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THE INSPECTOR'S SAFETY GUIDE

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1.0 PERSONAL PROTECTION

1.1 INTRODUCTION

1.1.1 ACKNOWLEDGEMENT

The 2nd edition of this manual continues the requirements of Environment Canada to achieve consistency and uniformity, while establishing national procedures for safe inspection practices. In this new edition we address advancements in procedures, technology and updates to regulations and acts.

We hope the updated information will assist field sampling personnel; for training new employees and as a reference for experienced staff. Our intention is for this manual to help in promoting best practices and safe sampling procedures. The national advisory committee included: John Holmes, Gordon Thompson and Richard Strub (Pacific & Yukon Region); David Noseworthy (Prairie & North Region); Rob Fortin (Ontario Region); Bruno Lafortune (Quebec Region) and Ron Hunter (Atlantic Region). I would like to thank the committee and others who helped bring this manual to fruition. I would also like to give a special thanks to John Holmes who contributed an extra amount of time to make this 2nd edition of this manual possible.

– Richard Strub, Project Coordinator, Richard.Strub@ec.gc.ca

1.1.2 LIABILITY AND LIMITATIONS

The information in this guide is intended to provide guidance to enforcement personnel in conducting inspections and investigations in a safe manner, as prescribed by Part II of the Canada Labour Code and Treasury Board Policy. The guidelines should serve to direct the decisions and actions of personnel. Inspectors and investigators should keep in mind, however, that the guide will not cover all hazardous situations and that they may be required to make decisions based on the demand of local conditions or the hazards of a specific site; in all such cases, personnel must use sound judgment in order to protect the safety and health of everyone on site.

Throughout the text, the term "should" implies that, although the department may be exceeding regulatory standards or requirements, it feels that the safety procedures or health precautions given are necessary to protect you from an occupational accident, injury or illness. The term "shall", however, implies that the given protective or preventive measure (safety procedure, use of protective equipment or clothing, etc.) is mandatory, whether it is supported by regulation or policy or directive.

The material in this guide purposely excludes matters of an administrative or a procedural nature as detailed in manuals or publications which already exist. It also excludes technical or operational information relating to specific programs or branches. Users of this guide are encouraged to supplement the guidelines provided with additional or more detailed information received during training courses or from other sources as appropriate.

Where any conflict exists between the information in this guide and any legislation or regulation having jurisdiction, the latter shall take precedence.

DISCLAIMER: Throughout this document the use or reference to trade names, companies, or trademarks is provided only for example purposes, and does not constitute endorsement of the products by Environment Canada.

1.1.3 INTRODUCTION

This manual has been written to provide national standards and uniformity in safety guidance in conducting inspections and to serve as a training and reference guide for inspectors in the field. Although some specific warnings on hazards involved in sampling procedures are included in this manual, inspectors should also familiarize themselves with **THE INSPECTOR'S SAMPLING MANUAL** along with Environment Canada's Task Hazard Analysis for specific tasks related to inspection work.

This manual draws on established procedures and protocols, legislative and regulatory requirements, scientific literature and the experience of Environment Canada inspectors, investigators and laboratory staff across Canada.

Being safe requires following several important steps; being aware of your environment, knowing how to identify and respond to risks and hazards and using the correct personal protective equipment (PPE).

The purpose of this reference guide is to help the enforcement officer prevent accidents and injury while working. This guide is not a detailed industrial hygiene text book or a comprehensive source book on occupational safety and health, but rather general guidance. The appropriateness of information provided should always be evaluated with site specific conditions. Other sources and experienced personnel should be consulted as necessary.

It is expected that Environment Canada employees using this manual have completed the 40 hour safety and health course based on the National Institute for Occupational Safety and Health (NIOSH) standards.

A good safety program consists of five key elements:

- safety planning
- safety procedures
- equipment
- training
- monitoring

Each of these is an essential part in conducting a proper inspection or investigation and guidelines for each must be adhered to on all field trips.

Environment Canada has a number of Task Hazard Analysis (THA's), which are available by searching for THA's at http://infolane.ec.gc.ca/. THA's shall be consulted on a regular basis to fully identify all hazards and follow recommended safe working procedures to keep you safe.

This guide brings together numerous policies, directives, standards and guidelines from a wide array of sources. It was developed to assist managers, supervisors and employees under Part II of the Canada Labour Code and Treasury Board Policy.

The guide has been organized into six parts and appendices:

PART 1: PERSONAL PROTECTION – A summary of safety and health planning issues, including an introduction to planning for inspectors and investigators; information on first-aid considerations for remote and none remote sites; task hazard analysis and reporting; details for standard personal protective equipment (PPE) and specialized special protection for working on water or at heights. Cleaning and decontamination of equipment is discussed in this chapter.

PART 2: HAZARDOUS SUBSTANCES – A detailed list of hazardous substance classification under Workplace Hazardous Materials Information System (WHMIS) and Transportation of Dangerous Goods Acts (TDGA). Also included in this section is information on sample preservatives.

PART 3: COMMON HAZARDS – A run down of many hazards which can be encountered in inspections and enforcement work. Suggested safety procedures and required PPE are listed for each hazard. Identified in this section are procedures for emergency situations, electrical hazards, entry into confined spaces and updated information on biological hazards.

PART 4: INDUSTRIAL SITE HAZARDS – A listing by industry of specific hazards and a convenient reference table on what PPE are required for each industry. Detailed information is included for pulp and paper, petroleum refinery, PVC, lead processing, air pollution control systems, ocean disposal, radiation hazards, farming, wood preservation, dry cleaning and mining operations.

PART 5: HAZARDOUS COMMODITIES INSPECTIONS – Information provided on specific hazardous commodity inspections for PCBs, Export and Import of Hazardous Wastes, phosphorous concentrations, contaminated fuels, gasoline compliance, ozone depletion and new substances notification.

PART 6: TRANSPORTATION SAFETY – Information on traveling with samples is in this chapter, as well as guidelines on how to stay safe while traveling by vehicles, fixed and rotary wing aircraft, boats, ATVs, snowmobiles and conducting trailer towing.

PART 7: APPENDICES – Included here is an explanation of terms and acronyms used in this guide, detailed lists for restocking first-aid kits and emergency contact phone numbers. Also included is a summary of safety and health legislation, information on sample containers and holding times for many industry tests, as well as detailed safety and health publication and web site references.

1.1.4 SAFETY PLANNING

A primary objective of any enforcement activity must be the prevention, or reduction of risks to personnel. This can be achieved by:

- Identifying potential hazardous situations and/or substances present.
- Characterizing the atmosphere/substance(s) in the current condition and location.
- Evaluating potential effects on enforcement staff.
- Initiating control procedures to minimize exposures to these hazards.

This assessment is called the site safety characterization. Characterization is relatively straightforward when enforcement operations occur at facilities where the substances involved are known or easily identified, the pathways of dispersion are clearly defined and the effect or potential impact is demonstrated. However, hazardous waste inspections at border crossings or at spills sites, may involve numerous identified or misidentified containers and the potential for undesirable events are more complex because of the possible chemical mixtures, degradation of products and various pathways of dispersion.

The recognition, evaluation and control of site hazards continue throughout all phases of enforcement operations. Over time, it is common that as facilities evolve, remodel or renovate, that hazards change. Exposure risks may decrease or increase due to these changes. As a result of continually changing field operations, enforcement staff must be certain to assess conditions on each visit.

INITIAL ASSESSMENTS

You should conduct hazard characterization and reconnaissance activities prior to your inspections so as not to enter into a hazardous situation.

The following questions, observations and information gathering can be performed prior to going on site:

What measures will be required for the protection of enforcement personnel?

What visual observations can be observed from afar and onsite?

What are the most preferred areas for site entries?

What is the general layout of location?

Are there visible placards, labels, markings on containers or vehicles?

Identify the types and number of containers, tank cars, trailers.

What biological indicators exist – dead vegetation, animals, insects and fish?

What visual observation are there of vapours, clouds, suspicious substances?

Are there odours?

Have you talked to surrounding residents, neighbours?

SAFETY PLAN

Based on the initial assessment, the enforcement officer should prepare a safety and health Plan (HASP). At a minimum, the safety plan should contain certain components such as:

- chemical and physical hazards
- monitoring equipment
- personnel requirements
- safe work practices
- engineered safeguards
- personal hygiene and decontamination
- personal protective equipment
- contingency planning

1.1.5 PREPARATION

For preparation all inspectors or investigators will undergo a 40 hour safety and health course.

PERSONAL CONSIDERATIONS

Postpone your inspection or investigation at any time you are not physically or mentally fit (physical sickness, depression, emotional drain, etc.). Consult your supervisor.

When planning your inspection or investigation refer to your previous records, notes and files or those of other inspectors who have visited the site. Call ahead to confirm that provisions are in place for safe sampling or for safe access to outfalls, test ports, stacks or other sampling locations.

Before leaving the office, make sure that you have all of the PPE that is required by the safety rules or procedures of the site. If the PPE is not specified, take extra precautions and follow the protective equipment recommendations in this guide, section 1.3 Personal Protection Equipment. Identify what PPE you may be required to bring. If life jackets are not available at the site and you will be sampling near or on water, you should bring your own.

SUGGESTED PROCEDURE

- Conduct your work at a controlled pace.
- Do not rush; accidents occur when you are not able to focus 100% of your concentration on your task.
- Work under safe conditions only. Any unsafe condition or activity should be reported to a site official immediately.
- Have a site official accompany you at all times during your inspection. When this is not possible, use the buddy system.
- Report all injuries, big or small to your supervisor and the site authority.
- All participants will be provided with safety training from contracted vehicle operators (e.g. fixed wing aircraft, helicopters, buses, and boats), industrial site operators and others where appropriate.
- Assess the hazards of the site you are inspecting. Ensure that you have been informed of all hazardous locations, conditions and substances. Be sure that you understand all hazard symbols.

ENVIRONMENT

Know the safety and health policies, procedures and rules of the site:

- Request a safety briefing session before you begin.
- Ensure that the facility has first-aid supplies, equipment and services available. Know the locations of first-aid, eyewash and shower stations.
- Be familiar with the emergency response plans of the site, including fire and evacuation procedures. Make sure that you know the warning signals. Let your work partner, supervisor or lead know where you are at all times when performing field work.

1.1.6 FIRST-AID AND EQUIPMENT

Under the Canada Labour Code and Treasury Board Directive, federal departments must provide first-aid services to their employees. Where an employee's normal work is away from departmental premises, the employer must ensure that first-aid services are available.

Inspectors should ensure, when planning inspections that remote provincially regulated facilities such as mines and mills have first-aid services. In addition inspectors should keep current their St. John Ambulance first-aid certificate and carry the requisite first-aid kit in their vehicles. These steps should be sufficient with the exception of working in very remote locations to comply with the requirements outlined below.

FIRST-AID ATTENDANT

First-aid supplies are assigned to the care of a person who has a current St. John Ambulance first-aid certificate. The person must also be trained in and capable of providing:

- artificial resuscitation
- controlling hemorrhaging
- other emergency lifesaving first-aid required by the nature of the work being done

FIRST-AID SUPPLIES AND RECORDS

First-aid supplies are determined in accordance with the Treasury Board's First-Aid Safety and Health Directive, see appendices. First-aid records must be kept showing:

- the dates and details of all reported injuries and illnesses
- treatment given
- any further medical attention necessary

These records are essential for substantiation of any workers compensation claim arising from the injury or illness or from any later complication. These records must be kept with the supplies.

NON-REMOTE INSPECTION SITES

Non-remote sites are defined as being within two hours of normal means of transport, which can include travel by aircraft to established hospitals or other medical facilities.

SUGGESTED PROCEDURES

- Carry a first-aid kit in your motor vehicle.
- Keep your first-aid training current.

Ensure the site you are visiting keeps first-aid supplies, equipment and services available. Depending on the facility, this could include first-aid kits, eyewash stations, emergency shower stations, a local health clinic, emergency evacuation services or other supplies, equipment and services. These supplies should be checked before the commencement of any inspection or other enforcement related duties.

REMOTE INSPECTION SITES

In field inspections a remote site or isolated work place means a work place that is more than two hours travel time from a hospital or medical facility under normal traveling conditions using the fastest available means of transportation. Where there is the possibility that local weather conditions or transportation facilities may delay or hinder the arrival of medical assistance, inspectors should consider such field sites to be remote.

Most of the sites that inspectors are required to visit away from their local district office are not considered to be remote sites because established hospitals or other medical facilities are readily available.

Ensure that you have the requisite number of trained personnel and supplies (as per the Treasury Boards First-Aid Safety and Health Directive). If uncertain about the required level of training or the type of supplies, consult the regional Medical Services Branch Office of Health Canada for further information.

Obtain required first-aid kits and other survival supplies (see Appendices): a motor vehicle first-aid kit for remote inspections that are reached by car or truck; a field party first-aid kit for remote inspections that require travel by boat, ATV, snowmobile, hiking or other unconventional means of transportation. Consult the Treasury Boards First-Aid Safety and Health Directive for more information, www.tbs-sct.gc.ca.

At least one inspector in each inspection team must have a current St. John Ambulance First-Aid certificate. If travel is required by boat, ATV, snowmobile, hiking, etc., each person must have a current St. John Ambulance Wilderness First-Aid certificate.

PREPARATION FOR ON-SITE EMERGENCY

Determine where the nearest medical treatment facility is and what level of service is available for each inspection site.

Ensure that communication by phone line, cellular phone, satellite phone or portable radio is working between you and those facilities that can provide emergency medical advice, assistance or rescue services. When operating alone and in very remote locations where communications are limited, an emergency location transmitter (ELT) can be carried.

Leave a travel plan containing; location of the inspection nearest medical treatment facility travel route and schedule with a supervisor or co-worker.

