered and labelled container for disposal.

Waste Disposal: Check with federal, provincial, and local government requirements for disposal.

Handling Procedures and Equipment: Use in a well-ventilated area, away from heat and all ignition sources (including sparks, open flames, and hot surfaces). Do not use with incompatible substances. Use grounded and non-sparking equipment.

Storage Requirements: Store in cool, well-ventilated area out of direct sunlight, away from heat and ignition sources. Storage facilities should be made from fire-resistant materials.

Special Shipping Information	PIN
TDG shipping name: Acetone, Classification 3, Flammable liquid, Packing Group II	1090

SECTION 8 — FIRST AID MEASURES

Inhalation: Remove source of contamination or move victim to fresh air.

Ingestion: If conscious, have victim rinse mouth thoroughly with water; do not induce vomiting; have victim drink 240-300 mL of water. Obtain medical attention immediately.

Skin Contact: Flush with water for 15 minutes.

Eye Contact: Immediately flush contaminated eye(s) with lukewarm, gently flowing water for 20 minutes, while holding eyelids(s) open. Obtain medical attention immediately.

SECTION 9 — PREPARATION INFORMATION

Prepared by (Group, Department, etc.)	Telephone Number	Preparation Date
Sally Safemeister	(604) 123-2222	January 4, 1999

Appendix 5B
The 16-section MSDS

The 16-section MSDS Checklist
Example of the 16-section MSDS Format
Example of a Completed 16-section MSDS

16-SECTION MSDS CHECKLIST

Review of 54 Items Required by Controlled Products Regulations (Schedule I)

Product Name: _____

☒ Missing or incorrect information
[ ] Optional Information (not required by *CPR*)

INFORMATION TO BE DISCLOSED ON AN MSDS					COMMENTS
SECTION 1 - Chemical Product and Company Identification					
❑ Product identifier					
❑ [WHMIS classification]					
❑ Product use					
❑ Manufacturer's Name					
❑ Street address					
❑ City, province, postal code					
❑ Emergency telephone number					
❑ [Fax number]					
❑ Supplier's Name					
❑ Street address					
❑ City, province, postal code					
❑ Emergency telephone number					
❑ [Fax number]					
❑ Preparation date of MSDS					
❑ MSDS prepared by					
❑ Phone number of preparer					
SECTION 2 – Composition/Information on Ingredients					
Hazardous Ingredients (specific)	%	CAS#	LD_{50}	LC_{50}	
❑	❑	❑	❑	❑	
❑	❑	❑	❑	❑	
❑	❑	❑	❑	❑	
❑	❑	❑	❑	❑	
❑	❑	❑	❑	❑	

SECTION 3 – Hazards Identification	COMMENTS
Route of entry: ❏ Skin contact ❏ Skin absorption ❏ Eye contact ❏ Inhalation ❏ Ingestion	
❏ [Emergency overview]	
❏ [WHMIS symbols] 	
❏ [Potential health effects]	
SECTION 4 – First Aid Measures	
❏ Skin contact	
❏ Eye contact	
❏ Inhalation	
❏ Ingestion	
SECTION 5 - Fire Fighting Measures	
Flammable ❏ No ❏ Yes - Identify under which conditions	
❏ Means of extinction	
❏ Flashpoint (℃) and method (oc or cc)	
❏ Upper flammable limit (% by volume)	
❏ Lower flammable limit (% by volume)	
❏ Autoignition temperature (°C)	
❏ Explosion data - Sensitivity to impact	
❏ Explosion data - Sensitivity to static discharge	
❏ Hazardous combustion products	
❏ [NFPA]	
SECTION 6 - Accidental Release Measures	
❏ Leak and spill procedures	
SECTION 7 - Handling and Storage	
❏ Handling procedures and equipment	
❏ Storage requirements	

SECTION 8 - Exposure Control/Personal Protection	COMMENTS
Exposure limits	
❑ ACGIH TLV	
❑ OSHA PEL	
❑ Other (specify)	
Engineering controls (specific) ❑ General ❑ Local exhaust ❑ Other (specify)	
Personal protective equipment (specific) ❑ Gloves ❑ Respirator ❑ Eye ❑ Footwear ❑ Clothing ❑ Other	
SECTION 9 – Physical and Chemical Properties	
❑ Physical state	
❑ Odour and appearance	
❑ Odour threshold (ppm)	
❑ Specific gravity	
❑ Vapour density (air=1)	
❑ Vapour pressure (mmHg)	
❑ Evaporation rate	
❑ Boiling point (°C)	
❑ Freezing point (°C)	
❑ pH	
❑ Coefficient of water/oil distribution	
❑ [Solubility in water]	
SECTION 10 - Stability and Reactivity	
Chemical stability? ❑ Yes ❑ No – Identify under which conditions	
Incompatibility with other substances ❑ Yes – Identify which ones	
❑ Reactivity, and under what conditions?	
❑ Hazardous decomposition products	

SECTION 11 - Toxicological Information	COMMENTS
❑ Effects of acute exposure	
❑ Effects of chronic exposure	
❑ Irritancy of product	
❑ Skin sensitization	
❑ Respiratory sensitization	
Carcinogenicity IARC (1, 2A, or 2B) ACGIH (A1, A2, or A3)	
❑ Reproductive toxicity	
❑ Teratogenicity	
❑ Embryotoxicity	
❑ Mutagenicity	
❑ Name of synergistic products/effects	
SECTION 12 – Ecological Information	
❑ [Aquatic toxicity]	
SECTION 13 – Disposal Considerations	
❑ Waste disposal	
SECTION 14 – Transport Information	
❑ Special shipping information ❑ PIN ❑ TDG ❑ [DOT] ❑ [IMO] ❑ [ICAO]	
SECTION 15 – Regulatory Information	
❑ [WHMIS CLASSIFICATION]	
❑ [OSHA]	
❑ [SERA]	
❑ [TSCA]	
❑ This product has been classified in accordance with the hazard criteria of *the Controlled Products Regulations (CPR)* and the MSDS contains all of the information required by the *CPR*.	
SECTION 16 – Other Information	

LISTE DE CONTRÔLE DE LA FS (16 SECTIONS)

Examen de 54 articles requis par les règles de produits contrôlés (annexe 1)

Identificateur du produit: _____

☒ renseignements incorrects ou manquants
[ ] renseignements optionnels (non requis par *RPC*)

RENSEIGNMENTS À DIVULGUER SUR LA FICHE SIGNALÉTIQUE					COMMENTAIRES
SECTION 1 – Identification du produit chimique et de la compagnie					
❑ Identificateur du produit					
❑ [Classification SIMDUT]					
❑ Usage du produit					
❑ Nom du fabricant					
❑ Adresse					
❑ Ville, province, code postal					
❑ N° de téléphone d'urgence					
❑ [N° de télécopie]					
❑ Nom du fournisseur					
❑ Adresse					
❑ Ville, province, code postal					
❑ N° de téléphone d'urgence					
❑ [N° de télécopie]					
❑ Date de préparation de la FS					
❑ FS préparée par					
❑ Numéro de téléphone					
SECTION 2 – Composition/information sur les ingrédients					
Ingrédients dangereux (précises)	%	Numéro CAS	DL_{50}	CL_{50}	
❑	❑	❑	❑	❑	
❑	❑	❑	❑	❑	
❑	❑	❑	❑	❑	
❑	❑	❑	❑	❑	
❑	❑	❑	❑	❑	

SECTION 3 – Identification des dangers	COMMENTAIRES
Voie d'entrée: ❏ Contact avec la peau ❏ Absorption par la peau ❏ Contact avec les yeux ❏ Inhalation ❏ Ingestion	
❏ [Sommaire d'urgence]	
❏ [Symboles SIMDUT] 	
❏ [Effets éventuels sur la santé]	
SECTION 4 – Mesures de premiers soins	
❏ Contact avec la peau	
❏ Contact avec les yeux	
❏ Inhalation	
❏ Ingestion	
SECTION 5 – Mesures de lutte aux incendies	
Inflammable ❏ Non ❏ Oui - indiquez dans quelles conditions ?	
❏ Moyens d'extinction	
❏ Point d'éclair (°C) et méthode (coupe ouverte ou fermée)	
❏ Seuil maximal d'inflammabilité (% en volume)	
❏ Seuil minimal d'inflammabilité (% en volume)	
❏ Température d'auto-inflammation (°C)	
❏ Données sur l'explosion – Sensibilité aux chocs	
❏ Données sur l'explosion – Sensibilité aux décharges ❏ électrostatiques	
❏ Produits de combustion dangereux	
❏ [NFPA]	
SECTION 6 – Mesures en cas de fuite accidentelle	
❏ Marche à suivre en cas de fuite ou de déversement	
SECTION 7 – Manutention et entreposage	
❏ Méthodes et équipement de manutention	
❏ Consignes d'entreposage	

SECTION 8 – Prévention de l'exposition / Protection personnelle	COMMENTAIRES
Limites d'exposition	
❏ ACGIH TLV	
❏ OSHA PEL	
❏ Autre (préciser)	
Mesures techniques de prévention (telles que la ventilation, le circuit fermé) ❏ Général ❏ Échappement local ❏ Autre (spécifiez)	
Équipement de protection personnelle ❏ Gants ❏ Respirateur ❏ Yeux ❏ Chaussures ❏ Vêtements ❏ Autre	
SECTION 9 – Propriétés physiques et chimiques	
❏ État physique	
❏ Odeur et apparence	
❏ Seuil d'odour (ppm)	
❏ Densité	
❏ Densité de la vapeur (air = 1)	
❏ Tension de la vapeur (mmHg)	
❏ Taux d'évaporation	
❏ Point d'ébullition (°C)	
❏ Point de congélation (°C)	
❏ pH	
❏ Coefficient de répartition eau/huile	
❏ [Solubilité dans l'eau]	
SECTION 10 – Stabilité and réactivité	
Stabilité chimique ❏ Oui ❏ Non – indiquez dans quelles conditions?	
Incompatibilité avec d'autres substances ❏ Oui – indiquez avec lesquelles	
❏ Réactivité et dans quelles conditions ?	
❏ Produits de décomposition dangereux	
SECTION 11 – Renseignements toxicologiques	
❏ Effets de l'exposition aiguë	
❏ Effets de l'exposition chronique	
❏ Propriété irritante du produit	
❏ Sensibilisation de la peau	
❏ Sensibilisation respiratoire	
Cancérogénicité ❏ CIRC ((1, 2A, or 2B) ❏ ACGIH (A1, A2, or A3)	
❏ Toxicité reproductive	

Renseignements toxicologiques…	COMMENTAIRES
❑ Tératogénicité	
❑ Embryotoxicité	
❑ Mutagénicité	
❑ Noms des produits/effets synergiques	
SECTION 12 – Renseignements écologiques	
❑ [Toxicité aquatique]	
SECTION 13 – Facteurs à considérer pour la mise aux déchets	
❑ Élimination des déchets	
SECTION 14 – Renseignements sur le transport	
❑ Renseignements spéciaux sur l'expédition ❑ PIN ❑ TMD ❑ [DOT] ❑ [OMI] ❑ [ICAO]	
SECTION 15 – Renseignements sur la réglementation	
❑ [CLASSIFICATION SIMDUT]	
❑ [OSHA]	
❑ [SERA]	
❑ [TSCA]	
❑ La classification de ce produit est conforme aux critères de danger des Règlements sur les produits contrôlés (RPC) et la FS contient tous les renseignements exigés par les RPC.	
SECTION 16 – Autres renseignements	

MATERIAL SAFETY DATA SHEET — 16 Sections

SECTION 1 — CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Identifier		[WHMIS Classification]	
Product Use			
Manufacturer's Name		Supplier's Name	
Street Address		Street Address	
City	Province	City	Province
Postal Code	Emergency Telephone	Postal Code	Emergency Telephone
Date MSDS Prepared	MSDS Prepared By	Phone Number	

SECTION 2 — COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Ingredients *(specific)*	**%**	**CAS Number**	**LD_{50} of Ingredient *(specify species and route)***	**LC_{50} of Ingredient *(specify species)***

SECTION 3 — HAZARDS IDENTIFICATION

Route of Entry ❒ Skin Contact ❒ Skin Absorption ❒ Eye Contact ❒ Inhalation ❒ Ingestion
[Emergency Overview]
[WHMIS Symbols]
[Potential Health Effects]

SECTION 4 — FIRST AID MEASURES

Skin Contact
Eye Contact
Inhalation
Ingestion

SAMPLE FORMAT PROVIDED BY THE WORKERS' COMPENSATION BOARD OF BRITISH COLUMBIA

57M6 (6/99)

Please continue on reverse side

[Optional, not required under WHMIS]

Product Identifier

SECTION 5 — FIRE FIGHTING MEASURES

Flammable ❒ Yes ❒ No	If yes, under which conditions?	
Means of Extinction		
Flashpoint (°C) and Method	Upper Flammable Limit (% by volume)	Lower Flammable Limit (% by volume)
Autoignition Temperature (°C)	Explosion Data — Sensitivity to Impact	Explosion Data — Sensitivity to Static Discharge
Hazardous Combustion Products		
[NFPA]		

SECTION 6 — ACCIDENTAL RELEASE MEASURES

Leak and Spill Procedures

SECTION 7 — HANDLING AND STORAGE

Handling Procedures and Equipment
Storage Requirements

SECTION 8 — EXPOSURE CONTROL / PERSONAL PROTECTION

Exposure Limits	❒ ACGIH TLV	❒ OSHA PEL	❒ Other *(specify)*			
Specific Engineering Controls *(such as ventilation, enclosed process)*						
Personal Protective Equipment	❒ Gloves	❒ Respirator	❒ Eye	❒ Footwear	❒ Clothing	❒ Other
If checked, please specify type						

[*Optional, not required under WHMIS*]

Product Identifier

SECTION 9 — PHYSICAL AND CHEMICAL PROPERTIES

Physical State	Odour and Appearance	Odour Threshold (ppm)
Specific Gravity	Vapour Density (air = 1)	Vapour Pressure (mmHg)
Evaporation Rate	Boiling Point (°C)	Freezing Point (°C)
pH	Coefficient of Water/Oil Distribution	[Solubility in Water]

SECTION 10 — STABILITY AND REACTIVITY

Chemical Stability ❒ Yes ❒ No	If no, under which conditions?
Incompatibility with Other Substances ❒ Yes ❒ No	If yes, which ones?
Reactivity, and under what conditions?	
Hazardous Decomposition Products	

SECTION 11 — TOXICOLOGICAL INFORMATION

Effects of Acute Exposure	
Effects of Chronic Exposure	
Irritancy of Product	
Skin Sensitization	Respiratory Sensitization
Carcinogenicity — IARC	Carcinogenicity — ACGIH
Reproductive Toxicity	Teratogenicity
Embryotoxicity	Mutagenicity
Name of Synergistic Products/Effects	

[Optional, not required under WHMIS]

Please continue on reverse side

Product Identifier

SECTION 12 — ECOLOGICAL INFORMATION

[Aquatic Toxicity]

SECTION 13 — DISPOSAL CONSIDERATIONS

Waste Disposal

SECTION 14 — TRANSPORT INFORMATION

Special Shipping Information	
	PIN
TDG	[DOT]
[IMO]	[ICAO]

SECTION 15 — REGULATORY INFORMATION

[WHMIS Classification]	[OSHA]
[SERA]	[TSCA]

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by CPR.