TECHNOLOGY

Technology can both help provide assistance and also cause specific hazards. Be aware of the following guidelines:

- Do not use cell phones, GPS or other instrumentation while driving.
- Use GPS when traveling to remote sites to identify your location in case of an emergency or accident.
- Use satellite phones in remote locations.
- Remove sampling gloves when using electronic devices so as not to contaminate the equipment.

In environments which require intrinsically safe equipment such as chemical processing plants, leave cell phones, pagers, blackberries, PDA's, cameras and GPS units in your vehicle. These types of equipment are NOT intrinsically safe.

SAMPLING EQUIPMENT

Before using any sampling equipment, make sure:

- you are comfortable and knowledgeable with equipment use
- equipment is functioning properly
- equipment required for work is permitted on site and is intrinsically safe

1.2 HAZARD ANALYSIS AND REPORTING

1.2.1 TASK HAZARD ANALYSIS (THA'S)

The creation and updating of Task Hazard Analysis (THA's) is an ongoing process at Environment Canada. These THA's help enforcement officers identify their responsibilities regarding:

- Requesting any safety and health information pertaining to the task they will be performing.
- The review and sign-off of the appropriate THA's which apply to their field project prior to entering the field.
- The use the equipment and training which are provided by Environment Canada.

Current THA's can be obtained by searching for Environment Canada's internal website, Infolane (http://infolane.ncr.ec.gc.ca). The following is a list of current critical tasks with related THA's:

TRAVELING TO SITE

Snowmobile Operations

Trailering-Towing

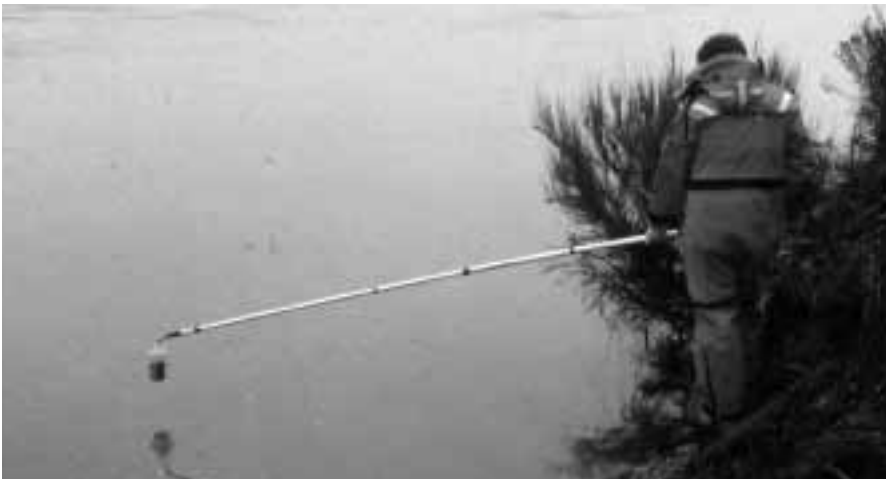
Accessing Remote Sites and Areas

Motor Vehicle Operations on Winter Roads

Small Boat Operations, Boarding Ships

Traveling in Fixed Wing Aircraft and Helicopters

Loading and Unloading Vehicles and Boats



ACCESSING THE SITE

Regulatory Specific Inspections (e.g. Pulp and Paper Mills, Mining Industries, Petroleum Refineries, PCB Storage, Disposal at Sea)

Working on Ice

Working along River Banks, Lake Shores, Ocean Coastlines, etc

Inspecting, Investigating Under Confined Space Conditions

Unique Inspections (Hazardous Sites – Decontamination, Agriculture and Aquaculture – Cross Contamination)

Confined Spaces

Hazardous materials sampling

Sampling from High Places

Heavy Loads

ASSESS ALL HAZARDS (PRESENT AT THE INCIDENT SITE)

Oil and Gas Industry Inspections (e.g., Drilling Operations, Off Shore Rigs)

Small Equipment Operations (e.g., Chainsaws, Augers)

Unique Inspections (Borders) Hazardous Sites (Decontamination), Agriculture, Aquaculture (Cross Contamination)

Working Alone

SAMPLING (OIL, CHEMICALS, FISH AND FISH HABITAT)

Sampling General – Handling preservatives

Sampling Water, Sediments, Hazardous Materials

Sampling for Secondary Lead and Vinyl Chloride

Sampling for Coal Fired Power Plants (under 36(3))

ENFORCEMENT OFFICERS CEPA AND FA POWERS

Conducting Search Warrants

Roadside Vehicle Stop under Conveyance (EIHWR)

Interviewing un-cooperative and hostile clients

Arresting /Use of Force Certification

Undercover/Surveillance

LABORATORY

Acids and Bases

Perchloric Acid

Hydrofluoric Acid

Solvents

Chemicals

Compressed Gases

Mercury Use

Operating High Temperature/Pressure Equipment

Handling Unknown Samples

Centrifuges

Flammables

Radioactive Materials

Infectious Materials

Chemical Asphyxiants

Cryogenics

Handling Pesticides/Herbicides

Hot Plate/Block Digestions

1.2.2 HAZARDOUS OCCURRENCE REPORTING

The reporting of accidents, incidents (near misses) and occupational diseases is required by Canada Occupational Safety and Health Regulations. Reporting applies only to work-related accidents, incidents or occupational diseases.

Accident reports are important for the following reasons:

- They help the injured worker obtain compensation and medical payments provided by the Government Employees Compensation Act (GECA).
- They keep management informed about hazardous conditions and practices.
- They enable management to take corrective measures and to develop priorities for safety and health training.

Report any hazardous occurrence, involving Environment Canada employees or property, to your supervisor. Failure to do so could:

- Lead to a recurrence of the incident.
- Jeopardize the safety and health of you or others.
- Jeopardize your right to worker's compensation.
- Result in enforcement action against you under the Labour Code.

MOTOR VEHICLE ACCIDENTS

Motor vehicle accidents involving departmental vehicles must be reported in accordance with the procedures identified above and with Part 6 (Vehicle Safety Standards and Accident Reporting) of the departmental Mobile Equipment Administrative Manual.

SUGGESTED PROCEDURES

- In the event of an accident notify the police and request medical assistance if necessary.
- If you are driving a vehicle owned or leased by EC complete the departmental "Motor Vehicle Accident Notes" form and obtain the names and addresses of witnesses and injured persons; notify the Responsibility Centre Manager within 24 hours.

1.3 PERSONAL PROTECTIVE EQUIPMENT (PPE)

Personal protective equipment (PPE) refers to clothing and respiratory apparatus designed to shield or protect individuals from chemical, physical or biological hazards. Inspectors must inform themselves of the possible hazards they face and use appropriate PPE to increase personal safety while they perform their duties. PPE assists in providing preventative measures when used correctly.

All enforcement personnel must use the protective equipment or wear the protective clothing that is prescribed in this section when; it is not possible to eliminate or control a safety or health hazard at any inspection site; and when the use of personal protective equipment and/or clothing could prevent or reduce injury from that hazard.

ALL PPE MUST

- Be suitable for the person using it and provide effective protection for its intended purpose.
- Not interfere with the operator performing their functions or with any other PPE being worn.
- Not create a hazard in itself.
- Be regularly inspected and tested by the enforcement officer.
- Be kept in a clean and sanitary condition by the enforcement officer.

PPE PROVIDED BY EC

- Ensure that all PPE function and fit properly.
- You should know the limits of the selected PPE.
- Report any problems or malfunctions to a supervisor.
- Obtain written instructions and follow all of the manufacturer's specifications with respect to the maintenance of PPE.
- Keeps a record of all PPE containing the description, date of purchase or acquisition, date and result of each inspection and test and date and nature of any maintenance work.

PROBLEMS WITH PPE

- improper fit
- defective or damaged PPE
- PPE with insufficient levels of protection
- restriction in body movement, cumbersome

PPE PROVIDED BY SITE AUTHORITIES

- Follow the company's safety policy and procedures.
- Observe all posters, labels and warning signs that determine the use of PPE.
- Conduct a visual inspection of your equipment to check for defects.

Ensure that loose clothing, long hair, jewelry or other accessories are tied, covered or secured.

PPE, whether it is provided by EC or the site authority should meet or exceed the standards prescribed in this section and also found at the Canadian Standards Association's Occupation Health and Safety website; ohs.csa.ca.

Everyone who uses PPE should receive instruction and training from a qualified person in the use of PPE where necessary.

1.3.1 PPE LIST

HEAD PROTECTION (CAN/CSA-Z94.1-92 (R1998))

HARD HATS –Wear a hard hat whenever there is a potential risk of head injury. Hard hats must meet CSA standards and must not be made of metal where there are electrical hazards. Hard hat components should be inspected daily for signs of dents, cracks, penetration and any damage due to impact, rough treatment or wear. Any hard hat that fails the visual inspection should be removed from service until the problem is corrected.

EYE AND FACE PROTECTION (CSA-Z94.3-02) – Where there is a hazard of injury to the eyes, face, ears or front of the neck, you must be provided with and must wear eye and face protection. This includes most industrial sites. All eye and face protection must meet CSA standards.

SAFETY GLASSES – Wear safety glasses with side shields where there is a risk of injury to the eyes.

SPLASH GOGGLES – Use splash goggles whenever there is potential exposure to acid mist and/or liquid chemicals.

CONTACT LENSES – Avoid wearing contact lenses where there is potential exposure to corrosives, irritating or toxic chemical vapours and mists or fumes. If there is a policy of no contact lenses, wear corrective eye glasses instead.

HEARING PROTECTION (CSA-Z94.2-02)

HEARING PROTECTION DEVICES – Wear ear plugs or ear muffs when required by plant policy or procedures, when you have trouble hearing a person at a distance of 2 feet or you are exposed to noise levels greater than 102 dBA for periods of more than 15 minutes.

PROTECTIVE FOOTWEAR (CSA-Z195-02) – Wear safety boots wherever there is a hazard of foot injury or electric shock through footwear. Choose boots with steel toes, slip-resistant soles and if required, non-sparking soles. Safety boots must meet CSA standards designated by a green triangle logo found on approved boots. In rough terrain, wear hiking or uniform boots with non-skid sole.

GLOVES – Choose a general purpose leather or synthetic glove to guard against abrasions when handling rough materials, slippery ladder rungs and excessive heat protection. To protect against exposure to hazardous substances, follow the guidelines on "Protective Clothing" at the end of this chapter. All sampling activity should be conducted wearing as a minimum Nitrol disposal gloves.

Leather and heat-resistant gauntlets must be worn when handling hot materials.

Chemical-protective gauntlets must be worn when handling caustic soda, petrochemicals and other corrosive materials.

CLOTHING DESIGN

In inspection and sampling activities such as stack witnessing or inspections of air pollution control systems, hazardous dusts may adhere to clothing; clothing should not have turn-ups, pleats or pockets in which dust may collect.

SKIN PROTECTION – Wear a face shield that provides covering when there is potential danger of being hit in the face by objects or chemicals.

PROTECTION FROM THE SUN (ULTRA-VIOLET RADIATION)

SUNGLASSES – Wear sunglasses with a minimum of 90% UV protection. If you are working on the water or driving long distances in sunlight, wear sunglasses with an anti-glare finish.

CLOTHING – Wear tightly-woven clothing that will block out UV rays. Fabrics with a tighter, denser weave, in dark colors, layered and a matte or dull finish, give the best protection

SUNSCREEN – Use sunscreen with a minimum sun protection factor (SPF) of 15 on all exposed skin.

OTHER CLOTHING

COVERALLS – Some refineries require that coveralls or overalls (such as NOMEX, flash-resistant coveralls) must be worn whenever practicable in process areas; they may also require that other clothing be made of natural materials.

APRONS – Special aprons and sleeves are available for protection against contact with hot materials, equipment and other hazardous substances.

1.3.2 PPE AND HAZARDOUS MATERIAL

Environment Canada follows the US Environmental Protection Agency (EPA) guidelines which define four distinct levels of protection against hazardous materials. Level A provides the highest level of protection and Level D provides the lowest level. Levels A & B require HAZMAT team approach and are outside the scope of this guide but are provided here for background information only.

LEVEL D PROTECTION

Level D provides minimal skin protection and no respiratory protection. It is the minimum protection required when dealing with chemicals. Level D generally means a work uniform. Level D protection is sufficient under any of the following conditions:

- The atmosphere contains no known hazard.
- Work functions do not include splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals.

D EQUIPMENT

- coveralls
- chemical-resistant boots/shoes with steel toe and shank
- safety glasses or chemical splash goggles

- disposable, chemical-resistant outer boots (optional depending on situation)
- gloves (optional depending on situation)
- hard hat (optional depending on situation)
- escape mask (optional depending on situation)
- face shield (optional depending on situation)

LEVEL C PROTECTION

The atmosphere contaminants, liquid splashes, or other direct contact will not adversely affect or be absorbed through any exposed skin.

The types of air contaminants have been identified, concentrations measured and an air-purifying respirator is available to remove the contaminants and all criteria for the use of air-purifying respirators are met.

C EQUIPMENT

- full or half facemask, air purifying respirator approved by NIOSH
- hooded, chemical-resistant clothing: overalls, two-piece chemical splash suit or disposable, chemical-resistant overalls
- outer chemical-resistant gloves
- inner chemical-resistant gloves

- chemical-resistant outer boots with steel toe and shank
- two-way, intrinsically safe radio communications equipment (optional depending on situation)
- disposable, chemical-resistant outer boot covers (optional depending on situation)
- hard hat (optional depending on situation)
- escape mask (optional depending on situation)
- face shield (optional depending on situation)

LEVEL B PROTECTION

Level B protection is required under circumstances requiring the highest level of respiratory protection, but a lesser level of skin protection. The main difference between Level A and Level B is that Level B does not require a totally vapor-protective suit. Level B provides liquid splash protection.