SECTION 16 — OTHER INFORMATION

[*Optional, not required under WHMIS*]

FICHE SIGNALÉTIQUE – 16 Sections

SECTION 1 – IDENTIFICATION DU PRODUIT CHIMIQUE ET DE LA COMPAGNIE [ ] renseignements optionnels

Identificateur du produit		**[Classification SIMDUT]**	
Usage du produit			
Nom du fabricant		**Nomdu fournisseur**	
Adresse		**Adresse**	
Ville	**province/état**	**Ville**	**province/état**
Code postal/zip	**N° de téléphone d'urgence**	**Code postal/zip**	**N° de téléphone d'urgence**
Date de préparation de la FS	**FS préparée par**	**Numéro de téléphone**	

SECTION 2 – COMPOSITION/INFORMATION SUR LES INGRÉDIENTS

Ingrédients dangereux (précises)	%	Numéro CAS	DL_{50} (Préciser l'espéce et la voie d'administarion)	CL_{50} (Préciser l'espece)

SECTION 3 – IDENTIFICATION DES DANGERS

Voie d'entrée ❑ Contact avec la peau ❑ Absorption par la peau ❑ Contact avec les yeux ❑ Inhalation ❑ Ingestion

[Sommaire d'urgence]

[Symboles SIMDUT]

[Effets éventuels sur la santé]

SECTION 4 – MESURES DE PREMIERS SOINS

Contact avec la peau

Contact avec les yeux

Inhalation

Ingestion

Identificateur du produit

SECTION 5 – MESURES DE LUTTE AUX INCENDIES

Inflammable ❑ Oui ❑ Non	Si oui, indiquez dans quelles conditions	
Moyens d'extinction		
Point d'éclair (ºC) et méthode (coupe ouverte ou fermée)	Seuil maximal d'inflammabilité (% en volume)	Seuil minimal d'inflammabilité (% en volume)
Température d'auto-inflammation (ºC)	Données sur l'explosion – Sensibilité aux chocs	Données sur l'explosion – Sensibilité aux décharges électrostatiques
Produits de combustion dangereux		
[NFPA]		

SECTION 6 –MESURES EN CAS DE FUITE ACCIDENTELLE

Marche à suivre en cas de fuite ou de déversement

SECTION 7 – MANUTENTION ET ENTREPOSAGE

Méthodes et équipement de manutention
Consignes d'entreposage

SECTION 8 – PRÉVENTION DE L'EXPOSITION / PROTECTION PERSONNELLE

Limites d'exposition ❑ ACGIH TLV ❑ OSHA PEL ❑ Autre (préciser)
Mesures techniques de prévention (telles que la ventilation, le circuit fermé)
Équipement de protection personnelle ❑ Gants ❑ Respirateur ❑ Yeux ❑ Chaussures ❑ Vêtements ❑ Autre
Si l'une des cases ci-haut est cochee, préciser le type

Identificateur du produit

SECTION 9 – PROPRIÉTÉS PHYSIQUES ET CHIMIQUES

État physique	Odeur et apparence	Seuil d'odour (ppm)
Densité	Densité de la vapeur (air = 1)	Tension de la vapeur (mmHg)
Taux d'évaporation	Point d'ébullition (ºC)	Point de congélation (ºC)
pH	Coefficient de répartition eau/huile	[Solubilité dans l'eau]

SECTION 10 – STABILITÉ AND RÉACTIVITÉ

Stabilité chimique ❑ Oui ❑ Non	Si non – indiquez dans quelles conditions
Incompatibilité avec d'autres substances ❑ Oui ❑ Non	Si oui – indiquez avec lesquelles
Réactivité et dans quelles conditions	
Produits de décomposition dangereux	

SECTION 11 – RENSEIGNEMENTS TOXICOLOGIQUES

Effets de l'exposition aiguë	
Effets de l'exposition chronique	
Propriété irritante du produit	
Sensibilisation de la peau	Sensibilisation respiratoire
Cancérogénicité - IARC	Cancérogénicité – ACGIH
Toxicité reproductive	Tératogénicité
Embryotoxicité	Mutagénicité
Noms des produits/effets synergiques	

Identificateur du produit

SECTION 12 – RENSEIGNEMENTS ÉCOLOGIQUES

[Toxicité aquatique]

SECTION 13 – FACTEURS À CONSIDÉRER POUR LA MISE AUX DÉCHETS

Élimination des déchets

SECTION 14 – RENSEIGNEMENTS SUR LE TRANSPORT

Renseignements spéciaux sur l'expédition	
	PIN
TMD	[DOT]
[OMI]	[ICAO]

SECTION 15 – RENSEIGNEMENTS SUR LA RÉGLEMENTATION

[CLASSIFICATION SIMDUT]	[OSHA]
[SERA]	[TSCA]

La classifcation de ce produit est conforme aux critères de danger des Règlements sur les produits contrôlés (RPC) et la FS contient tous les renseignements exigés par les RPC.

SECTION 16 – AUTRES RENSEIGNEMENTS

Example of a Completed 16-Section MSDS

1. PRODUCT AND COMPANY IDENTIFICATION

Product Identity: AQUASTOP PRIMER

Intended Use: Waterproofing coating

Manufacturer: ABC Company
1234 Main Street
Anytown, CA
Telephone: (213) 123-4567
Fax: (213) 123-4568

MSDS Date of Preparation: 30/01/99
Prepared by: J. Smith, Technical Dept.

2. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Ingredients	CAS No.	Amount (w/w)	Exposure Limit ACGIH
Xylene	1330-20-7	40%	100 ppm TLV-TWA 150 ppm TLV-STEL
Acetone	67-64-1	20%	500 ppm TLV-TWA 750 ppm TLV-STEL

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Flammable liquid. May cause eye and skin irritation. Inhalation of vapors may cause respiratory irritation and central nervous system effects. May cause birth defects. Prolonged overexposure may cause liver, kidney, and nervous system damage.

4. FIRST AID MEASURES

EYE: Flush eyes with large quantities of water for at least 20 minutes, holding the eyelids open. Get medical attention.
SKIN: Remove contaminated clothing. Wash skin thoroughly with soap and water. If rash or irritation develops, get medical attention. Wash clothing before reuse.
INGESTION: If conscious, rinse mouth with water. Never give anything by mouth to an unconscious or convulsing person. Do not induce vomiting. Get immediate medical attention.
INHALATION: Remove victim to fresh air. If breathing is difficult have qualified personnel administer oxygen. If breathing has stopped, administer artificial respiration. Get immediate medical attention.

5. FIREFIGHTING MEASURES

FLASH POINT: -7°C (Closed-Cup)
FLAMMABLE LIMITS: LEL: 1.0% **UEL**: 12.8%
AUTOIGNITION TEMPERATURE: Not available
EXTINGUISHING MEDIA: Use carbon dioxide, universal foam, dry chemical, or water fog. Do not use water stream. Use water to cool exposed containers and structures.
UNUSUAL FIRE OR EXPLOSION HAZARDS: Product is flammable and forms explosive mixtures with air. Vapors are heavier than air and will travel along surfaces to remote ignition sources and flash back. Closed containers may explode if exposed to extreme heat.
SPECIAL FIREFIGHTING INSTRUCTIONS: Firefighters should wear positive-pressure, self-contained breathing apparatus, and full protective clothing. Do not allow run-off from firefighting to enter drains or water courses.
HAZARDOUS COMBUSTION PRODUCTS: Oxides of carbon and nitrogen, and aldehydes.
EXPLOSION DATA:
Sensitivity to mechanical impact: None
Sensitivity to static discharge: Flammable vapors may be ignited by static spark. Electrically bond and ground containers when transferring product.

6. ACCIDENTAL RELEASE MEASURES

Remove all sources of ignition. Ventilate area using explosion-proof equipment. Wear protective clothing (see Section 8). Contain spill using inert absorbent material and place in a covered and labelled container for disposal.

7. HANDLING AND STORAGE

HANDLING: Avoid contact with the eyes, skin, and clothing. Avoid breathing vapors. Wear protective clothing and equipment (see Section 8). Use only with adequate ventilation. Wash thoroughly with soap and water after handling. Keep containers closed when not in use. Keep product away from heat, sparks, flames, and all other sources of ignition. Use with non-sparking tools and explosion-proof equipment. Electrically bond and ground containers for transfer.

Do not cut, drill, grind, or weld on or near containers, even empty containers. Empty containers may retain product residue. Follow all MSDS precautions when handling empty containers.

STORAGE: Store in a dry, well-ventilated area away from heat, direct sunlight, and all sources of ignition. Store away from oxidizers and acids.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

EXPOSURE GUIDELINES: See Section 2.
ENGINEERING CONTROLS: Use local exhaust ventilation to maintain exposures below the occupational exposure limits. Use explosion-proof equipment.
RESPIRATORY PROTECTION: If the exposure limits are exceeded, wear a NIOSH-approved respirator with organic vapour cartridge for concentrations up to 900 ppm (for xylene).
SKIN PROTECTION: Wear impervious gloves such as teflon.
EYE PROTECTION: Safety goggles and/or face shield.
OTHER: Impervious clothing as needed to prevent contact. Provide a safety shower and eye wash.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AND ODOR: Brown liquid with solvent odor.
ODOUR THRESHOLD: Xylene: 1 ppm. Acetone: 62 ppm.
PHYSICAL STATE: Liquid
BOILING POINT: 56.5°C (acetone)
VAPOR PRESSURE: 180 mm Hg @ 25°C (acetone)
VAPOR DENSITY (air = 1): 3.6 (xylene)
EVAPORATION RATE (n-butyl acetate=1): 5.6 (acetone)
SOLUBILITY IN WATER: Partially soluble
SPECIFIC GRAVITY: 0.87
pH: NA
MELTING POINT: NA
OCTANOL/WATER COEFFICIENT: ND

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal storage and handling conditions.
INCOMPATIBILITY: Strong acids and oxidizers.
HAZARDOUS DECOMPOSITION PRODUCTS: None.
HAZARDOUS POLYMERIZATION: Will not occur.

11. TOXICOLOGICAL INFORMATION

HEALTH HAZARDS:

INGESTION: Ingestion may cause mucous membrane and gastrointestinal irritation and nervous system depression with symptoms of headache, dizziness, nausea, narcosis, and unconsciousness. Aspiration into the lungs during ingestion or vomiting may cause serious lung damage which may be fatal.
INHALATION: Inhalation of vapors may cause mucous membrane and respiratory irritation and central nervous system depression with symptoms of headache, dizziness, nausea, vomiting, disorientation, incoordination, and unconscious. Severe overexposures may cause respiratory failure.
EYE: Contact may cause irritation.
SKIN: Repeated or prolonged contact may cause irritation, drying, and defatting.
SENSITIZATION: Product is not expected to cause sensitization.
CHRONIC: Prolonged overexposure may cause cardiac sensitization, effects on hearing, and damage to the nervous system, blood system, liver, and kidneys.
CARCINOGENICITY: No ingredient in this product present at greater than 0.1% is listed as a carcinogen by IARC or ACGIH.
TERATOGENICITY/ EMBRYOTOXICITY: Xylene has been found to cause adverse reproductive effects and/or birth defects in studies with laboratory animals.
REPRODUCTIVE EFFECTS: No harmful reproductive effects reported
MUTAGENICITY: Negative results from tests.
SYNERGISTIC PRODUCTS: None specifically known.
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Workers with pre-existing skin, liver, and kidney disease may be at increased risk from exposure.

ACUTE TOXICITY VALUES:

Xylene: Oral Rat LD_{50} - 5400 mg/kg
Inhalation Rat LC_{50} - 6700 ppm/4 hr
Acetone: Oral Rat LD_{50} - 5800 mg/kg
Inhalation Rat LC_{50} – 30,000 mg/m^3

12. ECOLOGICAL INFORMATION

No data available

13. DISPOSAL CONSIDERATIONS

Dispose of in accordance with local, state, and federal environmental regulations.

14. TRANSPORT INFORMATION

Proper Shipping Name: Paint Related Material (Contains Acetone and Xylene)
UN Number: UN1263
Hazard Class/Packing Group: 3, PG II
Labels Required: Flammable Liquid

15. REGULATORY INFORMATION

SARA HAZARD CATEGORY (311/312): Acute Health, Chronic Health, Fire Hazard.

SARA 313 INFORMATION: This product contains the following chemicals subject to Annual Release Reporting Requirements Under SARA Title III, Section 313 (40 CFR 372):

Xylene	1330-20-7	40%

EPA TSCA INVENTORY: All of the ingredients in this product are listed on the EPA TSCA Inventory.

CANADA:
This product has been classified under the *CPR* and this MSDS discloses information elements required by the *CPR*.
CANADIAN WHMIS CLASSIFICATION: Class B Division 2 (Flammable Liquid); Class D Division 2 Subdivision A (Very Toxic Material Causing other Toxic Effects)

16. OTHER INFORMATION

NFPA RATING: Health = 2 Fire = 3 Reactivity = 0 **HMIS RATING:** Health = 2* Fire = 3 Reactivity = 0

Abbreviations: ND = No Data NA = Not Applicable

Appendix 5C
Example of a Completed Generic MSDS

MATERIAL SAFETY DATA SHEET

SECTION I: PRODUCT IDENTIFICATION

Product identifier: Coverall Paint Coating

Colour:	Product Code:
Brown	0115-100
Rust	0115-105
Cedar	0115-120
Dark brown	0115-107
Oak	0115-110

Product use: Paint coating

Manufacturer's name: ABC Company
123 Main Street
Anytown

Supplier's name: XYZ Company
456 Main Street
Anywhere

Phone number: 604-580-2606

Emergency tel. no.: Chemtrec 800-424-9300
TDG classification: 3

SECTION II: HAZARDOUS INGREDIENTS

INGREDIENTS	% (W/W)	CAS NUMBER	LD_{50}	LC_{50}
Mineral Spirits	10–30	64742-47-8	>8 ml/kg (oral, rat)	1400 ppm (rat)
Kerosene	1–5	8008-20-6	>5 g/kg (oral, rat)	>2500 mg/m3 (rat)
Linseed Oil	1–5	8001-26-1	n/av	n/av
Ferric Oxide	1–5	1309-37-1	>10 g/kg (oral, rat)	n/av

SECTION III: PHYSICAL DATA

Physical state:	Liquid
Odour and appearance:	Brown liquid with hydrocarbon odour
Odour threshold:	n/av
Boiling point:	145°C
Freezing point:	-5°C
Vapour pressure (mm Hg):	6
Vapour density (Air =1):	>2
Specific gravity:	1.1
Evaporation rate (BuAe = 1):	<1
pH in saturated water solution:	n/ap
Coefficient of water/oil distribution:	n/ap
Combustion products:	Carbon dioxide, carbon monoxide, oxides of nitrogen.

SECTION IV: FIRE AND EXPLOSION DATA

Flashpoint:	40°C (cc)
Flammability:	Combustible liquid
Extinguishing media:	Dry chemical, foam, or carbon dioxide. Use water spray to cool closed containers
Flammable limits:	LEL = 1%; UEL = 6%
Sensitivity to impact:	no
Sensitivity to static discharge:	yes
Special firefighting procedures:	Firefighters should wear respiratory protection in enclosed areas
Unusual fire and explosion hazards:	none
Auto-ignition temperature:	225°C

SECTION V: REACTIVITY DATA

Chemical stability:	Yes
Incompatibility with other products:	Strong oxidizing agents, strong acids or bases.
Reactivity and under what conditions:	None known
Hazardous decomposition products:	None known

SECTION VI: TOXICOLOGICAL PROPERTIES

Route of entry:	Inhalation: yes Ingestion: yes Eye contact: yes Skin contact: yes Skin absorption: no
Effects of acute exposure:	May cause irritation to skin and eyes. Prolonged or repeated inhalation may cause headaches, nausea, dizziness, and central nervous depression. Harmful if swallowed.
Effects of chronic exposure:	Prolonged contact may cause dermatitis.
Carcinogenicity:	No
Exposure limits:	TLV – TWA (ACGIH) for Mineral Spirits 100ppm Refer to your local health and safety regulatory agency for current exposure limits.
Irritancy of products:	Yes
Sensitization to products:	No
Medical conditions – Generally aggravated by exposure: None known	
Teratogenicity:	No
Mutagenicity:	No
Reproductive toxicity:	No
Name of toxicologically synergistic products: None known	

SECTION VII: FIRST AID

Specific measures:

Eye contact:	Flush with water for 20 minutes, holding eyelid(s) open. Seek medical attention immediately.
Inhalation:	Move to area with fresh air. Apply artificial respiration if breathing has stopped. Seek medical attention.
Skin contact:	Wash with large amount of water. Remove and wash contaminated clothing. If irritation persists, seek medical attention.
Ingestion:	Do not induce vomiting. Should vomiting occur, place victim in recovery position to prevent aspiration into lungs. Seek medical attention.