The type and atmospheric concentration of substances have been identified and require a high level of respiratory protection, but less skin protection than Level A. This is based on either:

- Presence of Immediately Dangerous to Life and Health (IDLH) concentrations of specific substances that present severe inhalation hazards, but do not represent severe skin hazards or criteria for use of air-purifying respirators are not met.
- The atmosphere contains less than 19.5% oxygen or the presence of incompletely identified vapors and gases is indicated by a direct-reading organic vapor detection instrument, but they are not suspected of containing enough chemicals to harm the skin or be absorbed through the skin

B EQUIPMENT

- positive-pressure, full-face piece SCBA or positive-pressure supplied air respirator with escape SCBA approved by NIOSH
- hooded, chemical-resistant clothing (can be non-encapsulating or encapsulating)
- overalls and long-sleeved jacket
- one or two-piece chemical splash suit
- disposable, chemical-resistant overalls
- outer chemical-resistant gloves
- inner chemical-resistant gloves
- chemical-resistant outer boots with steel toe and shank

- coveralls (optional)
- two-way, intrinsically safe radio communications equipment (optional)
- disposable, chemical-resistant outer boot covers (optional depending on situation)
- hard hat (optional depending on situation)
- face shield (optional depending on situation)

LEVEL A PROTECTION

Level A protection is required when the highest potential for exposure to hazards exists and the highest level of skin, respiratory, and eye protection is required:

- Hazardous substances have been identified and require the highest level of protection for skin, eyes, and respiratory system based on either.
- Measured (or potential for) high concentration of atmospheric vapors, gases, aerosols or particulates.
- Site operations and work functions involving a high potential for splash, immersion, or exposure to unexpected vapors, gases, or particulates of materials that are harmful to the skin or are capable of being absorbed through the skin.
- Substances with a high degree of hazard to the skin are known or suspected to be present and skin contact is possible.
- Operations must be conducted in confined, poorly ventilated areas where hazardous substances may exist and the absence of conditions requiring Level A protection have not yet been determined.

A EQUIPMENT

- positive-pressure, full-face piece SCBA or positive-pressure supplied air respirator with escape SCBA approved by NIOSH
- fully encapsulating chemical protective suit
- outer chemical-resistant gloves
- inner chemical-resistant gloves
- chemical-resistant boots with steel toe and shank
- disposable protective suit, gloves, and boots (depending on suit construction, may be worn over fully encapsulating suit)
- coveralls (optional depending on situation)
- long underwear (optional depending on situation)
- hard hat under suit (optional depending on situation)
- two-way, intrinsically safe radio communication equipment (optional)

1.3.3 SPECIAL PROTECTION EQUIPMENT

ADDITIONAL MANDATORY ITEMS

All federally regulated sites must have the following items available (provincially regulated sites may also be required to have them):

- Where appropriate, a safety net or fall-protection system.
- Emergency equipment (including rescue equipment and first-aid supplies) that is held in readiness.
- Where appropriate, a powered boat must be available and held in readiness.
- A person qualified to operate all emergency equipment.
- A written document containing a full description of the procedures to be followed in the event of an emergency, including the roles and responsibilities of everyone on site and the location of emergency equipment. Read these procedures prior to your inspection.

FALL PROTECTION EQUIPMENT

Fall protection systems must be provided by either EC or site authorities. They must be worn when working from:

- An unguarded structure that is more than 2.4 m above the nearest permanent safe level.
- An unguarded structure that is above any moving parts of machinery (or other surfaces or objects) that could cause injury upon contact.
- A temporary structure more than 6 m above a permanent safe level.
- A ladder at a height of more than 2.4 m above the nearest permanent safe level where, because of the nature of the work, you are only able to use one hand to hold onto the ladder.

Fall protection systems must meet the following CSA standards:

a) Safety Belts & Lanyards (CAN/CSA-Z259.1-95 (R1999)

b) Fall Arresters, Vertical Lifelines and Rails (CAN/CSA-Z259.2.1-98)

c) Self-Retracting Devices for Personal Fall Arrest Systems (CAN/CSA- Z259.2.2-98)

d) Full Body Harnesses (CAN/CSA-Z259.10-M90 (R1998)

e) Shock Absorbers for Personal Fall Arrest Systems (CAN/CSA-Z259.11-M92 (R1998)

f) Connecting Components for Personal Fall Arrest Systems (Z259.12-01)

Inspectors or investigators who are required to use fall protection devices must be given appropriate training on the use of the equipment. Check your provincial legislation for certification requirements before using fall protection equipment.

PROTECTION FROM MOVING VEHICLES

MANDATORY VEST OR TRAFFIC BARRICADE – You must use a high-visibility vest (or other similar clothing) and/or a traffic barricade where traffic hazards exist. The vest or barricade should be readily visible under all conditions of use.

DROWNING PROTECTION

MANDATORY LIFE JACKET – Life jackets shall be worn for all inspection activities around docks, boats and barges. Life jackets must also be worn when working over water or within five feet from the face of a wharf. Whenever there is a hazard of drowning, you must be provided with and must wear a life jacket that meets the standards for safety of life at sea (SOLAS). Standards can be found on the Transport Canada website, http://www.tc.gc.ca. If life jackets are not available at the site, ensure that you take one with you.

FLOTATION SUITS AND JACKETS – The flotation suit or jacket provides flotation as well as extra warmth and comfort in a cold weather environment. The suit's closed-cell foam provides flotation and in-water insulation to delay the onset of hypothermia in the event of accidental water immersion.

LADDERS – Where the inspection site is a federal wharf, dock, pier or quay, there shall be a ladder constructed every 60 m along its length. The ladder must extend 2 rungs below low tide water level. If this is not the case you shall not work in that environment.

1.3.4 RESPIRATORY EQUIPMENT

There are two basic types of respirators: air-purifying and air-supplying, each made for a specific hazardous environment.

AIR-PURIFYING RESPIRATORS remove only harmful contaminants from the air and must not be used in an oxygen-deficient environment or in any other IDLH condition. Air-purifying respirators range from simple disposable masks to more sophisticated positive-pressure blower-operated respirators.

Air-purifying filters and cartridges have a limited lifespan and must be changed frequently. Filters must be changed when breathing becomes difficult due to clogging of filter pores by dust particles. Chemical cartridges/canisters must be changed before the chemical absorbent is used up, this should be done under the guidance of a qualified person such as an industrial hygienist.

AIR-SUPPLIED RESPIRATORS provide air from a clean source outside the work area or from a compressed air cylinder. They are used in IDLH environments and for substances with poor warning properties. Examples of air-supplied respirators include air line units, self-contained breathing apparatus (SCBA) and complete air-supplied suits.

Respirator face pieces come in two forms: full-face and half-mask. The full-face mask covers the face from hairline to chin and provides the most reliable fit, as well as eye protection against contaminants that are irritants or corrosives.

SELECTING THE RIGHT RESPIRATOR

Before any respirator can be selected, it is essential to know what the hazard is and how much is present. Selection of the right type of respirator for a specific hazard is essential to the safety and health of the user. It is very important to know the functions and limitations of the respirator you will be using.

If the wrong type of respirator is selected, workers will not receive adequate protection and the consequences can be serious.

CHECKING RESPIRATOR FIT

Another important factor while wearing a respirator is having a good fit. A respirator can only protect a worker effectively if there is a good seal between the wearer's face and the respirator. A gap or poor seal will allow contaminants to leak into the respirator and be inhaled. Respirators that leak shall not be worn.

To ensure that respirators fit correctly, fit-testing is essential. It must be performed for each person to determine a style and size of respirator that provides the best individual fit and most comfort. The respirator should also be fit-checked before each use to verify that a good seal exists. There are two easy checks that anyone can perform:

The negative-pressure test is conducted by closing off the cartridge inlets on the respirator by covering them with the palm of your hand (or squeezing the breathing tube) and inhaling gently. If the nose of the respirator collapses, the respirator fits adequately.

In the positive-pressure test, with cartridges attached, the exhalation valve is closed off with one hand while the wearer exhales gently into the respirator. The respirator is considered to have an adequate fit if it expands slightly as the wearer exhales into it without any evidence of outward leakage.

MAINTAINING RESPIRATORS

All respirators must be inspected before and after each use to detect any defect, deterioration or excessive wear of components. Special attention should be given to the face piece, especially the face seal surface, cartridges (or canister) and exhalation valve. A check of the tightness of the connections must also be included in the inspection. If you are not familiar with the parts and functions of the respirator, ask a co-worker with familiarity to perform the inspection for you. Repairs must be made only by a trained, qualified individual.

CLEANING RESPIRATORS

If you have been assigned a respirator for your exclusive use, the respirator must be cleaned regularly, preferably after each day's use. Those respirators used by more than one person must be thoroughly cleaned after each use.

Cartridges or canisters should be stored in sealed plastic bags to prevent absorption of contaminants or moisture.

REPLACING CARTRIDGES OR FILTERS

The replacement intervals depend on the substance to which the worker has been exposed and the length of exposure. Air-purifying filters and cartridges have a limited lifespan and must be changed frequently. Dust filters must be changed when breathing becomes difficult due to clogging of filter pores by dust particles. In general, inspectors put fresh cartridges on at the beginning of each inspection

TABLE 1— AIR-PURIFYING RESPIRATORS, CHEMICAL CARTRIDGE TYPES AND COLOUR CODING

ATMOSPHERIC CONTAMINANTS	COLOURS ASSIGNED
ACID GASES	White
HYDROCYANIC ACID GAS	White with ½ inch green stripe completely around the canister near the bottom
CHLORINE GAS	White with ½ inch yellow stripe completely around the canister near the bottom
ORGANIC VAPOURS	Black
AMMONIA GAS	Green
ACID GASES AND AMMONIA GAS	Green with ½ inch white stripe completely around the canister near the bottom
CARBON MONOXIDE	Blue
ACID GASES AND ORGANIC VAPOURS	Yellow
HYDROCYANIC ACID GAS AND CHLOROPICRIN VAPOUR	Yellow with ½ inch blue stripe completely around the canister near the bottom
ACID GASES, ORGANIC VAPOURS AND AMMONIA GASES	Brown
RADIOACTIVE MATERIALS, EXCEPT IN TRITIUM AND NOBLE GASES	Purple (Magenta)
PARTICULATES (DUSTS, FUMES, MIST, FOG OR SMOKE) IN COMBINATION WITH ANY OF THE ABOVE GASES OR VAPOURS	Canister colour for contaminant, as designated above, with ½ inch grey stripe completely around the canisternear the top
ALL OF THE ABOVE ATMOSPHERIC CONTAMINANTS	Red with ½ inch grey stripe completely around the canister near the top

1.3.5 CHEMICAL PROTECTIVE CLOTHING (CPC)

The purpose of chemical protective clothing is to shield or isolate enforcement officers from chemical, physical and biological hazards; it is not always apparent when exposure occurs. Many chemicals pose invisible hazards and offer no warning properties. Recommendations for skin protection and CPC are provided on the website for the Centers for Disease Control and Prevention (www.cdc.gov). You can also reference the NIOSH Pocket Guide to Chemical Hazards.

You should select CPC based on:

SIZE AND COLOUR

Be sure your CPC fits well and is comfortable. Ill-fitting clothing limits a worker's mobility, dexterity, concentration and can lead to accidents. Select brightly coloured suit material which makes it easier to maintain visual contact. Dark colours are often a poor choice as they absorb radiant heat from external sources.

CHEMICAL RESISTANCE

This is extremely important. Make sure the material will keep its structural integrity and protective qualities upon contact with a hazardous substance in all types of temperature, including extremes (especially heat) and remain flexible in cold weather.

DURABILITY AND FLEXIBILITY

Choose flexible materials that resist punctures, abrasions and tears for both gloves and full-body suits. Flexibility impacts on mobility, agility and range of motion.

CLEANABILITY

Use disposable outer garments (to prevent gross contamination) if the material is difficult to clean.

SERVICE LIFE

Consult the service life recommendations of the manufacturer. Exposure to chemicals, temperature extremes, moisture, ultraviolet light and oxidizing agents will lower a material's ability to resist aging and deterioration.

DESIGN TYPE CHOICES

- fully encapsulating/non-encapsulating
- one, two or three piece suits
- hood, face piece, gloves and boots (attached or unattached)
- location of zippers, buttons, storm flaps and seams (front, side and back)
- pockets, cloth collars and Velcro straps
- exhalation valves or ventilation ports
- ease of compatibility with wearing respiratory protection

Use the following tables to facilitate the selection of gloves and coveralls to prevent exposure to hazardous substances:

TABLE 2— CHEMICAL DEGRADATION PROTECTION LEVELS

GENERIC CLASS	BUTYL RUBBER	POLYVINYL CHLORIDE	NEOPRENE	NATURAL RUBBER
ALCOHOLS	E	E	E	E
ALDEHYDES	E-G	G-F	E-G	E-F
AMINES	E-F	G-F	E-G	G-F
ESTERS	G-F	P	G	F-P
ETHERS	G-F	G	E-G	G-F
HALOGENATED HYDROCARBONS	G-P	G-P	G-F	F-P
HYDROCARBONS	F-P	F	G-F	F-P
INORGANIC ACIDS AND SALTS	G-F	E	E-G	F-P
INORGANIC BASES	E	E	E	E
KETONES	E	P	G-F	E-F
NATURAL FATS AND OILS	G-F	G	E-G	G-F
ORGANIC ACIDS	E	E	E	E

KEY: E = Excellent G = Good F = Fair P = Poor

NOTE: For material and thickness, a general rule of thumb is that the permeation rate is inversely proportional to the thickness. Other important factors are chemical concentration, contact time, material grade, humidity and solubility of the material in the chemical.

C AND D LEVEL GUIDELINES FOR SELECTION OF DISPOSAL COVERALLS

TYVEK (NON-WOVEN POLYETHYLENE FIBRES)

Good for – dry particulate and dust protection; decontamination (disposable); lightweight.

Poor for – chemical resistance (penetration/degradation); durability.

Recommendation – used against toxic particulates but provides no chemical protection; worn over other CPC to prevent gross contamination of non-disposable items and under suits to replace cotton.