SECTION VIII: PREVENTIVE MEASURES

Personal protective equipment:

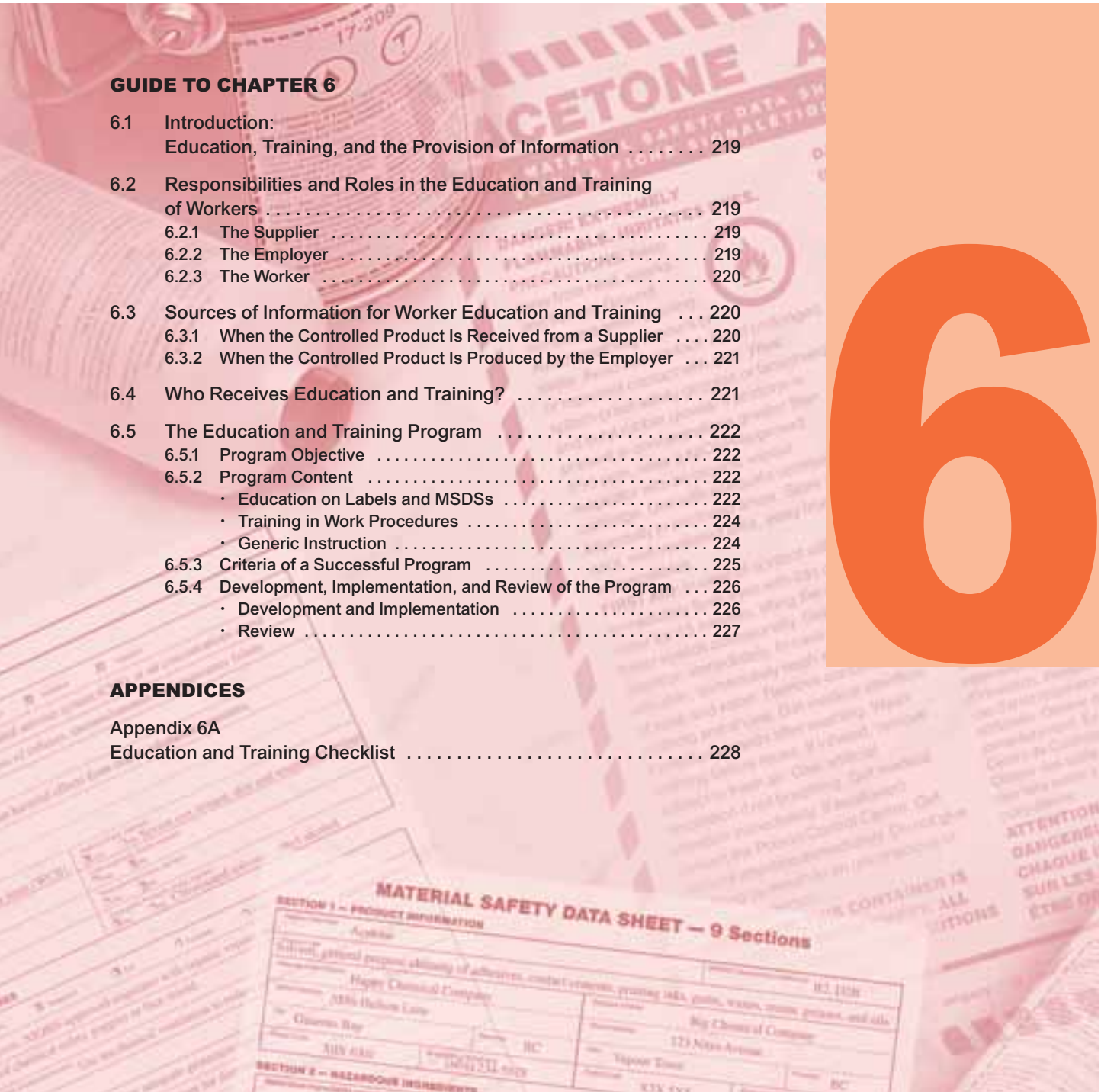
Respiratory protection:	Use a NIOSH-approved, organic vapour cartridge.
Protective gloves:	Wear natural rubber, neoprene, or nitrile gloves.
Eye protection:	Wear chemical goggles.
Footwear:	Wear approved safety footwear as appropriate to the work site.
Clothing:	Wear rubber apron.
Engineering controls:	Use local exhaust ventilation fitted with explosion-proof equipment to keep vapours below permissible exposure limits.
Leak and spill procedure:	Remove all sources of ignition. Use required personal protective equipment. Soak up spill with sand or other inert absorbent. Place spilled material in container for disposal.
Waste disposal method:	Dispose in accordance with all local, provincial, and federal regulations.
Handling procedures and equipment:	Keep containers closed. Keep away from any ignition sources. Bond and ground equipment. Avoid contact with skin, eyes, or clothing. Wash thoroughly after handling.
Storage procedures:	Store in a well-ventilated area away form incompatible materials and any ignition sources.
Special shipping information:	PIN 1263; Paint-related materials, UN1263, Class 3, Packing Group I

SECTION IX: PREPARATION DATE OF MSDS

Prepared by:	ABC Company
Phone number:	111-222-3333
Date:	March 4, 1999

CHAPTER 6

Worker Education and Training



GUIDE TO CHAPTER 6

APPENDICES

6.1 Introduction: Education, Training, and the Provision of Information

Educating and training workers about controlled products is an essential part of the WHMIS information delivery system. Legal requirements for worker education and training are adopted through the various occupational health and safety regulatory agencies, based on the WHMIS Model OSH Regulations.

Providing both theory and practice

Effective education and training of workers involves all activities that enable workers to work safely with or in proximity to controlled products in the workplace. These activities include both an explanation of facts—for example, the hazards of controlled products, the WHMIS system, product labels, and MSDSs—and practical instruction in safe, specific procedures developed from WHMIS information.

Providing hazard information

Also, under WHMIS, the employer must provide workers with hazard information received from suppliers as well as any information of which the employer is or ought to be aware. A large part of this responsibility will be discharged through programs of instruction. However, some information, such as updates on a product, may be circulated to workers by less formal means such as announcements at staff or tool-box meetings, or information circulars.

6.2 Responsibilities and Roles in the Education and Training of Workers

6.2.1 The Supplier

The supplier has no direct responsibility for the education and training of workers. The supplier does, however, play a role in the process by providing up-to-date supplier labels and MSDSs as a condition of sale/importation.

6.2.2 The Employer

The employer has the basic responsibility for educating and training workers. Specifically, the employer must meet these requirements:

Provision of hazard information

- Provide, on each controlled product *supplied* to the workplace, all hazard information received from the supplier and any additional information of which the employer is or ought to be aware on the storage, handling, use, and disposal of the controlled product.
- Provide, on each controlled product *produced* in the workplace, all hazard information of which the employer is or ought to be aware on the storage, handling, use, and disposal of the controlled product.

Worker education

- Develop and implement a program of worker education on controlled products that covers:
  - The principles and application of WHMIS
  - The required content, purpose, and significance of information on WHMIS labels and MSDSs
  - The use of other means of identification such as signs, placards, or colour, number, letter, or other codes used with transfer or reaction systems and wastes

Worker training

- Develop and implement a training program covering:
  - Procedures for the safe storage, handling, use, and disposal of controlled products
  - Procedures to be followed in an emergency involving a controlled product
  - Procedures to be followed when fugitive emissions are present

Application of information

- Ensure, as far as reasonably practicable, that the education and training program results in workers who are able to apply the information to protect their health and safety.

Computer training

- Train employees (at least one per shift), a health and safety representative, or any members of the joint health and safety committee to access computer-stored MSDSs, if MSDSs are stored on a workplace computer terminal.
- Review the education and training program **at least annually**, but more frequently if work conditions change, new or reformulated products with different hazards are used, or new hazard information becomes available.

Program review

- Provide further education and training if a review indicates that workers are not adequately informed. (The four questions on page 225 can be used to determine if workers are effectively educated and trained.)

Consultation

- Consult with the joint health and safety committee (if any) or health and safety representative (if any) during the development, implementation, and review of the education and training program. An employer has consulted with the joint occupational safety and health committee (or representative) about WHMIS education and training if two conditions are met:
  - Before the program is finalized, the committee (or representative) has the opportunity to review and provide information or advice on the entire program including its content, structure, and means of implementation. *Content* includes education about the WHMIS system and the hazards of controlled products, as well as training in safe work and emergency procedures. *Means of implementation* includes choice of instructors and the use of any in-course evaluation.
  - After the program is implemented, the employer asks for information and advice from the committee on the effectiveness of the program.

6.2.3 The Worker

While the employer is responsible for providing education and training, the worker must:

- Receive and learn the information that the employer is required to provide
- Inform the employer if the worker has inadequate information on a controlled product or insufficient training on its storage, handling, use, or disposal to ensure worker health and safety
- Work with the employer in the development, implementation, and review of education and training programs on controlled products, when acting as a health and safety representative or a member of the joint health and safety committee

6.3 Sources of Information for Worker Education and Training

The information sources on a controlled product that an employer must use when establishing a worker education and training program will depend, in part, on whether the product is received from a supplier or is produced in the workplace.

6.3.1 When the Controlled Product Is Received from a Supplier

Types of hazard information

The employer must ensure that employees who work with or in proximity to the product are informed about:

- All hazard information received from the supplier concerning the product
- Any information of which the employer is aware or ought to be aware concerning the product's storage, handling, use, and disposal

Hazard information from the supplier will normally be on the label and MSDS. However, a supplier may also provide information in the form of a letter (for example, in response to inquiries from the employer) or a circular warning of new hazard information for previous customers who may not have received a revised MSDS.

The employer should be aware of any additional information on the product. Appropriate sources include:

- Publications and computerized information available from the CCOHS or the CSST
- Publications from industry or trade associations of which the employer is a member and labour organization(s) representing workers at the workplace
- Publications of the regulatory agency with jurisdiction at the workplace

The employer may not need to consult every reference on this list if, for example, a supplier has already included, on the supplier MSDS, information from a reference. Likewise, the employer is not limited to the references on the list.

Chapter 8, "Resources," provides information on obtaining many of these and other reference materials.

6.3.2 When the Controlled Product Is Produced by the Employer

Types of hazard information

In this case, the employer must ensure that employees who work with or in proximity to the product are informed about all hazard information of which the employer is aware or ought to be aware concerning the controlled product and its storage, handling, use, and disposal.

This requirement means that the employer must inform workers about all classification information that brings the product into the WHMIS system, and provide any additional information related to the product as discussed in 6.3.1.

Chapter 8, "Resources," includes a section of information on all reference documents specified in the *CPR* for classification.

6.4 Who Receives Education and Training?

Education and training must be provided to all workers who work with or in proximity to a controlled product. *A worker who works with a controlled product* is any worker who stores, handles, uses, or disposes of a controlled product or who immediately supervises another worker performing these duties. *In proximity* refers to the area in which worker health and safety could be at risk during:

- The storage, handling, use, or disposal of the product
- Maintenance operations
- Emergencies such as accidental release or spill

The physical area of risk depends on factors such as the quantity and form (gas, dust, liquid or solid) of the product, the extent of enclosure during use, scheduling of work activity, and persistence of the product after its release.

Examples:

- Bulk quantities of chlorine are piped above ground from the receiving point at a pulp and paper mill to a location onsite for use as a bleaching agent. Education about the hazards of chlorine will be required for all workers at the plant, at minimum, for emergency evacuation.
- A bottle of formaldehyde is received at a hospital for transfer to a laboratory. Instruction on the product will be required for the shipper/receiver, the worker who takes the container to the laboratory, the lab personnel who store, handle, use, or dispose of the product, the workers responsible in emergencies with the product, and the appropriate supervisors.
- Boxes of welding rods are received by five welders in an assembly area at an auto manufacturing plant employing 600 workers. No workers other than the welders are likely to be exposed to welding fumes. Instruction will be required only for the five welders and appropriate supervisors (and for first aid personnel if exposure could produce acute ill health effects).
- In a retail store, information/instruction must be provided to those workers who routinely handle large quantities of controlled products (including those regulated as consumer restricted products) and those who may be exposed to harm as the result of a spill or other accident (for example, warehouse staff).

6.5 The Education and Training Program

An organized program of instruction must be provided to workers at risk of exposure to controlled products. The program must achieve a basic objective, provide specified areas of content, be established in cooperation with safety and health committees or representatives when required, and be reviewed and upgraded regularly. Appendix 6A, "WHMIS Education and Training Checklist" summarizes the essential elements of the education and training program.

6.5.1 Program Objective

The basic objective is to ensure, as far as reasonably practicable, that workers receiving education and training are able to apply the information to protect worker health and safety. This objective has several implications:

Occupation-specific training

- While everyone who works in proximity to a controlled product is likely to receive the same basic education and training on the product, the content may vary from worker to worker depending on the work they do. For example, a warehouse worker may need detailed information on storage and handling while a first aid attendant requires information on toxicological properties and emergency measures. Similarly, office workers at a pulp mill will not need procedures training in the storage, handling, use, or disposal of chlorine, but will need training in emergency procedures in the event of a major gas release.

Integrated hazard prevention program

- Instruction must be integrated into the overall hazard prevention program in the workplace. Procedures training must take into account not only the information available from the label and MSDS, but also the particular circumstances of the workplace. Knowing that the MSDS suggests a particular type of respirator for protection against a product is not enough—the worker must know where to obtain and use the respirator; how to test for fit; and, where necessary, how to maintain and store it.

Demonstrated skills and knowledge

- The proof of a successful program is the ability of workers to demonstrate both safe procedures with controlled products and a knowledge of the reasons for those procedures.

6.5.2 Program Content

Employers must provide instruction on each controlled product supplied to or produced in the workplace. Instruction will be of two kinds:

Overall content

- Education about labels, MSDSs, and identifiers
- Training in safe work procedures

Education on labels, MSDSs, and identifiers will include an explanation of the content WHMIS requires on these information sources as well as an explanation of the purpose and significance of the information on the documents for each controlled product. Procedures training will be based not only on the content of the applicable label and MSDS, but also on the specific circumstances in the workplace affecting the likelihood of exposure to the product and the appropriate corrective measures.

Education on Labels and MSDSs

Labels, MSDSs, and other means of identification

Workers must be taught the content required on the supplier label, workplace label, and the MSDS, as well as the purpose and significance of the information contained on these information sources for each controlled product. In addition, workers must learn to identify products labelled with other modes of identification (such as colour coding, numbers, or abbreviations) and know how to obtain additional information on the product from MSDSs or WHMIS labels.

Required Content:

Required elements

Workers must be instructed in the elements of information required on the different types of supplier labels found in the workplace, the elements of workplace labels, and the categories and associated information elements of the MSDS.

For example, for the standard supplier label, workers must be told that the label has a distinctive hatched border and contains seven basic elements of information (product identifier, supplier identifier, hazard symbols, risk phrases, precautionary statements, first aid measures, and a statement advising that an MSDS is available). If other types of supplier labels are found in the workplace, for laboratory supply house chemicals or laboratory samples, for example, workers will need to know the different types of information that must appear in each case.

Purpose of Information:

Purpose

Purpose refers to the reason information is present. For example, workers must be instructed in both:

- The purpose of the label as an alert and of the MSDS as a supportive technical document
- The purpose of the various elements on the label and MSDS: for example, the hazard symbol quickly and clearly communicates the WHMIS hazard Class(es) and Division(s) of the product, and the odour threshold and exposure limit of an organic solvent help determine the warning properties of the product

Significance of Information:

Significance

Significance refers to how the employer and worker must respond to the information provided for a specific product, and what they must do to ensure worker health and safety. For example:

- The corrosive material symbol on the supplier label signifies to the employer and worker the need for protection against corrosive effects, particularly for the skin and eyes and, if airborne, the lungs. The employer and worker must examine the MSDS with particular attention to information related to corrosive effects. Appropriate control measures must then be implemented.
- An odour threshold of 20 ppm and a short-term exposure limit of 1 ppm for a product as reported on an MSDS signifies very poor warning properties, and alerts against the use of air-filtering respirators to protect against toxic effects.
- A skull and crossbones symbol on a supplier label signifies that the product is poisonous, considered either "very toxic" or "toxic," and is capable of causing immediate and serious toxic effects and possibly other toxic effects such as adverse chronic effects. The symbol prompts the employer and worker to ensure that workers are instructed in the type(s) of toxic effect(s) and the measures needed to protect against exposure.

  An important point to address when educating workers on the significance of symbols is the incorrect assumption that the presence of the skull and crossbones symbol signifies acute effects only. A product may be included in WHMIS Class D because it meets criteria for Division 1 (immediate and serious toxic effects) as well as Division 2 (other effects); however, while the supplier must provide the skull and crossbones symbol in this case, the stylized "T" signifying Division 2 is optional.

Non-WHMIS symbols

If an employer uses a non-WHMIS hazard symbol system (such as icons representing different forms of personal protective equipment) on workplace labels, the employer must educate workers on the significance of that system. This education must include the meaning of each symbol, the criteria used to assign symbols to products, and the differences between such workplace symbols and WHMIS hazard symbols on supplier labels.

For example, the NFPA symbol system relies on a set of number and colour codes (for more information on the NFPA system, see Appendix 4B, "Labelling Requirements and Standards Outside Canada" in Chapter 4, "The Label"). Workers must know the meaning of the codes, including the criteria used for assigning a colour/number combination to a product. Workers must know that the NFPA system has limitations and is intended to apply to acute effects resulting from short-term exposure to products in emergency situations. Workers using such symbol systems must be aware of all the additional hazard information that WHMIS labels and MSDSs would provide.

Training in Work Procedures

Procedures training

WHMIS requires that four areas of procedures training be provided, where applicable, to workers:

- Safe storage, handling, use, and disposal of a product
- Safe storage, handling, use, and disposal of a controlled product contained or transferred in any of the following:
  - A pipe
  - A piping system including valves
  - A process vessel
  - A reaction vessel
  - A tank car, tank truck, ore car, conveyor belt, or similar conveyance
- Measures to be followed in case of an emergency involving a controlled product
- Procedures to be followed when fugitive emissions are present.

Procedures training must be based on written, safe work procedures developed by the employer, who has taken into account both information from labels and MSDSs and the specific circumstances of the worksite. The type of training provided to workers will depend on the nature of their work. For example, maintenance staff in an ammonia refrigeration plant will require procedures training in all four types of procedures; in contrast, office workers on the site will likely need training only in emergency procedures in the event of a major gas release.

Generic Instruction

Definition

Generic instruction refers to the instruction of workers in WHMIS hazard information without reference to specific products or worksites, for example, when workers are educated about the common hazards of a group of oil-based paints without reference to the specific characteristics and identity of each paint.

Application

Generic instruction is acceptable in the following cases:

- Instruction in the types of content required on supplier labels, workplace labels, and MSDSs.
- Instruction in how WHMIS works.
- Instruction in the hazards of a group of products with similar properties, for which a generic MSDS is acceptable (provided instruction in hazards peculiar to any one product in the group is given).
- Instruction in work procedures for a group of products if the procedures are basically the same for all the products in the group.
- Instruction in work procedures that apply to a variety of worksites if the work procedures are basically the same at each site.
- Preliminary stages of instruction in a multi-stage instruction program. For example, a construction industry education program might involve initial generic instruction of workers by trade schools or through programs provided by construction industry health and safety organizations, followed by on-site instruction in specific product hazards and procedures through extended tool-box meetings.

6.5.3 Criteria of a Successful Program

Testing

The employer is expected, so far as is reasonably practicable, to ensure that each worker has understood the material and is able to put into practice the procedures learned. Each employer must devise a means to determine if a worker has been properly trained. For example, the employer may ask the worker to take a written or oral test, or to participate in a practical demonstration.

"so far as is reasonably practicable"

The phrase *so far as is reasonably practicable* may apply to situations in which language or literacy problems make using oral or written means to determine what workers have learned difficult. However, in such cases, employers and supervisors are expected to base their evaluations on the actions of the employees.

Model OSH regulations do not require the employer to keep any records relating to the instruction program; however, records may help the employer demonstrate compliance with education and training requirements. In some jurisdictions, the existing occupational health and safety legislation requires records on education and training to be kept.

Education and training outcomes

Outcomes of a successful program include the abilities to:

- Identify and describe the information categories on supplier labels, workplace labels, and MSDSs
- Identify and describe hazard information, for a controlled product, that is significant for worker health and safety
- Identify the controlled product to which a mode of identification other than a label applies
- Describe and follow procedures for the safe storage, handling, use, and disposal of a controlled product, and procedures to follow in case of an emergency involving the product
- Describe and follow procedures required when fugitive emissions are present
- Gain access to MSDSs stored on a computer at the workplace (for workers selected for instruction in accessing MSDSs where required by regulation)

Adequately informed workers can be identified by the ability to answer four questions:

1. What are the hazards of the controlled product?
   The answer must reflect the possible adverse effects of the material(s) in question to demonstrate an understanding of generic hazard information (education).
2. How are you protected from those hazards?
   The answer must demonstrate knowledge of adequate workplace control of the hazard through engineering or administrative means or the use of personal protective equipment.
3. What do you do in case of an emergency?
   The answer must show the worker's understanding of procedures to follow in the event of spill, release, fire, or poisoning involving the controlled product, and include the use of personal protective equipment where applicable.
4. Where can you get further hazard information?
   This question focuses on the worker's ability to gain access to the significant information provided on labels and MSDSs. Workers must know how to interpret the supplier label, workplace label, and other means of identification applicable to the use of the product, and how to obtain information significant to health and safety from the MSDS.

6.5.4 Development, Implementation, and Review of the Program

Development and Implementation

Criteria for development and implementation

The employer must ensure that a program of worker education and training is developed and implemented as part of the existing hazard prevention and control program at the employer's place of employment. The program must be developed in consultation with the joint health and safety committee, or the health and safety representative, if any.

The program must be based not only on information provided by labels and the MSDS, but also on the specific hazards posed by controlled products in each workplace and on the particular means present for their control.

For example, a supplier who sells paints containing an aliphatic isocyanate, a potent sensitizing agent, should be aware that the product may be used in a variety of ways, from spot touch-up to large-scale spray applications. Although the MSDS may describe a wide range of control measures, from hand protection and cartridge respirators to full body protection, airline respirators, general ventilation, and isolation procedures, the appropriate choice of control measure and the corresponding type of instruction program will depend on the specific workplace design and product use.

Consultation

Consultation with workers through the joint health and safety committee or representative will help ensure that the education and training program addresses the practical difficulties of product use in the workplace, and effectively communicates with the people who will be taught.

Review

Conditions for review

The employer must review the program of instruction at least **once a year**, more often if:

- Conditions at the workplace change
- New information on a controlled product becomes available
- New products or reformulated products with different hazards are introduced

The review must take place in consultation with the joint health and safety committee or worker health and safety representative, if any. A variety of means exists for demonstrating that reviews have been conducted as required by law, through the minutes of the health and safety committee, for example.

The requirement for review does not mean that reinstruction automatically follows, but does identify any need for updating the program and, consequently, reinstructing the workers.

Example:

Formal reinstruction of workers should not be required in the following situations:

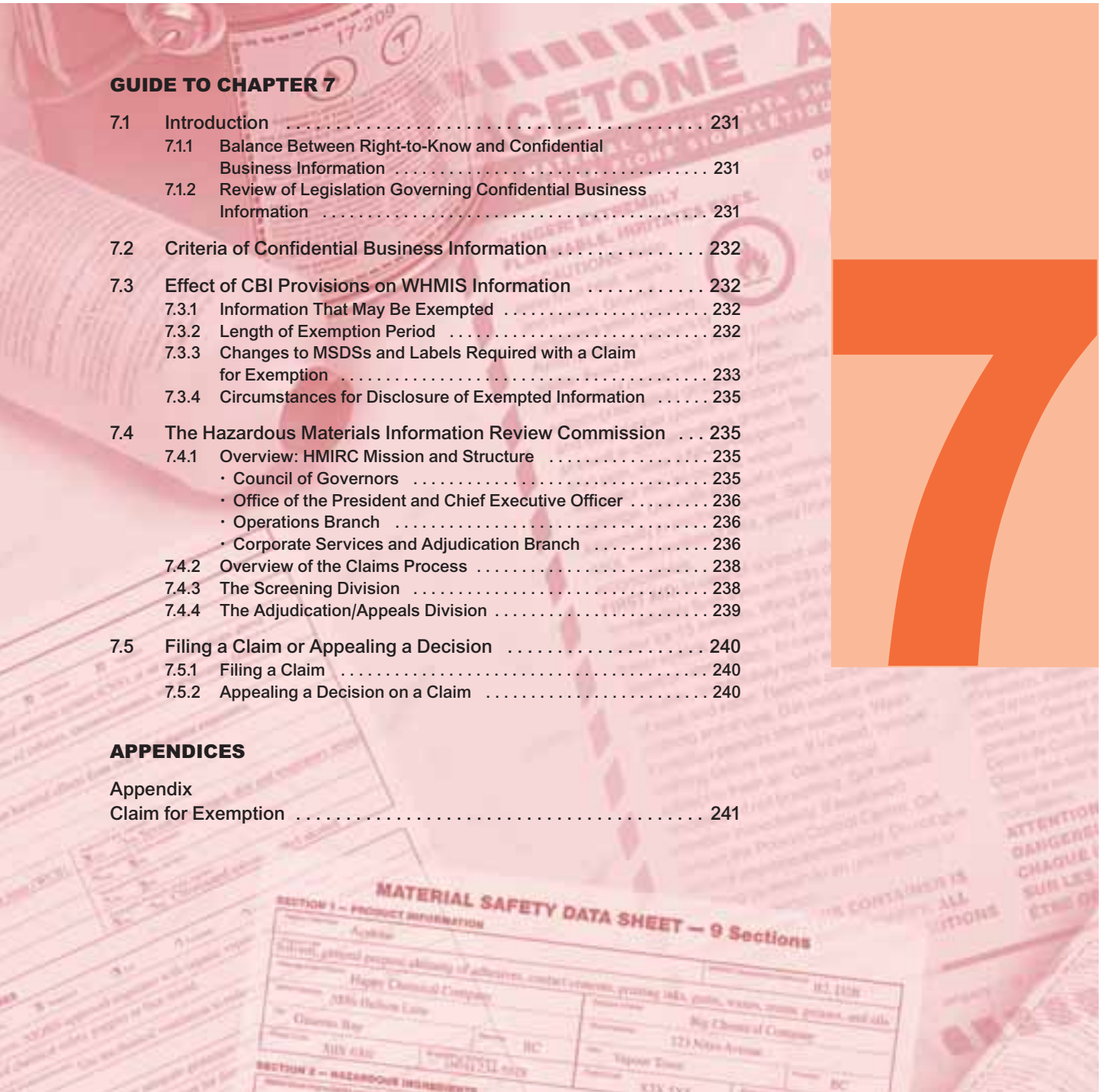
- An updated MSDS received at the workplace provides new hazard information on the product. Management and the health and safety committee conclude that existing control procedures provide adequate protection against the newly identified hazard. After a review of the education program, they decide that the new information can be adequately communicated by posting a copy of the revised MSDS on the staff notice board and making announcements at tool-box meetings.
- A well-managed education program for concrete workers provides hazard education and procedures training not only on cement, but also on various additives and form release agents. At a large construction project, different types of form release agents will be used, in situations that range from spraying of non-erected forms in open air to application on vertical forms in enclosed spaces. After a review of the education program, the joint health and safety committee advises management that supervisors and workers have received enough hazard education on form oils to know when to switch from the use of disposable dust/mist respirators to cartridge respirators for protection against mists and vapours. Their recommendation is that management remind supervisors of the need to consider viscosity of form oil and the location of application when determining the minimum form of protection required.

Appendix 6A
WHMIS Education and Training Checklist

Activity	Assigned to	Date completed
Development		
Consult the occupational health and safety committee or worker representative on the development, implementation, and review of the program.		
Identify all controlled products used in the workplace.		
Evaluate the hazards of each controlled product.		
Identify WHMIS instructors, from either internal or external sources.		
Train instructors (if internal), or evaluate their qualifications (if external).		
Identify employees to be instructed—those who work with or near controlled products.		
Establish a process to identify new employees and contractors who require instruction.		
Evaluate labels and MSDSs to be used in the education program. (Check for clarity, accuracy, and completeness.)		
Evaluate safe work and emergency procedures to be used in education and training program.		
Instruction		
Provide a general introduction to WHMIS (for example, discuss responsibilities, labels, and MSDSs).		
Provide instruction on how to identify controlled products.		
Provide instruction on control measures and safe work procedures.		
Provide instruction on emergency procedures.		
Provide instruction on accessing information on controlled products.		
Evaluate the need for additional or specialized instruction to workers (for example, to those with language or learning difficulties) and provide this instruction where required.		
Provide instruction to workers whenever new products are received or new hazard information becomes available.		
Follow-up activities		
Evaluate workers' understanding of WHMIS, and provide further education and training as required.		
Review the effectiveness of the education and training program at least once a year. (Reviews must be done in consultation with the occupational health and safety committee or worker representative.)		

CHAPTER 7

Confidential Business Information



GUIDE TO CHAPTER 7

APPENDICES

7.1 Introduction

7.1.1 Balance Between Right-to-Know and Confidential Business Information

Definition and rationale

In certain circumstances, the release of information that identifies a product, its ingredients, or its supplier may result in financial loss to the supplier or employer relative to competitors. Such information is termed *confidential business information* (also called *trade secret* or *proprietary information).*

Balancing the worker's right to know about workplace hazards with industry's need to protect genuine confidential business information was a basic consideration during the development of WHMIS.

WHMIS provides a mechanism for suppliers or employers to withhold genuine confidential information in specified circumstances.

Because the purpose of WHMIS is to protect the health and safety of workers, legislation requires suppliers or employers with both pending and successful claims for CBI exemption to disclose confidential information that is needed by medical professionals for emergency diagnosis or treatment, or by federal and provincial OSH agencies for enforcement. This information must also be released if ordered by an Appeal Board to protect health and safety in a workplace.

7.1.2 Review of Legislation Governing Confidential Business Information

Five pieces of legislation govern the circumstances in which exemptions are permitted and the effect on the delivery of hazard information in WHMIS.

Legislation governing HMIRC

- The *Hazardous Materials Information Review Act (HMIRA)* prescribes the types of information that may be exempted from disclosure and defines the structure and function of The Hazardous Materials Information Review Commission (*HMIRC*). Functions of the Commission include assessing and ruling on claims for exemption from disclosure, processing appeals to rulings including the convening of Appeal Boards, and providing information in confidence to specified parties.
- The *Hazardous Materials Information Review Regulations* include the criteria that must be considered when a claim of confidential business information is assessed for validity, and establish claim and appeal filing fees.
- The *CPR* prescribe, for the supplier, the adjustments that must be made to labels and MSDSs if a claim is filed and accepted.
- The Model OSH Regulations, where enacted by provincial health and safety regulatory agencies, provide details of CBI provisions for the employer equivalent to those established for the supplier under the *CPR*.
- The *HPA,* Section 16, permits the supplier to use generic chemical identities in place of specific chemical identity to name CBI ingredients under claim.

7.2 Criteria of Confidential Business Information

Four criteria must be considered when judging the validity of a claim of confidential business information.

HMIRC criteria for CBI

- *Information must be confidential to the claimant and known only to certain people, such as:*
  - Designated persons employed by or in a business relationship with the claimant
  - Government officials, in compliance with regulatory reporting requirements
  - Medical professionals, for medical diagnosis or treatment
- *The claimant must have taken reasonable care to maintain confidentiality of information*. For example, claimants must alert employees and business associates who are aware of the information that the information must be kept confidential.
- *The information must have economic value to the claimant or competitors*. The information is valuable because it is not generally known, and disclosure would result in material financial loss to the claimant or material financial gain to competitors.
- *The information may represent a significant development cost to the firm*. The money expended and business resources used to develop the information must be substantial.

  Note: An exemption cannot be denied on the grounds that insufficient expenses have been incurred to develop the information.

7.3 Effect of CBI Provisions on WHMIS Information

A claim for exemption from requirements to disclose information has a number of consequences for the WHMIS information delivery system. At issue are the types of information that may be exempted, the resulting changes to MSDSs and labels, and the circumstances in which exempted information must or may be disclosed.

7.3.1 Information That May Be Exempted

Under Section II of the *HMIRA*, only certain types of information can be the subject of a claim for a disclosure exemption.

Permitted exemptions for suppliers

Suppliers may claim exemption for:

- The chemical identity or concentration of any ingredient of a controlled product
- The name of any toxicological study that identifies any ingredient of a controlled product

Permitted exemptions for employers

Employers may claim exemption for:

- The chemical identity or concentration of any ingredient of a controlled product
- The name of any toxicological study that identifies any ingredient of a controlled product
- The chemical name, common name, generic name, trade name, or brand name of a controlled product
- Information that could be used to identify a supplier of a controlled product

7.3.2 Length of Exemption Period

Every person who files a claim for exemption in accordance with the *HMIRA* is exempt from the requirement to divulge the information that is the subject of the claim for the following periods:

Pending claims

- For a period beginning the date the claim is filed and ending with the final disposition of proceedings on the claim. (*Proceedings* means any proceedings under the *HMIRA* including the review of the claim by HMIRC and any appeals to its decisions)

Valid claims

- For a period of **three years**, if the claim is determined to be valid, following the date on which claim-related proceedings were completed, that is, for a period of three years from the date of the ruling by HMIRC, if no appeal is undertaken, or otherwise from the date of resolution of the appeal.

7.3.3 Changes to MSDSs and Labels Required with a Claim for Exemption

A supplier or employer who files a claim for exemption of information is permitted to delete that information from the MSDS or label, as applicable, on three conditions:

Deleted information

- The deleted information must be of the type permitted, as described in Part 7.3.1. Physical data, hazard information, preventive measures, and first aid information may not be claimed as confidential.

HPA 16

- The generic chemical identity of the product or ingredient must be disclosed with as much precision as is consistent with the exemptions, if the subject of the claim is the chemical identity of a controlled product or any ingredient of a controlled product.

HPA 19(2)

The identity of a product may be provided as a code name or code number specified by the supplier if the identity of the product is the subject of the claim.

Generic chemical identity

Generic chemical identity is the generic chemical class or category that is structurally descriptive of the chemical claimed as confidential business information, and must be no broader than necessary to protect the specific chemical identity from disclosure. The functional identity of a product is *not* adequate. For example, an appropriate generic chemical identity for hydrochloric acid is "inorganic acid."

If several ingredients exempted under the *HMIRA* can be described with one generic chemical identity, the supplier may use the single identity as long as it describes each of the ingredients with "as much precision as is consistent with the exemption." For example, if disclosure exemptions were provided for the ingredients hexane, heptane, and octane in a controlled product, the supplier could use, in place of three generic chemical identities, the identifier "saturated aliphatic hydrocarbons."

Added information

- Claim information must be added to the MSDS or labels where applicable, as follows:
  - Once a claim has been registered by the HMIRC, the claimant must disclose the date the claim was filed and the Registry Number assigned to the claim by the HMIRC. This information must be maintained on MSDSs and labels until the claimant is informed of a decision on the claim.
  - If an employer claim for exemption is granted, the claimant must revise the MSDS and label within 30 days of the final disposition of the claim. The new information replaces the date the claim was filed with a statement that an exemption was granted and the date of the decision granting the exemption.

    The date of the final disposition is, if no appeal of the decision is made, the date of the decision; if an appeal of a decision is made, the final disposition date is either the date of the Appeal Board's decision, or if appeal to the Federal Court is made, the date of the Federal Court decision or subsequent appeals of that judgement.
  - If a claim approved by the HMRIC includes an order for changes to the MSDS and/or label, the claimant must make such changes unless they are successfully appealed.

Changes to the MSDS for a Valid Claim	
Information Withheld	**Information Required**
• Chemical identity of ingredient(s) • CAS Number • Concentration • Name of identifying toxicological studies	• Generic chemical identity for ingredient(s) • Physical data • Hazard information • Preventive measures • First aid • Claim Registration Number and date (in a pending claim) • Statement of exemption and date of decision (in a granted claim) • Any changes ordered by HMIRC

Example: Changes to the MSDS Associated with a Claim

Before HMIRC Registration:

Section II: Hazardous Ingredients

Component	CAS #	% (wt)	OSHA PEL	ACGIH TLV
Petroleum distillate	64742-89	15–35	N/AV	N/AV
Proprietary	Trade Secret	15–55	N/AV	400 ppm
Proprietary	Trade Secret	1–20	N/AV	N/AV

After HMIRC Registration:

Section II: Hazardous Ingredients

Component	CAS #	% (wt)	LD_{50}	LC_{50}
Solvent Naphtha (petroleum), light aliphatic	64742-89-8	15–30	N/AV	N/AV
Aliphatic hydrocarbon	xxx-xx-x*	15–40	>15,000 mg/kg (rat)	25,000 ppm (rat)
Alkylbenzene	xxx-xx-x*	5–10	2,600 mg/kg (rat)	8,800 ppm (rat)

*HMIRC Claim #9876, filing date November 30, 1999

7.3.4 Circumstances for Disclosure of Exempted Information

Information that is the subject of an exemption must be disclosed under two circumstances:

- Suppliers and employers must provide information on a controlled product to any medical professional who requests that information for medical diagnosis or treatment in an emergency.
- A claimant must disclose, in confidence to one or more affected parties, information related to the subject of an appeal if the Appeal Board orders the information disclosed to protect health and safety in a workplace.