POLYETHYLENE (COATED TYVEK)

Good for – acids and bases, alcohols, phenols, aldehydes; decontamination (disposable); lightweight.

Poor for – halogenated hydrocarbons, aliphatic and aromatic hydrocarbons; physical properties (durability); penetration (stitched seams).

Recommendation – provides limited chemical protection against concentrated liquids and vapours. Useful against low concentrations and those activities which do not create a high risk of splash; also worn over CPC to prevent gross contamination of non-disposables.

SARANEX (LAMINATED TYVEK)

Good for – acids and bases, amines, some organics, PCBs; decontamination (disposable); lightweight; durable.

Poor for – halogenated hydrocarbons, aromatic hydrocarbons, stitched seams (penetration may occur).

Recommendation – provides greater chemical resistance and overall protection compared to polyethylene-coated Tyvek; used to prevent contamination of non-disposable clothing.

1.3.6 CLEANING AND DECONTAMINATION

Care must be taken to prevent the transfer of contaminants to clean areas and to prevent exposing unprotected personnel.

SUGGESTED PROCEDURES

- Use work practices that minimize contact with contaminants.
- Use remote sampling, handling and container opening techniques whenever possible.
- Protect monitoring and sampling instruments by bagging (making openings in the bags for sample ports, probes, sensors, etc.).
- Wear disposable outer garments and use disposable equipment whenever appropriate or practical.
- Cover equipment and tools with strippable coating which can be removed during decontamination.
- Encase the source of contaminants (plastic or overpacks).
- Use protective liner when setting equipment on the ground.

DECONTAMINATION MATERIALS

Where there is a possibility that PPE or tools have been contaminated, they must be decontaminated, cleaned or disposed of according to procedures established by the regional office, or specified in this guide.

DEFECTIVE EQUIPMENT

If you find any defect in the equipment or clothing that could make it unsafe for use, immediately report it to your supervisor or the responsible site authority.

Tag and mark all defective equipment or clothing as **UNSAFE**. Remove it from service.

LIMITED USE GARMENTS

Environment Canada has chosen limited use garments for the following reasons:

- lower purchase cost
- lower maintenance cost
- lighter to wear
- less decontamination
- shelf life – recommended five years (a limited use suit is not designed to be used repeatedly)

EQUIPMENT DISPOSAL

Garments are held until lab results come in. When the results indicate that a hazardous substance has been encountered, use outside suppliers to dispose of contaminated garments when possible. If you do dispose of garments yourself, be sure to use secure disposal which is not accessible to the public.

Garments that have come into contact with PCB's are to be left on location to be disposed of properly by industry.

2.0 HAZARDOUS SUBSTANCES

2.1 HAZARDOUS SUBSTANCES

2.1.1 WHMIS

2.1.2 TRANSPORTATION OF DANGEROUS GOODS ACT (TDGA)

CLASS 1: EXPLOSIVES

CLASS 2: GASES

CLASS 3: FLAMMABLE LIQUIDS

CLASS 4: FLAMMABLE SOLIDS, SPONTANEOUS COMBUSTIBLES AND SUBSTANCES THAT, ON CONTACT WITH WATER,EMIT FLAMMABLE GASES

CLASS 5: OXIDIZING SUBSTANCES AND ORGANIC PEROXIDES

CLASS 6: POISONOUS (TOXIC) AND INFECTIOUS SUBSTANCES

CLASS 7: RADIOACTIVE MATERIALS

CLASS 8: CORROSIVES

CLASS 9: MISCELLANEOUS PRODUCTS, SUBSTANCES OR ORGANISMS

2.1.3 SAMPLE PRESERVATIVES

2.1 HAZARDOUS SUBSTANCES

A typical enforcement work site can be one where numerous hazardous materials may be present. Enforcement operations occur at sites that vary considerably and require unique safety measures at each site to avoid exposure to chemical, physical, radiological and biological hazards.

Before performing duties at a work site, the inspector should identify any hazards on site and initiate all possible methods to eliminate or reduce the safety and health risks.

Many hazardous substances have no detectable odours or other properties, however exposure to these chemicals can be life-threatening.

The following list itemize things to be aware of for dangers associated with hazardous materials during inspections:

- explosion
- fire
- toxicity
- infection
- corrosion
- radiation
- unknowns

The degree of hazard can vary based on; the substances or materials involved, concentrations, time of exposure, the route of entry into the body, the individual's health and physical condition and environmental considerations.

There are two commonly used classifications systems for identification of hazardous substances, Workplace Hazardous Materials Information System (WHMIS) under the Hazardous Products Act and United Nations (UN) classification of dangerous goods used by the Transportation of Dangerous Goods Act (TDGA).

RELATION BETWEEN WHMIS AND TRANSPORTATION OF DANGEROUS GOODS ACT

WHMIS	TDGA	WHMIS and OSH Legislation
Suppliers must provide information through labeling and MSDSs	Transporters must provide identification of controlled products while in transit	Employers and Workers receive and use information at workplace

PREVENTIVE AND EMERGENCY MEASURES

- Follow the safety procedures and the PPE requirements of the site.
- Whenever you are required to handle hazardous products or there is a potential for exposure to hazardous chemicals, refer to this WHMIS guide.
- Ensure that you do not manipulate valves, remove end caps or adjust product controls without proper knowledge and authority.
- Additional information can be obtained by referencing the "Emergency Response Guidebook" and the "NIOSH Pocket Guide To Chemical Hazards".
- Refer to MSDS (material safety data sheet) or specific product information for safety precautions.
- Follow the emergency procedures of the site and the instructions of emergency and site authorities.

2.1.1 WHMIS

WHMIS stands for Workplace Hazardous Materials Information System. It is a nationwide communications system. It ensures that suppliers provide information about the hazards of materials to employers and workers; WHMIS applies to all workplaces in Canada. WHMIS covers any product, material or substance found in the classes listed in Schedule II of the Hazardous Products Act.

Inspectors and investigators must have WHMIS training for hazardous substances when conducting inspections or investigations.

MATERIALS COVERED BY WHMIS

WHMIS covers any product material or substance found in the classes listed in Schedule II of the Hazardous Products Act.

Class A
Compressed Gas

Class B
Flammable and
Combustible Material

Class C
Oxidizing Materials

Class D-1
Materials Causing
Immediate and Serious
Toxic Effects

Class D-2
Material Causing other
Toxic Effects

Class D-3
Biohazardous Infection
Materials

Class E
Corrosive Materials

Class F
Dangerously Reactive
Material

WHMIS HAZARD SYMBOLS

See Health Canada website, www.hc-sc.gc.ca for more information on WHMIS classifications.

PARTIALLY EXEMPTED PRODUCTS

These are products covered by other federal labeling legislation and are exempt from federal WHMIS requirements:

- Consumer Goods – This applies to restricted products packaged for sale to consumers through retail. These include bleaches, hydrochloric acid, turpentine and furniture paints with more than 0.5% lead by weight.
- Cosmetics and Prescription Drugs – These products must be presented for use as cosmetics or prescriptions. These products are regulated by the Food and Drug Act administered by Health and Welfare Canada. If products are for other purposes they are covered under WHMIS.
- Explosives – These and blasting agents are excluded from WHMIS because they are regulated by the Explosives Act and Regulations administered by the Department of Energy, Mines and Resources. If components of explosives are used individually, WHMIS requirements would apply.
- Pesticides – Is excluded from WHMIS when used as a pesticide. Pesticides are regulated by the Pest Control Products Act, administered by Agriculture Canada.
- Radioactive Substances – The transportation and use of these materials are governed by the Nuclear Safety and Control Act, administered by Canadian Nuclear Safety Commission.

COMPLETELY EXEMPTED PRODUCTS

These products are exempted from both federal and provincial WHMIS requirements:

- Wood and products made of wood
- Manufactured articles
- Tobacco and products made of tobacco
- Goods handled, offered for transport and transported under the Transportation of Dangerous Goods Act. Once these products are used in the workplace, WHMIS requirements would apply.

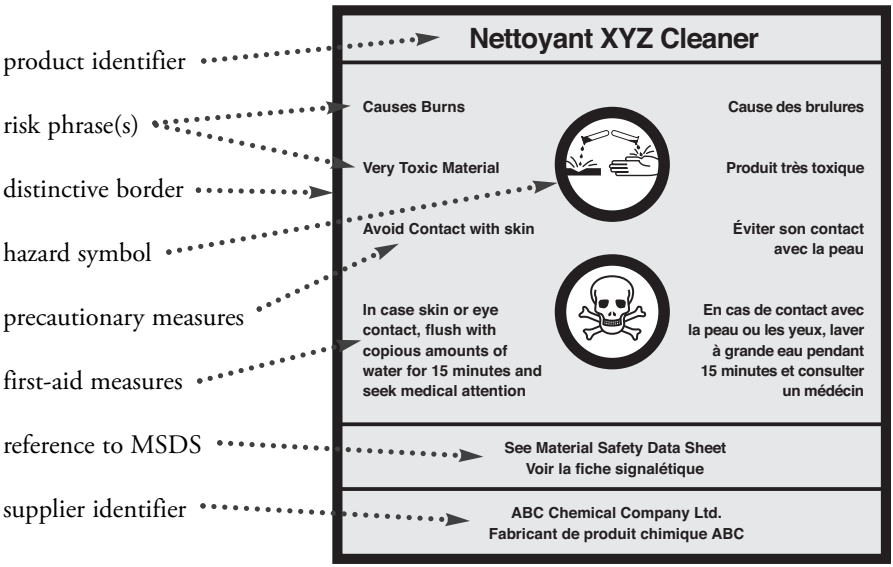
WHIMIS RESPONSIBILITIES

Suppliers – provide hazard information using labels and Material Safety Data Sheet (MSDS) on all controlled products or containers of controlled products.

Employers are to ensure that all containers of controlled products in the workplace have WHMIS labels, identifiers and up-to-date MSDSs.

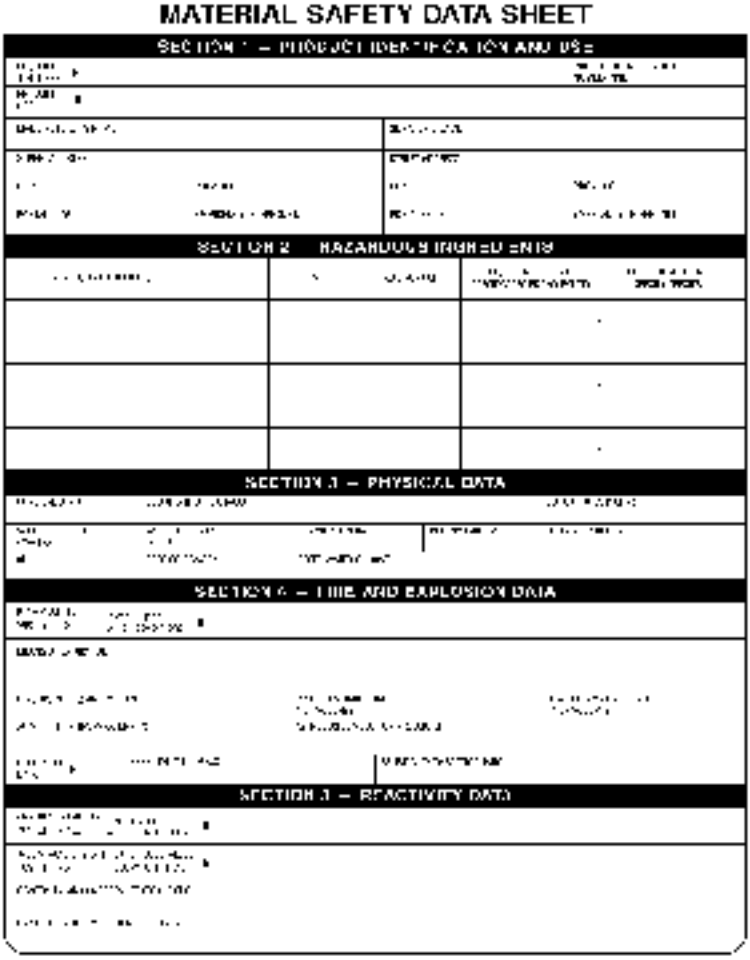
Employees are required to read the WHMIS label and handle controlled products in a safe manner.

Summary of the WHMIS Supplier Label



MATERIAL SAFETY DATA SHEET (MSDS)

Workplaces are required by law to hold Material Safety Data Sheet (MSDS) on all hazardous products on site. MSDS have information on the nature of the hazardous product including handling and first-aid requirements.