In addition, an official of the HMIRC may communicate information received from a supplier or employer concerning a CBI claim to a medical professional who requests that information for diagnosis or treatment in an emergency, and to any official of:

- Health Canada, to prepare advice for a screening officer on the compliance of the MSDS or label with the provisions of the *HPA* or the *Canada Labour Code*
- Human Resources Development Canada, to administer or enforce Part IV of the *Canada Labour Code*
- The Department of Transportation, to provide information in cases of medical emergency through the Canadian Transport Emergency Centre
- Provincial OSH regulatory agencies, to administer or enforce any law of the province relating to occupational health and safety.
- In all cases where confidential business information is disclosed, the recipients are required to maintain the confidentiality of the information. The *HMIRA* provides for penalties if *any* provision of the Act, including unauthorized disclosure of information, is contravened.

7.4 The Hazardous Materials Information Review Commission

7.4.1 Overview: HMIRC Mission and Structure

Mission

The Hazardous Materials Information Review Commission was established as a part of WHMIS with the proclamation of the *HMIRA* on October 1, 1987. The mission of the HMIRC is to maintain the balance between industry's right to protect genuine confidential business information and the worker's right to know about hazardous materials encountered on the job.

Mandate

Under the HMIRA, the Commission has the mandate to review and rule on claims for exemption of confidential business information; determine the regulatory compliance of MSDSs that are the subject of a claim for exemption and, for employer claims, product labels; and, when required, convene independent boards to hear appeals of original Commission decisions and orders. The HMIRC organization, shown in Figure 7.1, is composed of a Council of Governors, the Office of the President and Chief Executive Officer, and two branches, the Operations Branch and the Corporate Services and Adjudication Branch.

Organizational structure

Council of Governors

The HMIRC is governed by a Council of Governors, consisting of members representing workers, suppliers and employers, and the federal, provincial, and territorial governments. Each governor is appointed by the Governor-in-Council for a term of up to three years. The Council is headed by a Chairperson chosen by the governors each year.

The Council's primary responsibility is to make recommendations to the Minister of Health on claim review procedures and regulatory changes to the Commission's fee structure. The Council may also prescribe procedures for handling appeals.

The Office of the President and Chief Executive Officer

A President appointed by the Governor-in-Council heads the Commission and is accountable to the Council of Governors and the Minister of Health. As the Commission's Chief Executive Officer, the President oversees and directs the organization's day-to-day operations. The President's Office provides support and acts as Secretariat to the Council of Governors.

The Operations Branch

The Vice-President of Operations supervises and directs work within the MSDS Compliance, Client Services, and Screening programs. The Director also serves as Chief Screening Officer.

MSDS Compliance Program. In this program, Screening Officers have the statutory responsibility for determining if MSDSs and labels submitted with claims comply with WHMIS legislation. To make this decision, Screening Officers apply WHMIS legislation as well as legislation administered by other occupational health and safety agencies. Health and safety advice from Evaluators in the MSDS Compliance Division is also considered. Screening Officers order changes to MSDSs or labels when necessary, and are also responsible for reviewing amended MSDSs and labels.

Client Services Program. Within this program lies the responsibility for registration and security of claims for exemption. The Client Services Program collects and verifies claim fees, and, after completing preliminary reviews of claim submissions, issues the Registry Numbers that permit claimants to market their products in Canada. Screening officers judge the validity of claims, based on a review of supporting information from the claimant against criteria prescribed in the *HMIRA,* and issue disclosure orders for invalid claims.

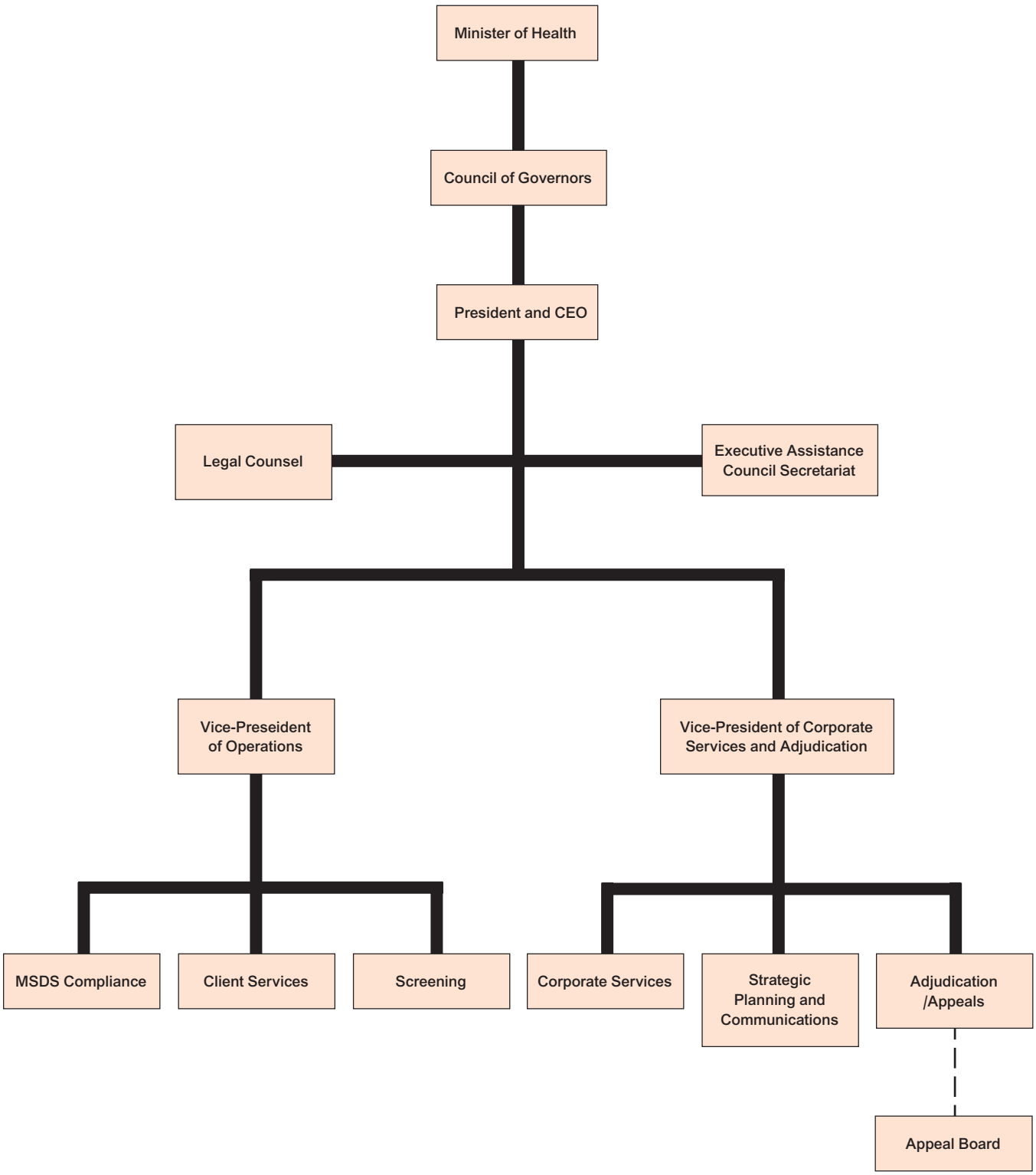
The Corporate Services and Adjudication Branch

The Vice-President of Corporate Services and Adjudication supervises and directs work within the branch, including Adjudication Services, Corporate Services, Strategic Planning, Communications, Access to Information and Privacy, and Policy Coordination and Development. The Vice-President acts as Chief Appeals Officer.

Adjudication Services. The Branch convenes, when needed, independent, tripartite, quasi-judicial boards to hear appeals of decisions and orders by Screening Officers. In convening an Appeal Board, the Chief Appeals Officer appoints a Chairperson, who appoints two additional members: one representing suppliers and/or employers, the other representing workers. Board members are selected from lists of nominees established and maintained by the Branch in accordance with the *HMIRA*. The Branch publishes in the *Canada Gazette* the Notice of Appeal accompanying each filed appeal, and the Notice of Decision issued once the appeal has been heard and a decision made. The Commission is also establishing a Dispute Resolution Program to work in conjunction with the current appeals process.

Corporate Services, Strategic Planning, Communications, Access to Information and Privacy, and Policy Coordination and Development. These programs oversee the Commission's strategic and business planning; internal and external communications; Privacy and Access to Information policy; and legislative and regulatory matters.

Figure 7.1
HMIRC Organizational Structure



7.4.2 Overview of the Claims Process

The Commission has an established procedure for handling claims:

The claims process

1. Claims for exemption are received by the Commission.
2. Claims for exemption are prepared for evaluation. Claims are registered in the HMIRC system, with assignment of a Registry Number and publication of a Notice of Filing in the *Canada Gazette*.
3. Claims for exemption are reviewed to determine whether they should be accepted or rejected based on specific criteria within the *HMIR Regulations*. Associated MSDS and, for employer claims, label information is reviewed for compliance with requirements under the *HPA*, the *Canada Labour Code,* or, pursuant to Section 32 of the *HMIRA*, the applicable legislation of a province or territory.
4. MSDSs and, where applicable, labels are reviewed to determine compliance with WHMIS requirements.
5. Claims are accepted or rejected. Claimants receive formal Statements of Decision, which for invalid claims or non-compliant MSDSs, include orders to make corrections.
6. Claimants or affected parties may appeal decisions on claims for exemption if they disagree with the original judgement.

7.4.3 The Screening Division (Operations Branch)

Screening Officers in the Operations Branch have the authority to make decisions on all aspects of the screening of claims.

Functions

The primary functions of the Screening Officers are to:

- Review claims requesting exemption from WHMIS reporting requirements
- Rule on the validity of exemption claims based on confidential business information criteria written in the *HMIR Regulations*
- Consult with the Branch's MSDS Compliance Evaluators and experts on occupational health and safety legislation and decide if MSDSs and labels comply with applicable legislation

In carrying out their duties, Screening Officers may require claimants to provide additional information on any aspect of the claim. All information revealed in the screening process is confidential.

The claim screening process is described below:

The claim screening process

1. The Chief Screening Officer assigns the claim to a Screening Officer.
2. The assigned Screening Officer reviews, in consultation with Evaluators, the claim's MSDS and label for compliance with regulations, and evaluates submissions about the claim generated from the Notice of Filing published in the *Canada Gazette* (which includes a deadline for responses).
3. The Screening Officer makes a decision based on how the claim information relates to exemption criteria in the *HMIR Regulations*.
4. The claimant receives a formal Statement of Decision. The Statement of Decision may include an order for changes to MSDS and/or label information. An order for disclosure accompanies claims that are ruled invalid. The ruling and any orders are also published in the *Canada Gazette*. Once published, the decision can be appealed by the claimant or affected parties.

   An unsuccessful claim can be ruled either partially or completely invalid. Claims ruled completely or partially invalid cannot be resubmitted but can be appealed.

   If a claim is disallowed, the supplier has the right to withdraw the product from market without disclosing the information that was the subject of the claim.
5. Affected parties who made written submissions and the appropriate provincial, territorial, or federal OSH enforcement agencies receive notice of the claim's acceptance or rejection. At the conclusion of all proceedings, a copy of the Notice of Decision and Order published in the *Canada Gazette* is sent to all provincial/territorial occupational health and safety agencies.

7.4.4 The Adjudication/Appeals Division (Corporate Services and Adjudication Branch)

Functions

The Adjudication/Appeals Division is responsible for the administrative work required to establish Appeal Boards to hear cases resulting from appeals of decisions and orders made by Screening Officers on claims. While Boards are administered by the Adjudication/Appeals Division of the Commission, they are independent of the Commission with respect to their powers to decide the outcome of an appeal. The primary functions of this Division are to:

- Receive appeals on HMIRC decisions and orders
- Maintain lists of potential Appeal Board members in each jurisdiction from names put forward by industry, labour, and government in the respective jurisdiction
- Notify claimants and affected parties of Appeal Board decisions

An appeal may relate to orders for compliance of MSDSs or labels, acceptance or rejection of claims, or requests that CBI be disclosed (in confidence) to affected parties for occupational health and safety reasons.

Appellants can be either the claimant or an affected party. An affected party may be the supplier of the controlled product to the employer who is the claimant; the employer who receives the product from the supplier who is the claimant; an employee at the workplace or employee representative (including trade union staff or officers), or a health and safety representative for the workplace.

The claim appeal process is described below:

The claim appeal process

1. The appellant files a written Statement of Appeal, accompanied by a filing fee, with the Chief Appeals Officer.
2. An Appeal Board is convened, usually in the province where the claimant conducts the most business. The Chief Appeals Officer appoints the Appeal Board Chairperson from a list of people recommended by the Lieutenant-Governor-in-Council of the province where the appeal will be heard. The Chairperson of the Appeal Board appoints industry and labour representatives from lists of potential Appeal Board members maintained by the Adjudication/Appeals Branch.
3. A Notice of Appeal is published in Part I of the *Canada Gazette* to allow affected parties to make representations to the Appeal Board. The Notice of Appeal includes a summary of the decision and/or order appealed, the names of members of the Board, the location of the hearing, and a deadline for affected parties to file an appearance (Form 4).
4. The appeal is heard. The hearing includes a review of the Record of the Screening Officer whose decision or order is being appealed; the Statement of Appeal; submissions made by the appellant or any affected party concerning the appeal; and if applicable, the criteria or regulations defining CBI or WHMIS requirements for MSDSs or labels that pertain to the case.

   Proceedings are confidential. However, the Appeal Board has the power to order a claimant to disclose, in confidence to affected parties, any information pertaining to the subject matter of the claim on appeal which, in the Board's opinion, should be disclosed to ensure health and safety in the workplace.
5. The Appeal Board makes a decision to uphold, vary, or rescind the Screening Officer's decision and/or order.

Appeal Board Decisions

The final outcome of the appeal process is the Appeal Board's decision to :

- Dismiss the appeal, and confirm the decision/order of the Screening Officer
- Allow the appeal, and either vary or rescind the decision/order being appealed

The Appeal Board delivers a written decision to the claimant (appellant) as soon as practicable after the hearing. Affected parties who have made submissions on the appeal receive a Notice of Decision, which is also published in the *Canada Gazette*.

An appellant or affected party may appeal the decision of an Appeal Board to the Federal Court of Canada. Such judicial reviews may consider the form by which a decision was reached (process, errors in law, adherence to principles of natural justice), but not the content of the Appeal Board decision.

7.5 Filing a Claim or Appealing a Decision

The address for correspondence with the HMIRC is:

Hazardous Materials Information Review Commission
427 Laurier Avenue West, 7th Floor
Ottawa, ON K1A 1M3
Tel: (613) 993-4331
Fax: (613) 993-4686
Website: www.hmirc-ccrmd.gc.ca

7.5.1 Filing a Claim

Requirements for filing a claim

A claim for exemption must be written using Form 1 shown in the Appendix of this Chapter. The form must be either **sent by registered mail** or **delivered in person** by the claimant or the claimant's agent to the head office of the Commission. (The information requested on Form 1 includes the information required under Section 8 of the *HMIR Regulations*, and calculations for claim fees as prescribed under Sections 4 to 7 of those regulations).

Screening Officers will assign a Registry Number to the claim for exemption as soon as practicable after receiving all of the following:

- The claim, provided on Form 1
- The information that is the subject of the exemption
- The MSDS and/or label to which the claim relates
- The required fee (Fees may be paid by certified cheque or money order made payable to the Receiver General of Canada. See the *HMIR Regulations*, Sections 4 and 12, for the fee structure.)

7.5.2 Appealing a Decision on a Claim

Requirements for appealing

The appeal process commences when the appellant files a Statement of Appeal with the Chief Appeals Officer. The statement must fulfill all of these requirements:

- Be in writing
- Provide the grounds and supporting material for the appeal
- Be accompanied by the required filing fee
- Be submitted within the prescribed time limit

The intent of the appeal must be filed in a form and manner prescribed by regulations. The *Appeal Board Procedures Regulations* (SOR/91-86) were adopted January 7, 1991. To obtain a copy, contact HMIRC.

Appeals of an order for compliance or a decision by a Screening Officer are based on the content of the decision. An appeal of a decision by an Appeal Board to the federal courts must be based on the form (process, errors in law or adherence to the principles of natural justice) by which the Appeal Board reached its decision rather than the content of the decision itself.

The fee for appeals can be found in Sections 4 and 12 of the *HMIR Regulations*.

Appendix 7A
Schedule 1, Form 1: Claim for Exemption

Hazardous Materials Information Review Commission

Conseil de contrôle des renseignements relatifs aux matières dangereuses

(Également disponible en français)

APPLICATION FOR A
CLAIM FOR EXEMPTION
(Confidential when completed)

Note: In this application, "HMIRR" means the *Hazardous Materials Information Review Regulations*.

PART I – CLAIMANT INFORMATION

CLAIMANT NAME:
ADDRESS:
CITY:
PROVINCE or STATE:
COUNTRY:
POSTAL or ZIP CODE:
TELEPHONE:
FAX:
E–MAIL ADDRESS:

CONTACT PERSON:
TITLE:
TELEPHONE:
FAX:
E–MAIL ADDRESS:

MAILING ADDRESS OF CONTACT PERSON (IF DIFFERENT FROM ABOVE)

ADDRESS:
CITY:
PROVINCE or STATE:
COUNTRY:
POSTAL or ZIP CODE:

LANGUAGE OF PREFERENCE

ENGLISH ☐

FRENCH ☐

CLAIMANT CATEGORY

SUPPLIER ☐

EMPLOYER ☐

CLAIM TYPE – CHECK APPROPRIATE BOX(ES)

This application is completed in respect of:

ORIGINAL CLAIMS

One original claim for exemption in respect of one controlled product (paragraph 4(a) of the HMIRR) ☐

More than one original claim for exemption in respect of any number of controlled products (paragraph 4(b) of the HMIRR) ☐

REFILED CLAIMS

One refiled claim for exemption in respect of one controlled product (paragraph 5(a) of the HMIRR) ☐

More than one refiled claim for exemption in respect of any number of controlled products (paragraph 5(b) of the HMIRR) ☐

PART II – CONTROLLED PRODUCTS INFORMATION

Note:This application has been designed to accommodate one or more than one claim for exemption in accordance with section 4 or 5 of the HMIRR.

For each controlled product included in the claim or claims for exemption, give the product identifier	Indicate Registry Number previously assigned (if applicable)	Indicate the subject of the claim for exemption by using the appropriate reference (i.e. A, B, etc.) listed in Part III of this application	Registry Number (for Commission use only)

PART III – SUBJECT OF CLAIM FOR EXEMPTION

SUPPLIER

A. Chemical identity of an ingredient of a controlled product
B. Concentration of an ingredient of a controlled product
C. Name of a toxicological study that identifies an ingredient of a controlled product

EMPLOYER

D. Chemical identity of an ingredient of a controlled product
E. Concentration of an ingredient of a controlled product
F. Name of a toxicological study that identifies an ingredient of a controlled product
G. Chemical name, common name, generic name, trade name or brand name of a controlled product
H. Information that could be used to identify a supplier of a controlled product

PART IV – INFORMATION THAT SUPPORTS THE CLAIM FOR EXEMPTION (SEE SECTION 8 OF THE HMIRR)

Note: This Part seeks the basic information necessary for the Commission to review a claim for exemption. Under subsection 14(1) of the Act a screening officer may request a claimant to submit such additional information as the screening officer may require. If this application is filed in respect of more than one claim for exemption (section 4 or 5 of the HMIRR) and the information that supports the claims differs, a separate copy of this Part shall be completed in respect of each controlled product for which the information differs.

Do not disclose in this Part information considered to be confidential business information. If it is necessary to disclose such information in order to meet the requirements of this Part, do so on a separate sheet and enclose it together with a completed Part VII of this application in a separate sealed envelope.

1. Is the information required in this section and which is applicable to the claim(s) identical to that which has been previously provided?

YES _____ (State Registry Number: _____)

If NO, complete the following:

(a) Number of employees, officers or directors of the claimant having knowledge of or access to the confidential business information _____

(b) Number of the other persons [i.e., persons not referred to in (a)] inside or outside Canada having knowledge of or access to the confidential business information _____

2. Measures taken to maintain the confidentiality of the information

Is the information in this section identical to that which has been previously provided?

YES _____ (State Registry Number: _____)

If NO, answer the following:

(a) Is access restricted to persons on a "need to know" basis ? YES _____ NO _____

(b) Are there confidentiality agreements for all individuals with access to confidential business information? YES _____ NO _____

(c) What other security measures, including those pertaining to site security, document security and computer security, are employed?

APPLICATION FOR A CLAIM FOR EXEMPTION – Continued

3. COMPLETE EITHER (1) **or** (2)

(1) (a) Estimate of the material financial loss to the claimant that would result from disclosure of the information ..... $ _____

(b) Explanation as to why the claimant considers the financial loss to be material:

(2) (a) Estimate of the material financial gain to the claimant's competitors that would result from disclosure of the information ..... $ _____

(b) Explanation as to why the claimant considers the financial gain to be material:

4. The amount of money and other business resources used to develop the information and the reasons why they are considered substantial in the circumstances.

PART V – FEE CALCULATION (SEE SECTIONS 4 TO 7 OF THE HMIRR)

Note: Fees may be paid by certified cheque or money order, made payable in Canadian dollars to the Receiver General for Canada, or by credit card (Visa, Mastercard or American Express)

This Part has been designed to accommodate the calculation of the fee required to accompany claims for exemption in respect of each prescribed method of fee calculation. Select the appropriate description(s) set out below and calculate the total fee that is required to accompany the claim or claims for exemption that are being made.

1. Basic Fee calculations

(1) Fee in respect of one or more claims for exemption referred to in paragraph 4 of the HMIRR. **Complete either section (a), (b) or (c) as applicable**.

(a) For 1 – 15 claims

(i) $1,800 x _____ (number of claims) max. $27,000 ..... $ _____

(b) For 16 – 25 claims

(i) $1,800 x 15 ..... $ 27,000
(ii) $400 x _____ (number of claims minus 15) max. $4,000 ..... $ _____
Add lines (i) and (ii)..... **$ _____**

(c) For 26 or more claims

(i) $1,800 x 15 ..... $ 27,000
(ii) $400 x 10 ..... $ 4,000
(iii) $200 x _____ (number of claims minus 25) ..... $ _____
Add lines (i), (ii) and (iii) ..... **$ _____**

(2) Fee in respect of claims for exemption referred to in paragraph 5 of the HMIRR [for any number of controlled products, all of which meet the definition of a **Refiled claim** set out in subparagraph 2(1)]. **Complete either section (a), (b) or (c) as applicable**.

(a) For 1 – 15 claims
(i) $1,440 x _____ (number of refiled claims) max. $21,600 ..... $ _____

(b) For 16 – 25 claims
(i) $1,440 x 15 ..... $ 21,600
(ii) $320 x _____ (number of refiled claims minus 15) max. $3,200 ..... .$ _____
Add lines (i) and (ii)..... $ _____

(c) For 26 or more claims

(i) $1,440 x 15 ..... $ 21,600
(ii) $320 x 10 ..... $ 3,200
(iii) $160 x _____ (number of refiled claims minus 25) ..... $ _____
Add lines (i), (ii) and (iii) ..... **$ _____**

(3) Total Fee [add amounts from sections (1) and (2)]..... **$ _____**

CLAIMANT IS TO SUBMIT TOTAL FEE UNLESS QUALIFYING CRITERIA FOR "SMALL BUSINESS" ARE MET (SEE FOLLOWING)

APPLICATION FOR A CLAIM FOR EXEMPTION – Continued

2. Fees for small businesses (section 7 of the HMIRR)

The fees for a claimant that meets the qualifying criteria of "small businesses" as set out in paragraphs 7(a) and (b) of the HMIRR are equal to one half of the fees calculated in section 1 of this Part.

(1) Eligibility as a small business

(a) Claimant's gross annual revenue, in the claimant's fiscal year immediately preceding the fiscal year in which the claim for exemption is filed was more than $3,000,000. …….... yes _____ no _____
(b) Claimant employs more than 100 employees .....…….... yes _____ no _____

Note: Where the answer to both paragraphs (a) and (b) is "no", the claimant is eligible as a small business.

(2) Fee for a small business claimant 1/2 x _____ (amount of Total Fee, above) .....…… $ _____

PART VI – DECLARATION

I, _____ , hereby declare, on behalf of the claimant herein, that the information
(name)
reported in Parts I to V and Part VII of this application is true to the best of my knowledge and belief.

_____ _____
(signature) (date)

_____
(title)

PART VII – CONFIDENTIAL BUSINESS INFORMATION

Note: Complete this Part, place it in a separate sealed envelope and submit it together with Parts I to VI of this application.

Use more than one page if required.

CLAIMANT NAME:
ADDRESS:
CITY:
PROVINCE or STATE:
COUNTRY:
POSTAL or ZIP CODE:

ADDRESS CORRECTION

ADDRESS:
CITY:
PROVINCE or STATE:
COUNTRY:
POSTAL or ZIP CODE:

CONTACT PERSON: _____ TELEPHONE: _____

TITLE: _____ FAX: _____

E–MAIL ADDRESS: _____

PART A [for claims **where subject matter pertains to the chemical identity or concentration of one or more ingredients in a controlled product** under HMIRR subparagraph 8(1)(e)(i) and/or (ii) or 8(1)(f)(i) and/or (ii)]

Code name, code number or product identifier for each controlled product included in Part II	Generic chemical identity of the ingredient(s) for which exemption is claimed	CAS registry number of the ingredient(s) for which exemption is claimed (if available)	Confidential business information for which exemption is claimed (e.g., the specific chemical identity that is the subject of the claim for exemption)	Registry Number (for Commission use only)

APPLICATION FOR A CLAIM FOR EXEMPTION – Continued

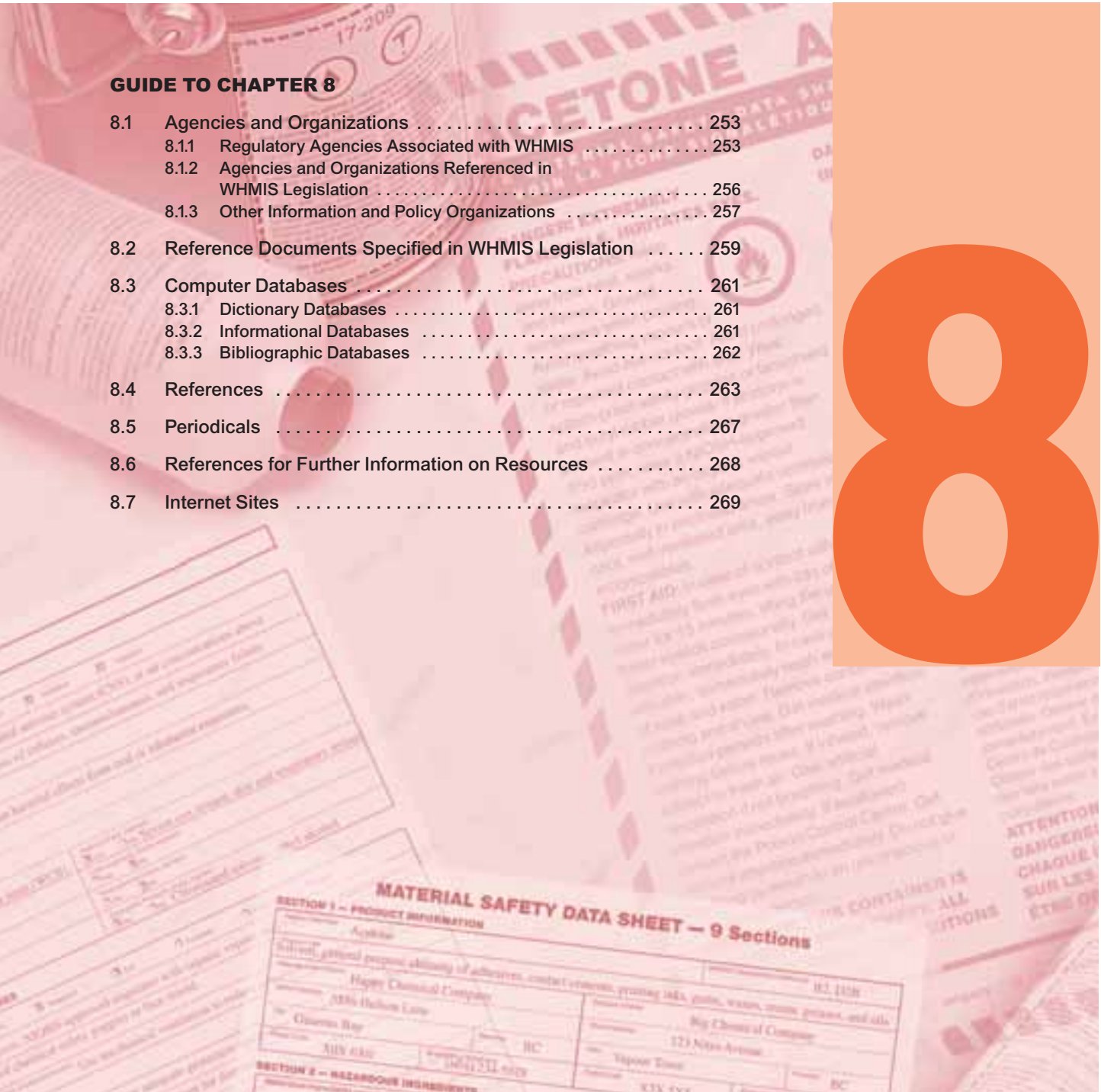
PART B [for claims **where subject matter is also or exclusively set forth** under HMIRR subparagraph 8(1)(f)(iii) and/or (iv)]

NOTE: THIS PART IS NOT REQUIRED TO BE SUBMITTED IF NOT APPLICABLE TO THE CLAIM

Code name or code number of controlled product	Chemical name, common name, trade name or brand name which is part of the subject matter of the claim	Information that would be used to identify the supplier of the controlled product	Registry Number (for Commission use only)

CHAPTER 8

Resources



GUIDE TO CHAPTER 8

8

8.1 Agencies and Organizations

This section provides the addresses and telephone numbers for three groups of agencies and organizations:

- Those involved as representatives in the development of WHMIS legislation
- Those referenced in WHMIS legislation
- Other general information and policy organizations

8.1.1 Regulatory Agencies Associated with WHMIS

Federal Government

Hazardous Materials Information Review Commission
427 Laurier Avenue West, 7th Floor
Ottawa, ON K1A 1M3
Tel: (613) 993-4331
Fax: (613) 993-4686
Website: www.hmirc-ccrmd.gc.ca

Health Canada, WHMIS Division
123 Slater Street, 4th Floor
Postal Locator: 3504D
Ottawa, ON K1A 0K9
Tel: (613) 957-2342
Fax: (613) 948-2626
Website: www.hc-sc.gc.ca/hecs-sesc/whmis/

Human Resources Development Canada
Labour Program
Phase 11, 10th Floor, Place du Portage
Hull, QC K1A 0J2
Tel: (819) 953-0215
Fax: (819) 953-4830
Website: www.hrsdc.gc.ca/en/labour/index.shtml

Provinces and Territories

Alberta

WHMIS Coordinator
Legislation, Policy and Technical Support Services
Workplace Health, Safety and Strategic Services
Human Resources and Employment
9th Floor, 10808 - 99 Avenue
Edmonton, AB T5K 0G5
Tel: (780) 415-0600
Fax: (780) 427-5698
Website: www.gov.ab.ca/LAB/index.html

British Columbia

WorkSafeBC
PO Box 5350, Station Terminal
Vancouver, BC V6B 5L5
Tel: (604) 276-3100
Fax: (604) 232-5848
Website: WorkSafeBC.com

Manitoba

Workplace Safety and Health Division
Department of Labour
200 - 401 York Avenue
Winnipeg, MB R3C 0P8
Tel: (204) 945-3450
Fax: (204) 945-4556
Website: www.gov.mb.ca/labour/safety/index.html

New Brunswick

Workplace Health, Safety and Compensation Commission
4th Floor, 500 Beaverbrook Court
Fredericton, NB E3B 5X4
Tel: (506) 738-4322
Fax: (506) 453-7982
Website: www.whscc.nb.ca

Newfoundland

Provincial Industrial Hygienist
Occupational Health and Safety Inspection Services
PO Box 8700
St. John's, NF A1B 4J6
Tel: (709) 729-0052
Fax: (709) 729-6639
Website: www.whscc.nf.ca/

Northwest Territories and Nunavut

Workers' Compensation Board N. W. T. and Nunavut
PO Box 8888
Yellowknife, NT X1A 2R3
Tel: (867) 920-3888
Fax: (867) 873-0262
Website: www.gov.nt.ca

Nova Scotia

Occupational Health and Safety Division
Department of Labour
5151 Terminal Road
PO Box 697
Halifax, NS B3J 2T8
Tel: (902) 424-8477
Fax: (902) 424-3239
Website: www.gov.ns.ca/enla/ohs/

Ontario

Ontario Ministry of Labour
Occupational Health and Safety Branch
655 Bay Street, 14th Floor
Toronto, ON M7A 1T7
Website: www.labour.gov.on.ca

Prince Edward Island

P. E. I. Workers' Compensation Board
Occupational Health and Safety Branch
PO Box 757
Charlottetown, PE C1A 7L7
Tel: (902) 368-5680
Fax: (902) 368-5697
Website: www.wcb.pe.ca

Quebec

Commission de la santé et de la sécurité du travail
Service du répertoire toxicologique
1199 rue de Bleury 4 étage
Montreal, QC H3C 3J1
Tél: (514) 906-3080
Télécopieur: (514) 906-3081
Website: www.csst.qc.ca

Saskatchewan

Occupational Health and Safety
Saskatchewan Labour
6th Floor, 1870 Albert Street
Regina, SK S4P 3V7
Tel: (306) 787-4539
Fax: (306) 787-2208
Website: www.labour.gov.sk.ca/