MATERIAL SAFETY DATA SHEET

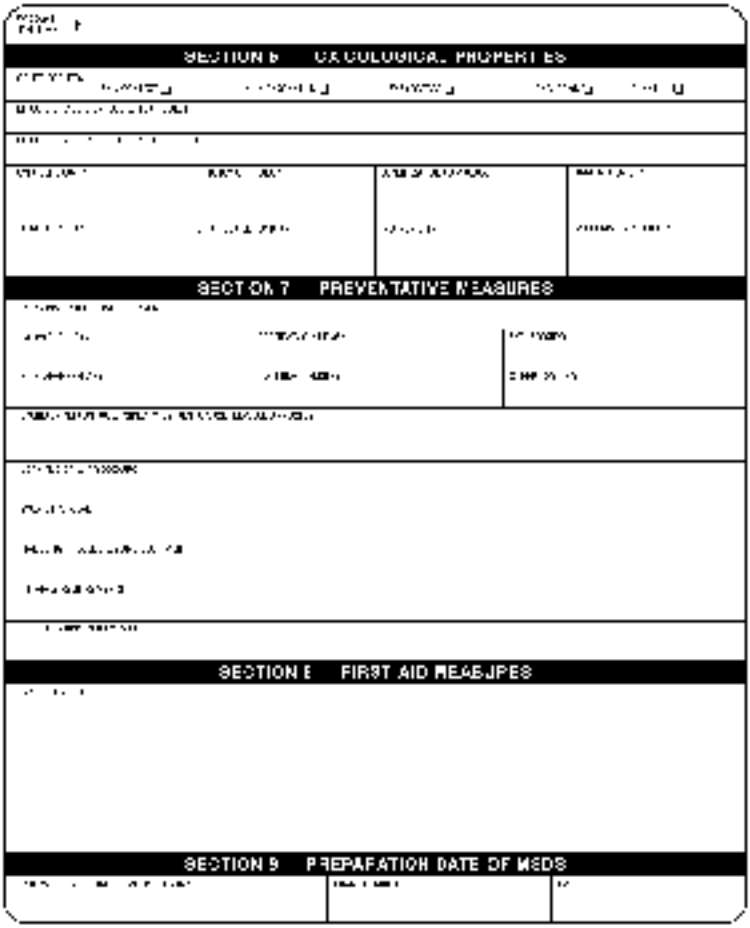
SECTION 1 – PRODUCT IDENTIFICATION AND USE

SECTION 2 – HAZARDOUS INGREDIENTS

SECTION 3 – PHYSICAL DATA

SECTION 4 – FIRE AND EXPLOSION DATA

SECTION 5 – REACTIVITY DATA



SECTION 6 ECOLOGICAL PROPERTIES

SECTION 7 PREVENTATIVE MEASURES

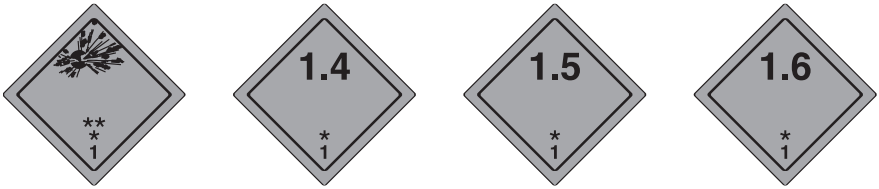
SECTION 8 FIRST AID MEASURES

SECTION 9 PREPARATION DATE OF MSDS

2.1.2 TRANSPORTATION OF DANGEROUS GOODS ACT (TDGA)

The following list identifies the 9 classes of hazardous materials (chemical, physical, biological) established by the United Nations (UN). Preventive measures are given for each class. This same classification applies to the Transportation of Dangerous Goods Act (TDGA). Content is also available on the internet at Transport Canada's web site http://www.tc.gc.ca

CLASS 1: EXPLOSIVES



HAZARDS

INCENDIARY HAZARDS – High temperatures or fire can ignite explosives, causing dangerous fires.

POSITIVE AIR BLASTS – The heat and gasses from an explosion create a wall of compressed air or "shock wave" which can be very destructive.

NEGATIVE PRESSURE – Movement of the blast of air away from detonation wave point creates a vacuum behind the shock front. This vacuum or "negative pressure phase" causes further destruction.

CREATION OF PROJECTILES – Materials surrounding an explosion (e.g. the walls of the device, packaging or storage building) can accelerate rapidly and become dangerous projectiles.

DEGRADATION – Degradation is the break-down of material. Its symptoms are sweating, weeping, oozing, exuding or rapid oxidization.

INCOMPATIBILITY – Explosions can occur if explosives are stored with incompatible substances.

IMPROPER HANDLING – Improper handling can result in an impact or friction which may initiate an explosion.

LIGHTNING OR ELECTRICAL HAZARDS – Lightning, static electricity or arcing from AC/DC source can initiate some explosive materials.

HEALTH RISKS

EXPLOSIVE SUBSTANCE	ROUTE OF ENTRY	HEALTH HAZARDS
BARIUM AZIDE UN 0224	Ingestion	Toxic
DINITROPHENOL AND DINITROPHENOLATES UN 0076, UN 0077	Skin absorption or inhalation	Increases metabolism, can cause death
EGDN (ETHYLENE GLYCOL DINITRATE)	Skin absorption or inhalation	Headache, dizziness, nausea, circulatory problems
LEAD SALTS	Ingestion	Paleness of skin, physical weakness
NITROGLYCERINE UN 0342	Skin absorption or inhalation	Headache, dizziness, nausea, circulatory problems
RDX (CYCLONITE) UN 0483	Skin absorption or inhalation	Can cause epileptic-like seizures
TETRYL UN 0208	Skin absorption or inhalation	Dermatitis, respiratory irritant, liver damage
TRINITROTOLUENE TNT UN 0209	Skin absorption or inhalation	Dermatitis, liver damage

CLASS 2: GASES

HAZARDS

EXPLOSION HAZARD – The following conditions can induce an explosion: over-pressurization of gas, rapid de-pressurization (caused by container failure), sympathetic explosion. Flammable gas can ignite as soon as its container ruptures.

PROJECTILE HAZARD – Ruptured pressure vessels can propel metal fragments a considerable distance.

ASPHYXIATION – An oxygen-deficient atmosphere can be created by the release of any compressed gases which displace oxygen or air. This can lead to breathing difficulties, asphyxiation or death.

IMPROPER STORAGE HAZARD – Compressed gas containers must be stored properly to prevent accidents. The containers should be upright and securely attached to a permanent structure. The safety relief valve inlet must always be in vapour space.

CRYOGENIC OR DEEPLY REFRIGERATED GASES – Gases that are liquefied when cooled to below -101°C may cause hazards due to their coldness. If the cooling mechanism fails, the liquid returns to a gaseous state that occupies more space. The container will rupture if not adequately vented. Cryogens can condense or solidify other gases – including the components of gaseous air. If this occurs in the venting tubes of storage containers, it prevents the release of pressure build-up. This is a major hazard. Cryogenic fluids can cause very painful frost burns if splashed on skin. Some chemical properties of cryogens may pose other hazards such as flammability hazards.

CLASS 3: FLAMMABLE LIQUIDS

HAZARDS

FIRE SUPPRESSION DIFFICULTIES – Water cannot be used to suppress these fires.

EXPLOSION HAZARD – Under certain conditions, flammable liquids in containers exposed to sufficient heat can explode.

TOXIC HAZARDS – Many of these liquids are toxic hazards. Other liquids produce toxic hazards from combustion or when decomposing.

HEAT – In the event of a fire, extreme heat can be present.

INCOMPATIBILITY WITH OTHER PRODUCTS – Class 3 products are not compatible with oxidizers, corrosives, toxins, explosives, compressed gases or radioactivity.

ELECTROSTATIC CHARGE GENERATION – Static electricity may induce fire and explosion hazard during handling of flammable liquids.

PREVENTIVE AND EMERGENCY MEASURES

- Ensure the absence of any ignition source.
- Ensure that all potential electrical discharge points are grounded and bonded. See section 3.2.2 Electrical Hazards.

CLASS 4: FLAMMABLE SOLIDS, SPONTANEOUS COMBUSTIBLES AND SUBSTANCES THAT, ON CONTACT WITH WATER, EMIT FLAMMABLE GASES

HAZARDS

SPONTANEOUSLY COMBUSTIBLE MATERIAL – Some solid substances may undergo spontaneous heating or self-burning without exposure to an outside source of heat or flame.

EXPLOSION – Some flammable solids are Class 1 explosives in wetted form. In the event of a fire, the wetting agent is likely to evaporate, leaving the explosive material in a very unstable state. The chances of an explosion are high.

TOXICITY – Some materials are toxic or can decompose when involved in a fire to form toxic gases.

CORROSIVENESS – Some materials react with water to form corrosive substances. This can occur if water is used to fight fires of flammable solids.

IMPROPER STORAGE – Spontaneously combustible materials must be shaded from direct sunlight. Also, they must be stored in a well ventilated area away from all sources of heat.

SOLUBILITY – Some materials (or their by-products) may present environmental hazards if they become solute. For example, if they are involved in a fire and water is used as an extinguishment agent, there could be a toxic run-off.

SUGGESTED PREVENTIVE AND EMERGENCY MEASURES

- Familiarize yourself with all the relevant safety rules and emergency procedures if flammable solids are stored anywhere on an inspection site.

CLASS 5: OXIDIZING SUBSTANCES AND ORGANIC PEROXIDES

DIVISION 5.1: OXIDIZERS

HAZARDS

SPONTANEOUSLY COMBUSTIBLE – Some oxidizing materials can spontaneously cause a fire when mixed with flammable material.

INVIGORATES COMBUSTION PROCESS – Because of chemical instability, these compounds can support combustion by providing oxygen or radicals.

DEFLAGRATION AND/OR DETONATION – When mixed with combustibles or confined in packages, deflagration and/or detonation can be initiated by fire, friction or impact.

EVOLUTION OF TOXIC GASES – Gases such as oxygen, hydrogen fluoride, chlorine and oxides of nitrogen can be produced when oxidizing agents are heated or burned. This especially occurs when oxidizers are mixed with other material. Some of these gases are toxic and support combustion. Some oxidizing agents react violently with water and produce toxic gases.

WATER REACTIVITY – Some metal peroxides react violently with water to produce oxygen gas or hydrogen peroxide solution. The reaction is exothermic and may cause ignition if the material is contaminated. If contaminated with combustible materials in the presence of water, ignition can be caused by impact or friction.

MULTIPLE HAZARD OXIDIZERS – Oxidizing agents can be toxic, corrosive and/or emit irritating or toxic vapours. This can cause burns to the skin, eyes or mucous membranes by direct contact or inhalation of the vapours.

INCOMPATIBILITY – Oxidizers are incompatible with: most organic materials, all flammable materials, powdered metals, most corrosives, some toxic chemicals.

PRECAUTIONS FOR STORAGE

OXIDIZING AGENTS – Store oxidizers away from flammables, organic compounds and combustible materials. Keep away from reducing agents such as zinc, alkaline metals and organic acids. Store in a cool, dry place.

SPILLS – The size of the spill will determine the type of action required.

- Keep combustibles away from spilled material.
- Do not touch damaged containers or spilled material unless wearing appropriate PPE.
- Do not get water inside containers or on spilled material.

DECOMPOSITION – Store substances away from sources of heat or direct sunlight to prevent decomposition.

DIVISION 5.2: ORGANIC PEROXIDES

HAZARDS

DECOMPOSITION – Organic peroxides vary in degree of stability-some will decompose if not kept at a controlled temperature. Rapid exothermic decomposition can lead to vessel failure due to pressure build up, fire, deflagration and/ or detonation.

FLAMMABILITY – Once ignited, these substances are capable of self- sustaining a fire as the breakdown of the unstable peroxy group in these chemicals can supply oxygen to the fire. The fires are usually intense and may lead to deflagration and/or explosion.

DEFLAGRATION AND/OR DETONATION – The combination of heat and confinement allows pressure to build up and accelerates decomposition; this can cause deflagration and/or detonation. Some peroxides are extremely unstable in their pure state. Friction, shock and static can easily initiate an explosion when the material is confined.

FUMES – Fumes generated from decomposition, fire or explosion can be flammable, explosive or toxic.

PHYSIOLOGICAL HAZARDS – Most organic peroxides are irritating to the skin, eyes and nervous membranes. Many are moderately toxic by ingestion.

THERMAL HAZARDS – These products may present corrosion and toxic, highly reactive additional thermal hazards.

DEHYDRATION – Some oxidizers may severely dehydrate (remove moisture) the eyes, skin, etc.

PRECAUTIONS FOR STORAGE AND TRANSPORT

- Keep cool.
- Store in original containers. Partially filled containers should not be transported or stored.
- Segregate from other substances and all other organic peroxides.
- Avoid friction and impact.
- Store in a well-ventilated, fire-safe, non-smoking area, away from heat sources.

SUGGESTED PREVENTIVE AND EMERGENCY MEASURES

- Avoid skin contact.
- Ketone peroxides are particularly corrosive and can cause severe injuries.
- Avoid splashing on eyes. Severe injury can occur.
- Avoid inhalation of dust and vapour. Follow the safety procedures and the PPE requirements of the site.

CLASS 6: POISONOUS (TOXIC) AND INFECTIOUS SUBSTANCES

DIVISION 6.1: POISONS

Division 6.1 products are divided into two separate groups: pesticides and non-pesticides.

GROUP 1: PESTICIDES

Pesticides are any substance used to destroy or inhibit the action of plant or animal pests. They fall into three chemical groups: organic pesticides, heavy metal pesticides and inorganic pesticides. All of these substances have varying degrees of toxicity. Pesticides include: insecticides, herbicides, rodenticides, nitricides, fungicides, bactericides and avidices.

GROUP 2: NON-PESTICIDES

Many of these products are extremely toxic. They fall into three chemical groups: organic toxins, inorganic non heavy metal toxins and inorganic heavy metal toxins. Poisons in this category may induce one or more of the following effects; asphyxiation, irritation or allergic sensitization, systemic poisoning, mutagenesis, teratogensis or carcinogenesis.

The effects can be acute or chronic depending on the inherent toxicity of the material, the magnitude of exposure and the route of exposure.

HAZARDS

POISON – Both pesticide and non-pesticide substances have varying degrees of toxicity.

POISONOUS GASES, LIQUIDS OR SOLIDS – Poisons usually produce poisonous gases, liquids or solids when exposed to the following: heat, fire, incompatible chemicals, oxidizers, corrosives, other toxic chemicals.

SUGGESTED PREVENTIVE MEASURES

- In the event of spill (or other hazardous incident) do not enter any contaminated zone.
- Carry a self-contained breathing apparatus escape pack at all times.

DIVISION 6.2: INFECTIOUS SUBSTANCES

These substances are defined as "organisms or their toxins that are infectious or usually believed to be infectious to humans or animals". There are five categories: viral, rickettsial/chlanydial, bacterial, fungal and parasitic.

HAZARDS

HUMAN HAZARDS – Depending on the infectious organism, the human hazards range from mild infection to disease to possible death.

DETECTION BY TASTE, APPEARANCE OR ODOUR – Infectious substances hazards are often not apparent from the taste, appearance or odour of the host organism or culture in which they live.

DETECTION BY MECHANICAL MEANS – The presence of these organisms is not usually detectable by normal mechanical means.