Yukon

Occupational Health and Safety
Workers' Compensation Health and Safety Board
401 Strickland Street
Whitehorse, YT Y1A 5N8
Tel: (867) 667-3726
Fax: (867) 393-6279
Website: www.wcb.yk.ca

8.1.2 Agencies and Organizations Referenced in WHMIS Legislation

American Conference of Governmental Industrial Hygienists (ACGIH)
1330 Kemper Meadow Drive, Suite 600
Cincinnati, OH 45240
U.S.A.
Tel: (513) 742-2020
E-mail: pubs@acgih.org
Website: www.acgih.org

American Society for Testing and Materials (ASTM)
100 Barr Harbor Drive
West Conshohocken, PA 19428-2959
U.S.A.
Tel: (610) 832-9585
Website: www.astm.org

National Association of Corrosion Engineers (NACE) International
1440 South Creek Drive
Houston, TX 77054-4906
U.S.A.
Tel: (281)228-6200
Website: www.nace.org

Organization for Economic Cooperation and Development (OECD)
2, rue Andre-Pascal
75775 Paris, Cedex 16
France
Website: www.oecd.org

OECD Test Guidelines are also available from:

- Renouf Publishing Company
  5369 Canotek Road, Unit 1
  Ottawa, ON K1J 9J3
  Tel: (613) 745-2665
  Website: www.renoufbooks.com

U. S. Government Standards
Superintendent of Documents
US Government Printing Office
Washington, DC 20402
U.S.A.
Tel: (202) 512-1800
Website: www.access.gpo.gov

World Health Organization Headquarters
Avenue Appia 20
1211, Geneva 27
Switzerland
Tel: +41 22 791 2111
Website: www.who.org

- WHO International Agency for Research on Cancer (IARC)
  150 cours Albert Thomas
  F - 69372
  Lyon, cedex 08
  France
  Website: www.iarc.fr
- Canadian Public Health Association
  1565 Carling Avenue, Suite 400
  Ottawa, ON K1Z 8R1
  Tel: (613) 725-3769
  Website: www.cpha.ca
- WHO Publications Centre (U.S.A.)
  49 Sheridan Avenue
  Albany, NY 12210
  U.S.A.
  Tel: (518) 436-9686
  Website: www.who.int/dsa/

8.1.3 Other Information and Policy Organizations

American National Standards Institute (ANSI)
11 West 42nd Street
New York, NY 10036
U.S.A.
Tel: (212) 642-4900
Website: www.ansi.org

Canadian Centre for Occupational Health and Safety (CCOHS)
250 Main Street East
Hamilton, ON L8N 1H6
Tel: 1-800-263-8466
Website: www.ccohs.ca

Canadian Chemical Producers' Association
350 Sparks Street, Suite 805
Ottawa, ON K1R 7S8
Tel: (613) 237-6215
Website: www.ccpa.ca

Canadian Government Publishing Centre
284 Wellington Street
Ottawa, ON K1A 0H8
Tel: (613) 957-4222
Website: www.canada.justice.gc.ca

Canadian Institutes of Health Research
160 Elgin Street, 9th Floor
Address Locator 4809A
Ottawa, ON K1A 0W9
Tel: 1 (888) 603-4178 or 613-941-2672
Website: www.cihr-irsc.gc.ca

Canadian Labour Congress
2841 Riverside Drive
Ottawa, ON K1V 8X7
Tel: (613) 521-3400
Website: www.clc-ctc.ca

Canadian Manufacturers and Exporters
6725 Airport Road, Suite 200
Mississauga, ON L4V 1V2
Tel: 1 (800) 268-9684 or (905) 672-3466
Website: www.cme-mec.ca

CSA International (Canadian Standards Association)
178 Rexdale Boulevard
Rexdale, ON M9W 1R3
Tel: 1-800-463-6727 or (416) 747-4000
Website: www.csa-international.org

CANUTEC (Canadian Transport Emergency Centre)
Transport of Dangerous Goods Branch
Transport Canada
330 Sparks Street, Suite 1401
Ottawa, ON K1A 0N5
Tel: (613) 992-4624
Emergency Telephone: (613) 996-6666
Website: www.canutec.gc.ca

European Union Delegation for the European Commission
2300 M Street, NW
Washington, DC 20037
U.S.A.
Tel: (202) 862-9500
Fax: (202) 429-1766
Website: www.eurunion.org

National Fire Protection Association
PO Box 9101
1 Batterymarch Park
Quincy, MA 02269-9101
U.S.A.
Tel: (617) 770-3000
Fax: (617) 770-0700
Website: www.nfpa.org

National Institute for Occupational Safety and Health (NIOSH)
Robert A. Taft Laboratories
4676 Columbia Parkway
Cincinnati, OH 45226
U.S.A.
Tel: (513) 684-8236
Website: www.cdc.gov/niosh/homepage.html

8.2 Reference Documents Specified in WHMIS Legislation

Hazardous Product Act (*HPA*) and Controlled Products Regulations (*CPR*) are available from the Canadian Government Publishing Centre or from the Justice Canada (Statutes and Regulations) website at www.canada.justice.gc.ca

Part IV of the *CPR* specifies these test methods and classification lists for use when evaluating if a product is a controlled product within the meaning of Classes A, B, D, E and F:

Class A: Compressed Gases

- *Standard Test Method for Vapour Pressure of Petroleum Products (Reid Method),* ASTM D323-82, dated August 27, 1981 (updated 1999, ASTM D323-99a).

Class B: Flammable and Combustible Material

- *Standard Test Methods for Flash Point by Pensky-Martens Closed Tester*, ASTM D93-80, dated August 29, 1980 (updated 1999, ASTM D93-99c).
- *Standard Test Methods for Flash Point by Setaflash Closed Tester*, ASTM D3828-81, dated August 28, 1981 (updated 1998, ASTM D3828-98).
- *Standard Test Methods for Flash Point of Liquids by Setaflash Closed-Cup Apparatus*, ASTM D3278-82, dated August 28, 1981 (updated 1996, ASTM D3278-96e1).
- *Standard Test Method for Flash Point by Tag Closed Tester,* ASTM D56-82, dated August 27, 1982 (updated 1998, ASTM D56-98a).
- *Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity),* ASTM D445-83, dated October 28, 1983 (updated 1997, ASTM D445-97).

Class D: Poisonous and Infectious Material

Nine categories of health effects are listed for poisonous materials in the *CPR*. The regulations specify tests and references for eight:

1. Acute Lethal Effects

- OECD Test Guideline No. 401, "Acute Oral Toxicity," dated May 12, 1981 (updated February 24, 1987).

  To be replaced, upon amendment of the *CPR,* by OECD Test Guideline
  - No. 420, "Acute Oral Toxicity - Fixed Dose Method," dated July 17, 1992
  - No. 423, "Acute Oral Toxicity - Acute Toxic Class Method," dated March 22, 1996
  - No. 425, "Acute Oral Toxicity - Up-and-Down Procedure," dated September 21, 1998
- OECD Test Guideline No. 402, "Acute Dermal Toxicity," dated May 12, 1981 (updated February 24, 1987).
- OECD Test Guideline No. 403, "Acute Inhalation Toxicity," dated May 12, 1981.

2. Chronic Toxic Effects

- OECD Test Guideline No. 408, "Subchronic Oral Toxicity - Rodent: 90-day," dated May 12, 1981 (updated September 21, 1998).
- OECD Test Guideline No. 409, "Subchronic Oral Toxicity - Non Rodent: 90-day," dated May 12, 1981 (updated September 21, 1998).
- OECD Test Guideline No. 411, "Subchronic Dermal Toxicity: 90-day," dated May 12, 1981.
- OECD Test Guideline No. 413, "Subchronic Inhalation Toxicity: 90-day," dated May 12, 1981.
- OECD Test Guideline No. 452, "Chronic Toxicity Studies," dated May 12, 1981.
- Tests or Methods described in U. S. FDA or EPA Guidelines as published, and amended from time to time, in the *U.S. Federal Register*.

3. Carcinogenicity

- American Conference of Governmental Industrial Hygienists (ACGIH). *Threshold Limit Values and Biological Exposure Indices*, latest version, Cincinnati, Oh.: ACGIH.
- World Health Organization (WHO). *IARC Monographs on the Evaluation of the Carcinogenic Risks of Chemicals to Humans*, 1972–1988, Geneva, Switzerland: WHO Publications.

  Continued in 1988 by *IARC Monographs on the Evaluation of the Carcinogenic Risks to Humans.* Available from WHO Publications Centre (U.S.A.) or WHO (Geneva).

4. Mutagenicity

- Organization for Economic Cooperation and Development (OECD). Introduction to the OECD Guidelines on Genetic Toxicology Testing and Guidance on the Selection and Application of Assays." In the *Third Addendum to the OECD Guidelines for Testing of Chemicals*. Paris, France: OECD Publications, March 1, 1987. [latest edition: 10th ed.Oct. 1998]
- Health Canada / Environment Canada. *Guidelines on the Use of Mutagenicity Tests in the Toxicological Evaluation of Chemicals*, Ottawa, Ont.: Canada Communications Group-Publishing, 1986.
- Proposed Guidelines for Registering Pesticides in the U. S.; Hazard Evaluation: Human and Domestic Animals. *U. S. Federal Register*, Volume 43 (No. 163): 37,336–37,403, 1978.

5. Teratogenicity And Embryotoxicity

- OECD Test Guideline No. 414, "Teratogenicity," dated May 12, 1981.
- OECD Test Guideline No. 415, "One-Generation Reproduction Toxicity," dated May 26, 1983.
- OECD Test Guideline No. 416, "Two-Generation Reproduction Toxicity," dated May 26, 1983.
- *Principles for the Testing of Drugs for Teratogenicity,* Technical Report Series Number 364, published by the World Health Organization, 1967.

6. Reproductive Toxicity

- OECD Test Guideline No. 415, "One-Generation Reproduction Toxicity," dated May 26, 1983.
- OECD Test Guideline No. 416, "Two-Generation Reproduction Toxicity," dated May 26, 1983.

7. Skin or Eye Irritation

- OECD Test Guideline No. 404, "Acute Dermal Irritation/ Corrosion," dated May 12, 1981 (updated July 17, 1992).
- OECD Test Guideline No. 405, "Acute Eye Irritation/Corrosion," dated May 12, 1981.
- Draize Test. *The Journal of Pharmacology and Experimental Therapeutics,* 82: 377–390, 1944.

8. Skin Sensitization

- OECD Test Guideline No. 406, "Skin Sensitization," dated May 12, 1981 (updated July 17, 1992).

Class E: Corrosive Material

- *Test Method, Laboratory Corrosion Testing of Metals for the Process Industries*, NACE Standard TM-01-69 (1976 Revision).
- OECD Test Guideline No. 404, "Acute Dermal Irritation/Corrosion, dated May 12, 1981 (updated July 17, 1992).

Class F: Dangerously Reactive Material

- OECD Test Guideline No. 403, "Acute Inhalation Toxicity," dated May 12, 1981.

8.3 Computer Databases

Three types of databases on hazardous materials are available: dictionary, informational, and bibliographic.

8.3.1 Dictionary Databases

Dictionary databases help identify chemicals by linking names of chemicals to identification numbers, chemical structures, and the locations of toxicological information in other database files. Such databases are helpful with the Product Information and Hazardous Ingredients Sections of the MSDS.

Examples:

Chemical Dictionary File. Oakridge, Tn.: Biomedical and Environmental Information Analysis Section and the Oak Ridge National Laboratory. Available at the website: www.ornl.gov/sci/techresources/cdf/index.html

CHEMIDplus. Bethesda, Md.: National Library of Medicine. Available at the website: www.chem.sis.nlm.nih.gov/chemidplus

CHEMNAME. Available through DIALOG Information Services. Available at the website: www.dialog.com

CHEMSEARCH. Available through DIALOG Information Services.

CAS Registry. Chemical Abstracts Service. Available through STN International and at the website: www.cas.org

CHEMINDEX: Hamilton, On.: CCOHS. Available on the CHEMpendium™ CD-ROM and at the website: ccinfoweb.ccohs.ca

8.3.2 Informational Databases

Informational databases contain condensed, practical information on topics such as human health hazards, first aid, product safety and handling. Information is in a form that is helpful for filling out or evaluating most sections of MSDSs.

Examples:

CHEMINFO. Hamilton, On.: CCOHS. Available on the CHEMpendium™ CD-ROM and at the website: ccinfoweb.ccohs.ca

Detailed, practical information on substances including chemical and physical properties, toxicity, personal protection, storage, handling, and first aid. Written in non-technical language.

MSDS. Hamilton, On.: CCOHS. Available on the CHEMpendium™ CD-ROM and at the website: ccinfoweb.ccohs.ca

Complete text of MSDSs voluntarily provided by manufacturers.

RTECS® (The Registry of Toxic Effects of Chemical Substances Online). Cincinnati, Oh.: NIOSH. Available on Chempendium™ CD-ROM.

Summary toxicity information for more than 140,000 substances. Includes workplace exposure limits and refers to U.S. standards and regulations. If no toxicity data on a chemical exists in RTECS, it is unlikely data exists. Citations do not include author, name, or article title, and information is subject only to review by original journal of publication. Updated quarterly.

HSDB (Hazardous Substances Databank). Bethesda, Md.: National Library of Medicine. Available on CHEMpendium™ CD-ROM and at the website: http://chem.sis.nlm.nih.gov/chemidplus

Contains information on chemical and physical properties, toxic effects, standards and regulations, environmental fates, safety, and handling.

8.3.3 Bibliographic Databases

Bibliographic databases list citations, usually of abstracts or summaries of the reported data. Bibliographic databases rarely provide information that can be applied immediately and additional legwork is needed to collect and interpret data.

Examples:

CIS/ILO. Geneva, Switzerland: The International Occupational Safety and Health Information Centre/ Centre International d'Information de Securite et d'Hygiene du Travail, 1974–. Available on the CHEMpendium™ CD-ROM and at the website: ccinfoweb.ccohs.ca

Information is provided in three sections:

- Hazards, pathology, and control measures
- Industries and operations
- General problems, for example, law or occupational medicine

About 3,600 new records are added each year. Full text articles for each citation are stored under accession numbers at CCOHS.

Chemical Exposure. Oakridge, Tn.: Chemical Effects Center, Oak Ridge National Laboratory. Available through Dialog Information Services

Provides body burden information, that is, data on chemicals that have been identified in human and animal tissues as a result of environmental exposure.

HSELINE. United Kingdom: Health and Safety Executive, 1977–. Available on the CHEMpendium™ CD-ROM and at the website: ccinfoweb.ccohs.ca

Approximately 250 journals are scanned.

NIOSHTIC®. Cincinnati, Oh.: NIOSH, 1800s–mid-1998. Available through Dialog Information Services, Pergamon, CHEMpendium™ CD-ROM, and at the website: ccinfoweb.ccohs.ca

Provides author, title, place, publisher, and date. Covers literature from 19th century to mid-1998. Continued by OSHLINE.

NIOSHTIC-2. Cincinnati, Oh.: NIOSH, Sept. 1998–. Will be available starting January 2000 on the NIOSH website. Covers only NIOSH-authored or -supported research.

OSHLINE. Hamilton, On.: CCOHS, mid-1998–. Available on

CHEMpendium™ CD-ROM, and at the website: ccinfoweb.ccohs.ca

TOXLINE. Bethesda, Md.: National Library of Medicine, 1981–. Available through MEDLARS system

Sources include MEDLINE, Chemical Abstracts, CIS abstracts, EPA, and NTIS. Some idiosyncrasies in how data is filed and searched.

CHEMTOX. Brentwood, Tn.: Resource Consultants. Available through Dialog Information Services.

Contains environmental, health, and safety data for legislated or regulated chemical substances (U. S.), and substances with properties making them potential candidates for legislation or regulation.

Other databases such as BIOSIS (available through Dialog and the National Research Council), EMBASE (produced by Excerpta Medica and available through Dialog), and MEDLINE (available through Dialog and the NRC) contain information related but not specific to toxicology and industrial health.

8.4 References

American Conference of Governmental Industrial Hygienists. *Documentation of Threshold Limit Values and Biological Exposure Indices,* 6th ed. Cincinnati, Ohio: ACGIH, 1993.

Summary statements, which reflect the information considered by the ACGIH when assigning TLVs, are provided for more than 600 substances. Also supplements 1996–1999. Available from:

ACGIH Inc.
1330 Kemper Meadow Drive, Suite 600
Cincinnati, OH 45240
U.S.A.

American Conference of Governmental Industrial Hygienists. Committee on Industrial Ventilation. *Industrial Ventilation: A Manual of Recommended Practice,* 23rd ed. Lansing, Mich.: ACGIH, 1998.

Provides technical information on ventilation systems including a table on dilution volumes for various solvents.

Committee on Industrial Ventilation
ACGIH
Lansing, Michigan
U.S.A.

Benenson, Abram, ed. *Control of Communicable Diseases in Man.* Washington, D.C.: American Public Health Association, 1981.

A review of reservoirs, modes of transmission and control measures for approximately 200 microbiological disease agents. Out of print. Check libraries and second-hand bookstores.

American Public Health Association
1015 Fifteenth Street NW
Washington, DC 20005
U.S.A.