TRANSPORTATION

Forms of infectious substances that may be transported include:

- Samples (blood, cerebrospinal fluid, urine, feces, sputum, biopsies, swabs from throat, ear, eye, nose and urogenital openings, rectum wounds, etc.).
- Cultures (pathogens are often transferred from samples to cultures).
- Preserved samples (samples or cultures that are preserved by being mixed with chemicals, quick frozen in dry ice or liquid nitrogen or freeze dried).
- Vaccines.

SUGGESTED PREVENTIVE MEASURES

- Avoid direct contact with suspected products and containers.
- Wear the PPE specified by warning labels.
- Wear PPE to prevent exposure if you are sampling an effluent or other waste that may be contaminated.
- Decontaminate with 6% bleach or "perfex solution" if you suspect contamination.

EMERGENCY SITUATION

- In the case of fire, use water as an extinguishing agent.
- In a spill situation, use soda ash for absorption and neutralization.

CLASS 7: RADIOACTIVE MATERIALS

TYPES OF RADIATION

ALPHA WAVES – Alpha waves cannot penetrate the skin. They can be ingested or inhaled.

BETA WAVES – Beta waves can enter the body by ingestion, inhalation and absorption.

GAMMA RAYS – Gamma waves can enter the body by ingestion, inhalation and absorption.

HAZARDS

HEALTH RISKS – Depending on the absorbed dose, the imminent hazards include: immediate or gradually-developing cellular damage, cancer, mutagenesis, teratogenesis, physical illness, death.

INCOMPATIBILITY – Radioactive substances are incompatible with other substances.

FIRE – Fire will weaken containers or damage shielding material in some cases.

IMPROPER STORAGE – Improper storage of containers can lead to exposure to ionization.

CLASS 8: CORROSIVES

HAZARDS

CORROSION OF STRUCTURAL MATERIALS – The corrosion of structural materials will result in collapse, rupture and explosion.

CORROSION OF LIVING TISSUE – Tissue can be corroded by skin contact, inhalation or ingestion.

INCOMPATIBILITY – Corrosives are highly reactive when mixed with incompatible chemicals.

INCOMPATIBLE CONTAINER – Corrosives placed in an incompatible container may result in gross container failure. The contents would then spill.

INCOMPATIBLE PRODUCT – If corrosives are placed in a container with an incompatible product (where one chemical by-product is gas), pressure may build until container explodes or splits.

IMPROPER STORAGE AND LABELLING – Storage and handling hazards may result from improperly stored or labeled containers.

DELAYED CORROSION – The effects of corrosive materials are sometimes not immediately evident.

FIRE, TOXIC HAZARDS, EVOLVING GASES – Fires related to corrosives usually result in toxic and corrosive fumes.

NEUTRALIZATION/DILUTION – The exothermic neutralization process may cause heat damage to skin and other materials. If water is added to acid, a severe explosive reaction will result.

SUGGESTED PREVENTIVE MEASURES

- Be aware of structures and materials that show evidence of corrosion.
- Avoid any contact with corrosive materials or materials that may be corrosive such as sludge and effluent.
- Use an approved, compatible and labeled container where required and ensure that you are trained in the proper handling procedures.

CLASS 9: MISCELLANEOUS PRODUCTS, SUBSTANCES OR ORGANISMS

This class includes the miscellaneous products, substances or organisms which do not meet the criteria for inclusion in any other class that 1) contains a genetically modified organism that would if released endanger public safety. 2) is listed as a marine pollutant, 3) is material that is transported, if a liquid at greater than 100°C and if a solid at 240°C except for asphalt or tar, 4) leachable toxic waste 5) waste containing an environmentally hazardous substance. Or is specified as a class 9 substance.

PREVENTIVE MEASURES

- Refer to MSDS or product labels for safety precautions.
- Follow applicable safety regulations and procedures.
- See section 5.1.3 Export and Import of Hazardous Wastes (EIHW) and any other applicable safety regulations or guidelines for hazardous wastes/materials.

2.1.3 SAMPLE PRESERVATIVES

PERSONAL PROTECTIVE EQUIPMENT

- coveralls
- gloves – Nitrile or impermeable material, see section 1.3 Personal Protective Equipment.
- safety glasses

SAMPLING PRESERVATIVES HAZARDS

Sample preservatives can present a danger to samplers, persons transporting samples and laboratory personnel.

NITRIC ACID – HNO_3

HAZARD – Powerful oxidizer; highly toxic; causes severe burns; corrosive; do not inhale fumes

SULPHURIC ACID – H_2SO_4

HAZARD – Highly toxic; causes severe burns; corrosive; do not inhale fumes.

SODIUM HYDROXIDE – NAOH

HAZARD – Hygroscopic; corrosive.

ZINC ACETATE – ZNAC

HAZARD – Causes skin and eye irritation and burns.

Always review the appropriate MSDS before preservative use

First-Aid – For all preservatives, except Nitric Acid, if the substance comes into contact with your skin, rinse thoroughly with water for 15 minutes; for eye contact flush with water for 15 minutes; immediately seek medical advice. For Nitric Acid rinse skin or flush eyes for 30 minutes.

SAMPLE HAZARDS

HAZARDOUS EXPOSURE RISKS	
CORROSIVE MATERIALS	Strong acid or base samples.
FLAMMABLE MATERIALS	Samples of hydrocarbons.
OXIDIZING MATERIALS	Chemical samples.
INFECTIOUS MATERIALS	Samples from sewage treatment plants or samples of industrial effluent to which sewage may have been added.
TOXIC MATERIALS	Samples of pesticides, PCP, PCB industrial effluent.

SUGGESTED SAMPLING SAFETY PROCEDURES

- Always wash your hands with soap after handling samples.
- Keep the exterior surfaces of the sample container clean by rinsing with water and drying with disposable paper towels.
- Shipping containers should be sealed to prevent the samples from spilling. Most of the time taping the container should suffice.
- Samples should be packed and insulated to avoid breakage. Sorbents such as paper towels, foam, oleophatic pads and vermiculite may be used to pad samples. Sorbents will contain spills in case the sample containers are damaged during shipment.
- Outer packaging should be compatible with the samples. See 7.4 Sample Containers, Preservation,Holding Time.
- If drums or jerry cans are used as sample/shipping containers, ensure that the outlets are tightly sealed and leak-proof.

- Do not overload shipping containers. Where no provisions are made for mechanical lifting assistance, weight should not exceed 25 kg.
- Inform the receiving lab before you ship any samples of dangerous materials.
- Collect and ship only the amount of sample required by the lab. This will minimize the hazards and problems associated with handling, transportation and disposal. Limit the sample weight (which includes the packaging) to less than 10 kg (22 lbs.) as required.
- Where the matrix of the sample is composed of one of the classes of dangerous goods, label and ship the sample as per the TDG Regulations for that class of goods.
- Always ship dangerous goods by the most direct route. Make sure the shipper is willing to handle your shipments.

REDUCING YOUR RISK–TDG REGULATIONS

Transportation of reagents and other chemicals are subject to the Transportation of Dangerous Goods Regulations (TDGR). Section 1.19 of the TDG Regulations (2004) exempts samples from the manifesting and labeling requirements. However, the packaging requirements of the Regulations must be met. The Regulations state:

SECTION 1.19 SAMPLES

(1) These Regulations do not apply to samples of goods, including forensic samples, that are reasonably believed to be dangerous goods if, for the purposes of inspection or investigation duties under an Act of Parliament or of a provincial legislature, the samples are

(a) in transport under the direct supervision of a federal, provincial or municipal government employee acting in the course of employment; and

(b) in a means of containment that is designed, constructed, filled, closed, secured and maintained so that under normal conditions of transport, including handling, there will be no accidental release of dangerous goods that could endanger public safety.

(2) These Regulations do not apply to samples of goods that the consignor reasonably believes to be dangerous goods, if

(a) the samples are in transport for the purposes of classifying, analysing, testing or demonstrating;

(b) the samples are believed not to contain explosives, infectious substances or radioactive materials;

(c) the gross mass of the samples is less than or equal to 10 kg;

(d) the samples are accompanied by a shipping document that, despite sections 3.5 and 3.6 of Part 3, Documentation, includes the name and address of the consignor and the words “test samples” or “échantillons d'épreuve”;

(e) the samples are in a means of containment that is designed, constructed, filled, closed, secured and maintained so that under normal conditions of transport, including handling, there will be no accidental release of dangerous goods that could endanger public safety; and

(f) the means of containment has marked on it the words “test samples” or “échantillons d'épreuve” and the words are legible and displayed against a background of contrasting colour.

Although the above exemption allows for the shipping of samples without safety marks, the general practice is, in cases where you know you are shipping dangerous goods such as fuel samples, to mark the container with the appropriate safety marks as well as the required wording: “test samples” or “échantillons d'épreuve.”

TRANSPORTING PRESERVATIVES

Preservatives with the exception of Zinc Acetate are classified as dangerous goods under TDGR. Preservatives can be shipped as “limited quanities” under section 1.1.7 of TDGR if quantities are kept below one litre. Note: Nitric Acid must be shipped as a 50% concentration as concentrated Nitric Acid can not be shipped as a “limited quantity.” Preservatives are available from EP labs and private suppliers in ready to use vials and packaged for transport.

CANUTEC

CANUTEC is the Canadian Transport Emergency Centre operated by the Transport Dangerous Goods Directorate of Transport Canada. They provide bilingual (French & English) emergency response advice.

In an emergency, CANUTEC may be called collect at 613-996-6666 (24 Hours), or *666 cellular.

In non-emergency situation, please call the information line at 613-992-4624 (24 hours)

3.0 COMMON HAZARDS

3.1 HAZARDS

This chapter looks at hazards that can happen during an inspection. Discussion on what to be aware of and preventative measures to minimize these hazards are outlined. This is not an exhaustive list but covers the most common hazards that may be encountered.

3.1.1 SLIP, TRIP, FALL HAZARDS

These hazards are some of the most common causes of accidents and injury - including debilitating back injuries.

PERSONAL PROTECTIVE EQUIPMENT

- Industrial setting – approved non-skid sole safety boots; rough terrain – hiking boots.

HAZARDS

Slipping, tripping or falling over overhead supports, beams, valve stems, conveyors, guy wires, support wires, electrical cords, ropes, sampling equipment, rough terrain, and industrial machinery.

SUGGESTED PROCEDURES

- Never hurry through your inspection, attempt to identify potential accidents before they happen.
- Watch out for slippery areas – oily and greasy surfaces, wet or dirty surfaces, as well as polished floors or other low-friction surfaces.
- Take environmental conditions into account at your inspection site (snow, rain, etc.).
- Plan access and egress route to ensure slip, trip and fall hazards are minimized.
- This type of accident can usually precede a drowning incident, so extreme caution should be taken around water.
- Wear boots or shoes with slip resistant soles, particularly when climbing ladders or crossing cat-walks/elevated walkways.

HAZARDS

When you enter any area, take a moment to scan the floor, walls and ceilings for any safety issues.

SUGGESTED PROCEDURES

- Always check flooring you are walking on for open trenches, missing grates and misplaced manhole covers.
- Identify the nearest exit.
- Ask your guide to point out alternate routes that should be taken to avoid hazards.

3.1.2 TRAFFIC AND OTHER KINETIC HAZARDS

Kinetic hazards are some of the more common physical hazards and can lead to very serious accidents and injuries. Traffic hazards are common where raw materials and products are moved around.

PERSONAL PROTECTIVE EQUIPMENT

- Safety vest, traffic cones and barricade.

TRAFFIC HAZARDS

Be on the lookout for moving vehicles, forklifts, trucks, front end loaders, or even aircraft and railcars. If there are designated safe walking areas, usually delineated by floor markings, where practical stick to them, keep behind all traffic pylons and barricades.

SUGGESTED PROCEDURES

- Be aware while moving around a site; use extreme caution.
- Wear a high visibility traffic vest, mark work area with cones or barricades and where required, use flashing lights on vehicle.
- Park your vehicle between the sampling location and industrial activity to provide a barrier between your sampling area and potential traffic. Use safety cones.

KINETIC HAZARDS

loose fitting clothes or hanging shirt tails, etc. can get caught in moving machinery and lead to a fatal accident; conducting inspections within the vicinity of other objects (such as compressed gas cylinders) with potential kinetic energy, moving parts or high speed machinery particularly if the machinery operates intermittently.

SUGGESTED PROCEDURES

- Use extreme caution; avoid entering mill process areas where there is high-speed machinery or intermittent operations.
- Respect mill access barriers.
- Do not wear baggy or excessively loose-fitting clothes; do not wear ties or jewelry; all shirt tails, etc. must be kept tucked in at all times.

REMOTE OPERATION HAZARDS

Remote plant operations such as overhead cranes, moving machinery or intermittently operated equipment are potential hazards. Operators may have a lack of visibility or awareness of your presence; they also may be completely unaware that an accident is happening or about to happen.

SUGGESTED PROCEDURES

- Ask about remotely operated equipment, traffic patterns, etc. Follow site safety guidelines and access barriers; keep alert at all times if you are unfamiliar with remote control operations; ask a guide to accompany you.
- Be sure that you **KNOW** about all intermittent operations and that you can be seen at all times by plant workers; modify your inspection accordingly.
- Do not stand directly underneath screw conveyors or other pieces of machinery.

3.1.3 FALLS FROM ELEVATION

PERSONAL PROTECTIVE EQUIPMENT

• Fall protection shall be used when no guardrail is present.

Work on ladders, scaffolds, roofs, elevated platforms, walkways and the tops of trailer trucks can lead to accidental falls, serious injuries or fatalities.

A fall protection system (e.g. body harness) shall be used when work is being done at a place from which a fall of 3 m (10 ft) or more may occur – this includes unguarded structures more than 2.4 m above the nearest permanent safe level or on a temporary structure (scaffolding, platform, etc.) 6 m above a permanent safe level.

HAZARDS

People who are performing work at elevated heights are at risk from falling. Poorly secured, rusted or broken ladders, stairs or platforms can pose a risk, as can open or unguarded manholes, access hatches or climbing stairs and ladders too quickly or without the ability to use both hands. Trailer truck tops can pose a fall risk to the inspector – surfaces can be greasy and slippery.

SUGGESTED PROCEDURES

- Ladder should be stable and securely attached.
- Do not attempt to climb a ladder or stairs quickly or in an unsafe manner; both hands should be free when climbing. Use a knapsack to carry light tools, sampling equipment, notebook, etc. Make note of the length of some ladders – fatigue when climbing may become a factor.
- Always check the condition of ladders and platforms before climbing for sturdiness, rust, secure connections, etc. Take into consideration if the weather has created slippery surfaces. Pay particular attention to roofs or horizontal surfaces that may be weakened by the accumulation of excessive solids or the corrosion of supports.
- Assess presence of overhead obstructions and need for overhead protection.
- Check for proximity to electric power lines.
- Man-way and access hatches should have guards or fall protection devices around them.
- Inspectors require fall protection to work on top of trailers that are higher than 2.4 meters. There must be at least 2 persons per truck being sampled: one inspector to climb the trailer and take the sample, the other to assist from the ground.
- Use a stepladder for trailers with high ladders. Do not mount the trailer by climbing on the frame, tires, etc. Do not climb the trailer with sampling equipment in hand. Climb half way and have the other inspector hand you the necessary equipment and supplies, place them securely on top of the trailer and climb to the top. See section 5.1.1 Contaminated Fuels for more details on trailer sampling.

3.1.4 FALLING OBJECTS

PERSONAL PROTECTIVE EQUIPMENT

- Hard hat.

HAZARD

Objects falling from elevated work areas can cause serious injury or death.

SUGGESTED PROCEDURES

- Be aware of equipment and machinery operating at elevated grades as well as overhead hoisting equipment and objects stored in elevated locations.
- Keep well away from all elevated platforms and ladders, (including industrial stack ladders) when persons are working overhead.
- Always wear a hard hat when overhead work is being performed.

3.1.5 HEAVY LIFTING

While performing enforcement duties some heavy lifting of sampling equipment and collected samples, etc. may be required. Bioassay samples weighing approximately 20 kg for a 20 L pail are probably the heaviest item an enforcement officer might have to carry. Coolers used for samples and/or other packages should be kept at or below this weight. Items that are heavier than this should be handled by 2 people or some type of mechanical device such as a hand truck or dolly.

Other factors to consider when faced with lifting or carrying an item is the frequency, duration, distance and terrain over which an object is to be transported.

HAZARD

Personal injury from lifting objects improperly or which are too heavy.

SUGGESTED PROCEDURES

Always follow these rules, even for lifting light objects:

- Place your feet approximately shoulder width apart for good balance.
- Bend your knees.
- Hold the object as close to your body as possible.
- Lift smoothly and slowly.
- Pivot with your feet – don't twist your back.
- Push rather than pull a load.

- Share the load – work with a partner.
- Get mechanical assistance for heavy loads.

Know your own strengths and limitations. Use proper lifting, bending and sitting techniques on the job to help reduce back injuries in the workplace. More information can be found at the Treasury Boards website, www.tbs-sct.gc.ca.

3.1.6 ACOUSTIC HAZARDS

PERSONAL PROTECTIVE EQUIPMENT

- Hearing protection.

HAZARD

Excessive sound levels may result in physical damage to the ear and/or a loss of hearing. Other potential hazards include distraction, confusion, and inability to hear alarms or follow emergency directions.

SUGGESTED PROCEDURES

- Where levels of noise exceed regulatory limits, remove yourself from the source of the noise to a comfortable distance, avoid high noise process areas or enter them for short periods of time only.
- Wear protective hearing devices where required by site policy.
- Watch for noise level warning signs.
- Always carry disposable earplugs.

3.1.7 INCLEMENT WEATHER

HAZARD

Severe weather conditions can present a significant safety risk when outdoor sampling, driving or work on stacks is being done.

SUGGESTED PROCEDURES

- Check weather report before traveling or performing outside work.
- Consider postponing outdoor activities during extreme weather conditions: the ambient temperature is less than -30°C (wind chill) or greater than 30°C; the wind speed is greater than 40 km per hour; during electrical storms; under conditions of sleet, hail, snow or freezing rain.

3.1.8 THERMAL HAZARDS

HEAT STRESS HAZARD

Heat stress, through dehydration and increased levels in body temperature can occur very rapidly while working near furnaces, hot process areas, hot air ducts, pollution control systems, un-insulated hot roofs, and other heat-generating locations and when wearing certain PPE in these areas or during the hot summer months. Heat stress is particularly dangerous for women in their first trimester of pregnancy.

SUGGESTED PROCEDURES

- Be knowledgeable and aware of heat stress symptoms.
- Schedule rest breaks away from radiant heat sources.
- Drink sufficient fluids to replenish fluids lost through perspiration and have continuous access to cool potable water.
- Avoid hot areas as much as possible.

COLD STRESS/HYPOTHERMIA HAZARD

Working in extreme cold conditions can result in impaired mental and physical ability, frostbite and hypothermia.

SUGGESTED PROCEDURES

- Wear warm clothing that is layered to trap warm air and to prevent conductive heat loss.
- Wet clothing causes rapid loss of body heat due to evaporative cooling. Wear waterproof clothes in wet weather.
- Prevent sweating by removing layers and opening closures at neck and wrists.
- Have a warm shelter readily available that is protected from the wind.
- Alternate inside and outside work.
- Follow inclement weather guidelines (above).

EXPOSURE TO SUN HAZARD

Working in the sun.

SUGGESTED PROCEDURES

- Wear sunscreen with SPF 15 on all exposed skin.
- Avoid the sun and radiant heat. Sunburn can increase dehydration and cause heat stress.

3.1.9 DROWNING HAZARDS

PERSONAL PROTECTIVE EQUIPMENT

- Life jacket or flotation suit; fall protection.

HAZARD

Swamping, capsizing or boating accidents are one potential area for drowning. A second type of hazard is falling into large chemical tanks, drums, vats, pits or other large

containers holding liquid, porous substances or large amounts of dry granular substances. Drowning hazards also exist while working near or on a dock, or conducting investigations near water sources, including ditches, treatment ponds, lagoons, creeks, dykes, rivers, lakes and oceans.

SUGGESTED PROCEDURES

- Ensure that you are wearing an approved life jacket, or are equipped with a fall protection system if you are on a boat or within 5 feet of a dock face.
- Ensure that emergency equipment and personnel are available on site, including a powered rescue boat if necessary.
- Ensure that written emergency procedures are available and that you have read the procedures prior to your inspection or investigation.
- See section 6.1.5. Boating Safety
- Around lagoons, treatment ponds and ditches ensure that you have rescue equipment such as poles or throw ropes.
- EC policy when there is a risk of drowning is **DO NOT WORK ALONE**.

3.1.10 ADDITIONAL INDUSTRIAL HAZARDS

POOR SIGHT LINES HAZARD – People that operate large, heavy equipment often have poor sight lines; if you are in an area where the operator cannot see you, you are in an extremely dangerous zone.

SUGGESTED PROCEDURE

- Do NOT enter dangerous zones where large equipment (particularly mobile equipment) is operating; if you must enter one of these areas, make sure that you are visible to all operators and that a guide accompanies you at all times. Wear a safety vest.

MOVING PARTS AND PROCESS PIPES HAZARD – Serious injury may result from close contact with moving parts and process pipes.

SUGGESTED PROCEDURE

- Do not touch any moving parts or process pipes that you are not familiar with; always **ASK** first.

PRESSURE VESSELS HAZARD – Sudden and unexpected high-pressure steam releases can have fatal consequences. Steam leaks can exist as invisible, high velocity streams for long distances. Contact can cause serious or fatal injuries. High temperature steam is extremely dangerous and will cut through flesh.

SUGGESTED PROCEDURES

- Have a guide show you the locations of potentially dangerous pressure vessels; keep clear of these at all times.
- Take utmost care around all high-pressure systems, especially steam equipment and reactors. If at all possible, do not enter an area where there is a high temperature steam leak; stay put until help arrives.

DRIPS AND STEAM LEAK HAZARDS – Can cause severe burns to skin. Always assume that any drips or sprays you see are hazardous even though 99.9% of the time they are not.

SUGGESTED PROCEDURE

- Avoid areas where “live steam” leaks may occur (e.g. digester room-steam plant).

POOR LIGHTING HAZARD – Higher risk of physical hazards (falling, tripping, entering dangerous zones unaware).

SUGGESTED PROCEDURE

- Avoid dimly lit areas; have a mill guide accompany you if you must enter an area that has poor lighting.

CONGESTED AREA HAZARDS – Increased danger of falls and accidental injury with irregularly shaped objects.

SUGGESTED PROCEDURE

- Avoid these areas where possible; traverse them with utmost care and be alert to all physical hazards.

MALFUNCTION, BREAKDOWN OR SHUTDOWN HAZARDS – Spills or machinery breakdowns within the mill may allow emissions to escape to the atmosphere without any control.

SUGGESTED PROCEDURES

- Know the emergency evacuation routes and procedures.
- Avoid areas adjacent to the process vents and discharge points.
- Ensure you have the appropriate respirator on hand and ready to wear.

EXPLOSIVE HAZARDS – Portions of the mill may have potentially explosive dusts, mists and/or vapours. Flashlights, pH meters, thermo-couples and other battery-powered devices can set off an explosion.

SUGGESTED PROCEDURE

- Only intrinsically safe monitoring/safety equipment should be used in areas where explosive or flammable dusts, mists and/or vapours may be present.

3.2 HAZARDOUS SITUATIONS

3.2.1 EMERGENCY SITUATIONS (OIL OR CHEMICAL SPILLS)

PRIOR TO ARRIVAL ON-SITE

Contact first responders if possible and notify emergency scene commander of intended arrival and anticipated activities. Make arrangements for assistance where necessary and obtain site-specific information about potential hazards and other response activities.

ON-SITE SUGGESTED PROCEDURES

- Locate the access point and meet with emergency scene command if applicable to obtain instruction for safe entry to and exit from immediate scene.
- Determine how to communicate with those in charge of first responders while in close proximity to incident scene.
- Where possible, always travel on the site with an emergency first responder or another EC employee. Always arrive on scene with all required Personal Protective Equipment (PPE).
- Consult first responders to anticipate what chemicals may be present and what other hazards are anticipated in the hot zone. Where possible, refer to MSDSs and/or chemical manifests prior to working near chemicals.
- Plan and select the sample collection media or equipment in advance to ensure necessary equipment only is taken into a hot zone.
- Be aware of potential for ignition of liquid pools or gas clouds. Use gas-monitoring equipment if possible and keep as far from potentially explosive environments as possible. Use only intrinsically safe equipment in areas where an explosion hazard may be present.
- Co-ordinate with first responders to plan safe route and back-up route out of the hot zone. Ask for a "buddy" to assist in the hot zone during sampling. Obtain assistance, site-specific hazard information and response activities for the scene in question.
- Make sure you have a back-up team ready to rescue you if necessary. Plan an evacuation route before traveling through an emergency site if not prepared by first responders.

- Stay away from lines, vessels or tanks that contain steam, gas or liquid under pressure or heat. Avoid contact with pipelines since they may be hot. Trenches and excavations can be confined spaces when gases, vapors or liquids accumulate in them. Review part 3.2.3 Guidelines for Entry into Confined Spaces. Only use properly grounded or double insulated power tools/equipment. Wear appropriate footwear providing insulation against electric shock at all times while on site visits or during emergency activities.
- Use appropriate PPE for chemical exposure or hazardous environments. Where unidentified substances are present, remain a safe distance away from the scene until the area has been assessed. Make sure appropriate decontamination measures are in place before you enter the contaminated area.

3.2.2 ELECTRICAL HAZARDS

Electrical sources such as batteries, generators, or existing AC can cause shocks, burns or falls that can result in serious injury or death. Electricity can also be the source of ignition in a potentially flammable or explosive atmosphere.

SUGGESTED PROCEDURES

- Always maintain a minimum clearance of 3 m (10 feet) between the area in which you are working and energy lines.
- For inspections of PCB-containing electrical equipment, refer to the safety precautions in Section 5.1.7 of this guide.
- At industrial sites suspend your inspection immediately during an electrical storm.
- Use double-insulated tools approved by the CSA. Double insulated tools are identified by writing on the tool or by the symbol of a square within a square.
- Be aware that in certain industrial sites, particularly around water, it is a requirement that tools only be plugged into circuits protected by a ground fault circuit interrupter. To comply with this, inspectors should obtain an extension cord equipped with a ground fault circuit interrupter.
- Inspect all electrical and battery-powered equipment to be used in an explosive atmosphere. Ensure that the equipment is marked and certified to be intrinsically safe.
- Ground all cables and equipment where there is a static or shock hazard.
- Grounding is normally a secondary protective measure to protect against electric shock. It does not guarantee that you won't get a shock or be injured or killed by an electrical current. It will, however, substantially reduce the risk.
- Do not attempt to handle downed power lines. Be aware of the locations of buried cables.

GROUNDING AND BONDING

It is possible that the source of ignition can come from you or your sampling device. As a precaution, the following grounding and bonding practices should be implemented before sampling. Inspectors should have prior training in proper grounding and bonding techniques before attempting any grounding or bonding activities.

GROUNDING

Grounding is connecting one or more conductive objects directly to earth using ground rods. Grounding drains away static charges as quickly as they are produced.

- Test grounding cables for resistance using an ohm meter. Resistance to ground should not exceed ten (10) ohms,. If readings show resistance-to-ground greater than ten (10) ohms, take appropriate action to reduce resistance to ten (10) ohms, or less, by driving additional ground rods and/or checking connections.