Braker and Mossman. *Matheson Gas Data Book,* 6th ed. Secaucus, N.J.: Matheson Gas Products Inc., 1980.

Provides detailed physical data on more than 100 gases. Available from:

Matheson Tri-Gas
Parsippany, NJ 07054-0624
U.S.A.

Canadian Standards Association. *CSA Standard Z94.3-92: Industrial Eye and Face Protectors.* Rexdale, Ont., Canadian Standards Association, 1992.

Canadian Standards Association. *CSA Standard Z94.4-93: Selection, Care, and Use of Respirators.* Rexdale, Ont., Canadian Standards Association, 1993.

Both available from:
CSA International
178 Rexdale Boulevard
Rexdale, ON M9W 1R3

CANUTEC. *Dangerous Goods Initial Emergency Response Guide.* Ottawa, Ont.: Canada Communication Group, 1992.

Provides summary emergency information on dangerous chemicals by product identification numbers in conjunction with the *TDG Act*. Available from:

Canadian Government Publishing Centre
284 Wellington Street
Ottawa, ON K1A 0H8

Chemical Rubber Company. *Handbook of Chemistry and Physics,* latest ed. Cleveland, Ohio: CRC Press, published annually.

Provides detailed information on physical data for chemical substances.
CRC Press
18901 Cranwood Parkway
Cleveland, OH 44128
U.S.A.

Clayton and Clayton, eds. *Patty's Industrial Hygiene and Toxicology,* 4th ed. New York: John Wiley and Sons, 1991.

A five-volume publication on both occupational hygiene practices and toxicology of specific chemicals. Available from:

Wiley-Interscience Publication
John Wiley and Sons
NY, U.S.A.

Goselin, Smith et al. *Clinical Toxicology of Commercial Products.* 5th ed. Baltimore, Md.: Williams and Wilkins, 1984.

Provides lists of ingredients of various commercial products and toxicological reviews of some ingredients. Out of print. Check libraries and second-hand bookstores.

Williams and Wilkins
Baltimore, Maryland
U.S.A.

Grant, W. Morton. Toxicology of the Eye, *4th ed. Springfield, Ill.: Charles C. Thomas Publishers, 1993.*

Available from:

Charles C. Thomas Publishers
Springfield, IL
U.S.A.

Harper, R.E.C., Bate Smith, and D.G. Land. *Odour Description and Odour Classification.* New York: American Elsevier, 1968.

Hayes, W. J. *Pesticides Studied in Man.* Baltimore, Md.: Williams and Wilkins, 1982.

Detailed toxicological information on a wide variety of individual and chemical families of pesticide. Out of print. Check libraries and second-hand bookstores.

Williams and Wilkins
428 East Preston Street
Baltimore, MD 21202
U.S.A.

Health Canada. WHMIS Division, Product Safety Bureau. *Reference Manual for the WHMIS Requirements of the Hazardous Products Act and the Controlled Products Regulations*. Ottawa, Ont.: Health Canada, 1996.

Ingredient Disclosure List. *The Canada Gazette*. Part II. Vol. 122, No. 2

Medical Research Council of Canada. *Guidelines for the Handling of Recombinant DNA Molecules and Animal Viruses and Cells.* Ottawa, Ont.: MRC Publications, 1980.

Provides classification of viruses by level of hazard and standards of laboratory practice.

Publications. Out of print. Check libraries and second-hand bookstores.

National Fire Protection Association. *Fire Protection Guide on Hazardous Materials,* 12th ed. Boston, Mass.: National Fire Protection Association, 1997.

Provides hazard information related to fires, explosions, and decomposition products for a wide variety of materials. Available from:

National Fire Protection Association
PO Box 9101
1 Batterymarch Park
Quincy, MA 02269-9101
U.S.A.

NIOSH Publications

NIOSH produces publications such as:

- *Criteria Documents.* Provides detailed discussions of toxic effects of specific substances and likelihood of exposure.
- *Occupational Health Guidelines for Chemical Hazards,* 1981 and supplements. Reviews hazard control information on various substances in a format similar to MSDSs.
- *Pocket Guide to Chemical Hazards,* 5th ed., 1997. Acts as a quick reference to toxicological and physical data on chemicals and a respirator selection guide.
- *RTECS: Registry of Toxic Effects of Chemical Substances*. Summarizes chemical and toxicological information on more than 140,000 substances. (RTECS® is also available as a database from CCOHS.)

Available from:

Robert A. Taft Laboratories
4676 Columbia Parkway
Cincinnati, OH 45226
U.S.A.

Reynolds and Prasad, eds. *Martindale: The Complete Drug Reference,* 32nd ed. London, U.K.: Pharmaceutical Press, 1999.

Provides detailed physical, chemical, toxicological and treatment information on pharmaceutical chemicals. Available from:

Pharmaceutical Press
London, UK

Richmond, Jonathan Y., and Robert W. McKinney. *Biosafety in Microbiological and Biomedical Laboratories.* 3rd ed., Washington, D.C.: U.S. Department of Health and Human Services, 1993.

Provides hazard classification for arboviruses and associated safe laboratory practice. Available from:

Diane Publishing Company
Upland, PA
U.S.A.

Sax, Irving N. *Dangerous Properties of Industrial Materials,* latest ed. New York: Van Nostrand Reinhold, published annually.

Provides summarized chemical, physical, toxicological, incompatibility, and fire-related information on a wide variety of chemicals. Can be used in conjunction *with Hazardous Chemicals Information Annual* (see Part 8.6), which provides updates on specific chemicals. Available from:

Van Nostrand Reinhold
115 Fifth Avenue
New York, NY 10003
U.S.A. 10003

Sittig, Marshall. *Handbook of Toxic and Hazardous Chemicals and Carcinogens,* 3rd ed. Park Ridge, N.J.: Noyes Publications, 1991.

Provides synopsis of exposure limits, routes of entry, harmful effects, protective and disposal methods for approximately 1,000 chemicals. Available from:

Noyes Publications
Noyes Data Corp.,
Mill Road at Grand Avenue,
Park Ridge, NJ 07656
U.S.A.

Stellman, Jeanne Mager, ed. *Encyclopedia of Occupational Health and Safety,* 4th ed. Geneva: International Labour Office, 1998.

Windholz, Budavari et al., eds. *The Merck Index - An Encyclopedia of Chemical, Drugs, and Biologicals,* 12th ed. Rahway, N.J.: Merck and Co. Inc., 1996.

Provides summary physical, chemical and acute toxicological information on various chemicals, including drugs and cosmetics. Available from:

Merck and Co. Inc.
Rahway, New Jersey
U.S.A.

WorkSafeBC. *Suppliers' Guide to WHMIS: Preparing Compliant MSDSs and Supplier Labels.* Richmond, B.C.: WorkSafeBC, 2006.

8.5 Periodicals

A wide variety of periodicals specializing in toxicology and occupational hygiene is published. Examples include:

American Industrial Hygiene Association Journal
AIHA
2700 Prosperity Avenue, Suite 250
Fairfax, VA 22031
U.S.A.

Applied Occupational and Environmental Hygiene
ACGIH Inc.
Kemper Woods Center,
1330 Kemper Meadow Drive
Cincinnati, OH 45240
U.S.A.

American Journal of Industrial Medicine
Wiley-Liss Inc.
605 Third Avenue
New York, NY 10158-0012
U.S.A.

Annals of Occupational Hygiene
Elsevier Science
PO Box 945
New York, NY 10159-0945
U.S.A.

Archives of Environmental Health
Heldref Publications
1319 Eighteenth Street NW
Washington, DC 20036-1802
U.S.A.

CA Selects: Chemical Hazards Health and Safety
Chemical Abstracts Service
PO Box 3012
2540 Olentangy River Road
Columbus, OH 43210-0012
U.S.A.

Excerpta Medica, Section 35, Occupational Health and Industrial Medicine
Elsevier Science
655 Avenue of the Americas
New York, NY 10010-5107
U.S.A.

International Archives of Occupational and Environmental Health
Springer Verlag
Journal Fulfillment Services Department
PO Box 2485
Secaucus, NJ 07096-2485
U.S.A.

Journal of Occupational and Environmental Medicine
Lippincott, Williams, and Wilkins
12107 Insurance Way
Hagerstown, MD 21740
U.S.A.

Occupational and Environmental Medicine
BMJ Publishing Group
PO Box 299
London, U.K.
WC1H 9TD

Occupational Health and Safety Canada
Occupational Health and Safety Canada Magazine
1450 Don Mills Road
Don Mills, ON M3B 2X7

8.6 References for Further Information on Resources

Halton, David M (CCOHS). Computerized Information Resources in Toxicology and Industrial Health – A Review. *Toxicology and Industrial Health* 2(1): 113-125, 1986.

Tucker, M. E. *Industrial Hygiene: A Guide to Technical Information Sources.* Fairfax, Va.: American Industrial Hygiene Association, 1984.

8.7 Internet Sites

Contact	Internet Site	Description
3M	www.3M.com/intl/CA/ohes.html	Information on the selection of respirators
Agency for Toxic Substances and Disease Registry (ATSDR)	www.atsdr.cdc.gov/toxpro2.html	Information on Toxicological profiles developed by ATSDR
American Conference of Governmental Industrial Hygienists (ACGIH)	www.acgih.org	TLVs and BEIs for chemical substances
American Industrial Hygiene Association	www.aiha.org	Information on AIHA and discussions on industrial hygiene
Ansell Healthcare	www.ansellpro.com	Information on glove selection
American National Standards Association	www.ansi.org	Information on ANSI and links to national and international standards
American Society for Testing and Materials	www.astm.org	Information on ASTM. Online store for ASTM test methods
Canada Justice	www.canada.justice.gc.ca	Canadian federal regulations and acts
Canadian Auto Workers Association	www.caw.ca /whatwedo/health&safety/ factsheet/index.asp	Health and safety fact sheets
Canadian Center for Occupational Health and Safety (CCOHS)	www.ccohs.ca	Information on CCOHS, occupational health and safety issues. Links to subscription databases and related sites
CanOSH Websites	www.canoshweb.org/oshmainpage.html	Links to Canadian OSH websites
Canadian Standards Association	www.csa-international.org	CSA news releases, directory information and products
Canutec	www.canutec.gc.ca	Emergency response information for Transport Canada
CAS Databases	www.cas.org/casdb.html	Chemical Abstract Services databases with abstracts from journal articles; comprehensive chemistry coverage
Centers for Disease Control and Prevention (CDC)	www.cdc.gov	CDC publications, data, statistics,etc.
Chemical Finder	www.chemfinder.com	Chemical information database
Environmental Protection Agency (EPA)	www.epa.gov	Information on environmental issues and links to related information
Environmental Protection Agency (EPA)	www.epa.gov/opptintr/chemfact/#pdfversions	Information on chemical spills; fact sheets
Fisher Scientific	www.fishersci.com	Link to MSDSs
Genium Publishing Corporation	www.genium.com/	Material safety data sheets for a fee from a MSDS database
Health Canada – Product Safety Bureau	www.hc-sc.gc.ca/hecs-sesc/whmis/	WHMIS information
Health Canada – Biosafety	www.hc-sc.gc.ca/sr-sr/biotech /role/index_e.html	Links to news, updates, LCDC programs, MSDSs for biohazards.
Hazardous Materials Information Review Commission	www.hmirc-ccrmd.gc.ca	HMIRC information
Human Resources Development Canada (Labour Program)	www.hrsdc.gc.ca/en/gateways /nav/top_nav/program/labour.shtml	Links to Canada Labour Code, Part II on Occupational Health and Safety

Contact	Internet Site	Description
International Agency for Cancer Research (IARC)	www.iarc.fr/	Information on IARC, links to WHO, and Lists of IARC evaluations
IPCS-INCHEM	www.inchem.org/search.html	Searchable collection of information on hazardous chemicals compiled by international bodies
Medscape	www.medscape.com	Free, full-text, peer-reviewed and medical news
MSDS on Internet	www.ilpi.com/msds/index.html	Link to MSDS sites, government agencies, chemical manufacturers and suppliers and safety publications
MSDS search	www.msdssearch.com	Links to MSDSs
National Association of Corrosion Engineers (NACE)	www.nace.org	NACE news and order form for NACE Standard test methods
National Fire Protection Agency (NFPA)	www.nfpa.org/index.asp	NFPA ratings of chemicals
National Institute of Environmental Health Sciences (NIES)	www.niehs.nih.gov	National Toxicology Program (NTP); text of Environmental Perspectives Journal; environmental health issues
National Institute of Occupational Safety & Health	www.cdc.gov/niosh/ipcs/icstart.html	International chemical safety cards
National Institute of Occupational Safety & Health	www.cdc.gov/niosh/npptl/topics/protclothing	Advice on selecting protective clothing
National Library of Medicine (NLM)	www.nlm.nih.gov	Free access to MEDLINE; Links to Internet Grateful Med & PubMed; health and medical information; toxicology and environmental health information (ie. HSDB, Toxline, RTECS)
OECD Chemical Test Guidelines	www.oecd.org/department/0,2688, en_2649_34377_1_1_1_1_1,00.html	Information on OECD guidelines for testing chemicals. Monograph series on testing and assessment
Occupational Safety & Health Administration	www.osha.gov/SLTC/reactivechemicals/index.html	OSHA chemical hazards
Physical and Theoretical Chemistry Laboratory Oxford University	http://physchem.ox.ac.uk/MSDS/	Chemical safety information
Transport Canada	www.tc.gc.ca/tdg/menu.htm	TDG information and legislation
U.S. Occupational Safety and Health Administration (OSHA)	www.osha.gov/	OSHA standards and technical information on health and safety
Vermont SIRI (Safety Information Resourceson the Internet) Website	www.siri.org/ **or** www.hazard.com	Occupational and environmental health and safety information, MSDSs, safety issue sheets, OH&S resources
World Health Organization (WHO)	www.who.int/en/	WHO directory and program information, links to WHO library and publications

WorkSafeBC Offices

Visit our web site at WorkSafeBC.com.

Abbotsford
2774 Trethewey Street V2T 3R1
Phone 604 276-3100
1 800 292-2219
Fax 604 556-2077

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450 – 6450 Roberts Street V5G 4E1
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1 888 621-7233
Fax 604 232-5950

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1 888 967-5377
Fax 604 232-1946

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801 30th Street V9N 8G6
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1 800 663-7921
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1 800 663-3935
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Phone 250 717-4313
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Fax 250 717-4380

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1 800 663-7382
Fax 250 751-8046

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1 800 663-4962
Fax 250 352-1816

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Phone 604 276-3100
1 888 875-6999
Fax 604 232-1558

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1066 Vancouver Street V2L 5M4
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1 800 663-6623
Fax 250 561-3710

Surrey
100 – 5500 152 Street V3S 5J9
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1 888 621-7233
Fax 604 232-7077

Terrace
4450 Lakelse Avenue V8G 1P2
Phone 250 615-6605
1 800 663-3871
Fax 250 615-6633

Victoria
4514 Chatterton Way V8X 5H2
Phone 250 881-3418
1 800 663-7593
Fax 250 881-3482

Head Office / Richmond
Prevention Information Line:
Phone 604 276-3100
1 888 621-7233 (621-SAFE)
Administration:
6951 Westminster Highway
Phone 604 273-2266
Mailing Address:
PO Box 5350 Stn Terminal
Vancouver BC V6B 5L5

After Hours
Health & Safety Emergency
604 273-7711
1 866 922-4357 (WCB-HELP)

R06/06

Product Identifier Acetone

SECTION 6 — TOXICOLOGICAL PROPERTIES

Route of Entry ☒ Skin Contact ☐ Skin Absorption ☒ Eye Contact ☒ Inhalation ☒ Ingestion

Effects of Acute Exposure to Product: Irritation; possible effects on central nervous system (CNS); at air concentrations above 8,000 ppm may cause drowsiness, incoordination, loss of reflexes, unconsciousness, and respiratory failure

Effects of Chronic Exposure to Product: Dermatitis. No significant harmful effects from oral or inhalation exposures.

Exposure Limits (value, source, date): 250 ppm, 8-hour exposure limit (WCB)

Irritancy (if yes, explain): ☒ Yes ☐ No Severe eye irritant, skin and respiratory irritant

Sensitization (if yes, explain): ☐ Yes ☒ No

Carcinogenicity (if yes, explain): ☐ Yes ☒ No

Reproductive Toxicity (if yes, explain): ☐ Yes ☒ No

Teratogenicity (if yes, explain): ☐ Yes ☒ No

Mutagenicity (if yes, explain): ☐ Yes ☒ No

Synergistic Products (if yes, explain): ☒ Yes ☐ No Chlorinated solvents, ethyl alcohol

SECTION 7 — PREVENTIVE MEASURES

Personal Protective Equipment: ☒ Gloves ☒ Respirator ☒ Eye ☐ Footwear ☐ Clothing ☐ Other

If checked, specify type: Butyl rubber gloves. NIOSH-approved respirator with organic vapour cartridge for air concentrations up to 2,[illegible] ppm. Splash-proof chemical safety goggles or face shield.

Controls (such as ventilation, enclosed process): Use mechanical ventilation to reduce exposure. Use non-sparking and [illegible] ignition sources. Wear adequate protective equipment. Contain spill with absorbent [illegible] and labelled container for disposal.

[illegible] government requirements for disposal.

SECTION 1

Product Identifier

Product Use: Solvent, gen

Manufacturer's Nam

Street Address