- Insert steel grounding rod into earth. Grounding rods should be 5' in length and 3/8" to 1/2" in diameter. Use galvanized or copper-clad steel rods.
- Rods must be driven into the ground deep enough to make contact with water levels in the soil. If soil around rod is dry, add water to moisten the soil to aid in the conductance of electricity. Adding salt to the water can also help increase conductivity.
- Connect one end of cable to rod and measure resistance from rod to cable.
- Connect other end of cable to the frame of the tanker and measure resistance from tanker to cable (< 10 ohms). Ensure surface of grounding connections on tanker is clean. Remove any paint, rust or dirt by using a steel brush.
- Wait 15 minutes in order to dissipate static charge.

BONDING

Bonding is connecting two or more conductive objects with a conductor such as a copper wire, which equalizes the charge between them.

- Test bonding cables for resistance. 0 OHMS is optimal, do not use cable if more than 10 ohms register.
- Connect one end of cable to metal container and measure resistance from container to cable (0-10 ohms optimal).
- Connect other end of cable to second metal container and measure resistance from second container to cable (0-10 ohms optimal).
- Wait 15 minutes in order to dissipate static charge.

COMMON CAUSES OF FAULTY GROUNDING OR BONDING OPERATIONS

- Loose parts or connections (bolts, nuts, etc.).
- Broken or frayed wires.
- Loose ground or bonding clamp.
- Worn or improperly installed clamp point contact.
- Grounding surfaces not clean (insulated by dirt, paint, rust, corrosion etc).
- Tank insulated from the point of contact where grounding clamp connected.
- Local soil conditions (soil type, moisture content, temperature)
- Local weather conditions (temperature, wind speed, humidity)

3.2.3 GUIDELINES FOR ENTRY INTO CONFINED SPACES

PERSONAL PROTECTIVE EQUIPMENT

- Safety Check – Carry out a safety check on equipment before entering a confined space.
- Notify the person in charge, immediately, if any defects are noted in the company's equipment or EC equipment; DO NOT enter the confined space until the equipment is repaired or replaced.

NOTE: These procedures are general guidelines and do not supersede governing Regulations. They must be augmented with specific procedures for each designated confined space.

A confined space is defined as a tank, processing vessel, underground vault, ditch, containment dyke, tunnel or other enclosure not designed or intended for human occupancy, except for the purpose of performing work. A confined space may have:

- a limited number of openings for entry and exit
- poor natural ventilation
- an oxygen deficient atmosphere
- an airborne dangerous substance

Confined spaces are dangerous areas and it is possible to enter into them unaware. Dangers include asphyxiation, exposure to high levels of toxic pollutants, hot free flowing solids, high static charges and high gas temperatures. Fatal injuries are possible in and around air pollution control devices.

- Be sure to know the locations of all confined spaces in the inspection area. Ask a knowledgeable site official to identify these places for you.
- **NEVER** enter an air pollution control device!

TYPE I LOW RISK ENTRY PROCEDURES

- No person shall enter a confined space or act as an assistant during an entry without proof of current confined space entry training.
- An entry permit shall be completed by the worker(s) making the entry and will be filed with another worker ("assistant") at the work place who is trained and available to assist in case of emergency. (See appended example permit)
- No entry will be undertaken by a worker alone and unsupported by a means of communicating with the assistant. The assistant shall visually check the worker at intervals suitable to the nature of work, at all times during work.
- Entry points will be barricaded and locked open. Ensure that all access points are open. Where removable, decking over pits and sumps shall be entirely removed.
- All cisterns, tanks and sumps shall be dewatered prior to entry. Approved ladders shall be used for access.
- Pipes or vessels which convey or may leak water or hazardous gases into the space will be disconnected, blanked, or blinded prior to entry. All hazardous electrical equipment must de-energized and locked out. (Note: a separate tag-out/lock-out procedure must be in place in the workplace.)
- The space must be ventilated for at least 20 minutes prior to entry and be continuously ventilated during work. At least 20 air exchanges per hour must be maintained. Use only positive pressure ventilation. Ensure that the ventilation supply air circulates throughout the entire space.
- If extrication of an injured worker requires use of a mechanical lifting device or if the nature of the space otherwise makes retrieval difficult, all workers entering the

space must where appropriate personal protective equipment; workers entering a confined space will wear a harness and a lifeline which enables immediate recovery to the surface in an upright position and which is controlled by the assistant. The use of wristlets alone for this purpose is prohibited.

- No work, equipment or vehicles which produce combustion gases shall be operated within 15 meters of raceways, sumps or ponds, or the intake(s) of any ventilation equipment in use. No flammables shall be stored or used within 15 meters of raceways, sumps or ponds, or the intake(s) of any ventilation equipment in use.
- Where any hazardous substance is used in the space during work, a hot work permit shall be completed and the space will be deemed to be a Type 2 confined space during work and for at least the first entry following such work. All workers will wear suitable respiratory protection and any other required personal protective equipment (PPE) during work.

NOTE: a respiratory protection program must be in place in the workplace and PPE and respirator type must be specifically identified.

TYPE 2 HIGH RISK ENTRY PROCEDURES

- No person shall enter a confined space or act as an assistant during an entry without proof of current confined space entry training.
- An entry permit shall be completed by the worker(s) making the entry and will be filed with the senior duty manager.
- No entry will be undertaken by a worker alone and unsupported by a qualified assistant in attendance immediately outside the space. The assistant shall be in constant communication with the worker(s) inside the space at all times during work.
- The assistant shall be equipped with and dressed into any equipment required to enter the space and assist an injured worker. The assistant shall be supported by at least two additional qualified persons in the vicinity of the space and by a means of alerting the support persons.
- All entry points will be barricaded and locked open.
- Wherever practical, all water containing vessels and tanks shall be dewatered prior to entry. Where this is impossible, workers entering the space shall wear in addition to specified equipment, an approved flotation device. Where fixed ladders are not installed for entry in the space, an approved alternate system shall be used for access.
- Pipes or vessels which convey or may leak water or hazardous gases into the space will be disconnected, blanked, or blinded prior to entry. All hazardous electrical equipment must de-energized and locked out.

NOTE: a separate tag out/lock out procedure must be in place in the workplace.

- Testing and ventilation: No person will enter the space until these procedures have been completed, or in any case when a hazardous atmosphere is present in the space. Prior to entry the space must be tested to ensure the minimum air specified in the site procedures. Specific toxins likely to be present must be identified and included in the procedures. Wherever practical, the space must be ventilated for at least 20 minutes prior to entry and be continuously ventilated during work. At least 20 air exchanges per hour must be maintained. Use only positive pressure ventilation. Ensure that the ventilation supply air circulates throughout the entire space. The space must be continuously monitored during work at all times when ventilation is not used or when there is risk of contaminant invasion or build-up in the space.
- Testing and monitoring of atmospheric conditions will be conducted only by personnel who are trained and certified in the operation of the instrument(s) in use at the site. Testing shall be conducted: (a) prior to fully opening the space and ventilating it and (b), after initial ventilation and immediately prior to entry. The latter readings will be entered on the Entry Log. If the space is left unattended for 20 minutes or longer, workers will re-test prior to entry.
- In addition to appropriate personal protective equipment, workers entering a confined space will wear a harness and a lifeline which enables immediate recovery to the surface in an upright position and which is controlled by the assistant. The use of wristlets alone for this purpose is prohibited.
- No work, equipment or vehicles which produce combustion gases shall be operated within 15 meters of any ventilation equipment in use. No flammables shall be stored or used within 15 meters of any ventilation equipment in use.
- Where any hazardous substance is used in the space during work, a hot work permit shall be completed. All workers will wear suitable respiratory protection and any other required personal protective equipment during work.

NOTE: a respiratory protection program must be in place in the workplace and PPE and respirator type must be specifically identified.

3.3 BIOLOGICAL HAZARDS

Biological hazards may be encountered during inspections of waste treatment facilities, farms, hospitals and laboratory disposal areas. If the proper precautions and procedures are not in place, bacteria, viruses and other micro-organisms have the potential to cause illness in a number of exposure situations.

- Do not enter areas that have imminent hazards unless you have proper PPE.
- Ensure that you practice good hygiene.
- Follow all federal, provincial, municipal and facility rules and regulations.

3.3.1 BIOLOGICAL HAZARDS IN SAMPLING

Prior to undertaking any sampling for micro-organisms, ascertain the biosafety level of the facility to determine the level of personal protective equipment (PPE) required. Biosafety levels are defined in Health Canada's Laboratory Biosafety Guidelines, 2nd Edition 1996.

BIOLOGICAL INCIDENTS

- Symptoms usually present themselves in hours to days.
- Biological agents are usually odorless or colorless.
- Due to the delayed onset of symptoms, the area affected may be greater due to movement of other infected individuals.
- Biological agents are classified according to risk groups. In general inspector's exposure will be limited to risk groups 1 and 2.

RISK GROUP 1 (LOW INDIVIDUAL AND COMMUNITY RISK)

This group includes those microorganisms, bacteria, fungi, viruses and parasites, which are unlikely to cause disease in healthy workers or animals.

RISK GROUP 2 (MODERATE INDIVIDUAL RISK, LIMITED COMMUNITY RISK)

A pathogen that can cause human or animal disease but, under normal circumstances, is unlikely to be a serious hazard to laboratory workers, the community, livestock, or the environment. Laboratory exposures rarely cause infection leading to serious disease; effective treatment and preventive measures are available and the risk of spreading is limited. Infectious organisms that may be present in sewage effluent such as Escherichia coli and Streptococcus are in risk group 2.

SUGGESTED PROCEDURE RISK GROUP 1 & 2

- These risks can be controlled by basic hygiene procedures such as handling samples with disposable gloves, hand and equipment washing or use of broad-spectrum disinfectant.

RISK GROUP 3 (HIGH INDIVIDUAL RISK, LOW COMMUNITY RISK)

A pathogen that usually causes serious human or animal disease but does not ordinarily spread by casual contact from one individual to another, or that can be treated by antimicrobial or antiparasitic agents.

RISK GROUP 4 (HIGH INDIVIDUAL AND COMMUNITY RISK)

A pathogen that usually produces very serious human or animal disease, often untreatable, may be readily transmitted from one individual to another, or from animal to human or vice-versa directly or indirectly, or by casual contact.

- Risk group 3 and 4 contain more toxic biological hazards and inspectors should deal with these only under the supervision of the Canadian Food Inspection Agency or Health Canada. For a listing of infectious organisms and there Rick groups consult Appendix 3 of Part 2 of the TDGR.

The need for additional precautions should be considered as part of the risk assessment, taking into account not only the pertinent features of the biological agent and its route of transmission, but also the type of work being carried out and the likelihood of infection occurring during normal work and in the event of an accident.

ROUTES OF INFECTION AND EXPOSURE LIMITS

Micro-organisms can gain access to the body by ingestion (mouth), instillation (eyes), inhalation (respiratory tract) or via the percutaneous route (skin). While many chemicals can be absorbed through intact skin, micro-organisms cannot and only enter the body through skin that is damaged (cuts, grazes, puncture wounds) or the mucous membranes. Working practices and control measures should be based on blocking these routes of infection by the use of well established and standardized precautions. Vectors such as insect bites are another common exposure route.

There is generally no dose-response relationship and with many micro-organisms able to infect at very small doses there are no exposure limits. Therefore exposure to micro-organisms should be controlled to as low as reasonably practicable taking account of the risk.

SUGGESTED PROCEDURES

- Do not enter areas that have imminent hazards unless you have proper respiratory and chemical protective gear.
- Ensure that you practice good hygiene.
- Follow all federal, provincial, municipal and facility rules and regulations.

3.3.2 BIOLOGICAL HAZARDS IN THE FIELD

Outbreaks of Chronic Wasting Disease (CWD), Bovine Spongiform Encephalopathy (BSE) and Avian Flu may involve inspectors coming into contact with diseased animal carcasses in the course of their inspections. Inspectors who have been in close contact with infected animals or contaminated surfaces should wash their hands as soon as possible, repeating until contact with infected or contaminated animals is complete. Hand hygiene should consist of washing with soap and water for 15-20 seconds or the use of other standard hand-disinfection procedures.

SUGGESTED PROCEDURES

- Inspectors involved in the transport or disposal of animal carcasses should wear appropriate PPE.
- Protective clothing capable of being disinfected or disposed, preferably coveralls plus an impermeable apron or surgical gowns with long cuffed sleeves plus an impermeable apron.
- Disposal gloves, should be carefully removed and discarded and hands cleaned.
- Have appropriate respiratory protection, see section 1.3.4 Respiratory Equipment.
- Goggles and boots or protective foot covers that can be disinfected or disposed.

3.3.3 VECTOR BORNE DISEASES

Lyme Disease, Hantavirus and West Nile Virus are all diseases that staff that are out in the field or conducting inspections may contract. The following information is provided to mitigate the chances of contracting these diseases. Please note that the chance of contracting any of these diseases is extremely small.

LYME DISEASE

Lyme Disease is a bacteria carried by ticks. Not all ticks carry the disease. However, the disease can be serious. Symptoms include; fever, headache, muscle and joint pain, fatigue or weakness of the muscles of the face; Skin rash, especially one that looks like a "bulls eye" (may not be where the bite was); In some cases, paralysis of the feet and legs may occur within a few hours to several days.

A tick can be removed with tweezers but it is imperative that all of the tick be removed. DO NOT squeeze the tick. If possible, it is best to have medical assistance to do this.

SUGGESTED PROCEDURES

- Walk on cleared trails wherever possible.
- Wear light coloured clothing; tuck your shirt into your pants and your pants into your boots or socks.
- Put insect repellent containing 5% Permethrin onto clothing and insect repellent containing DEET on all uncovered skin.
- Frequently check your skin and clothing for ticks – early diagnosis is imperative.

HANTAVIRUS

Hantavirus Pulmonary Syndrome (HPS) is a severe illness that is normally found only in rodents, especially deer mice, but also rats and other kinds of mice. Humans get the disease when they breathe in the virus that is found in the urine, saliva or droppings of infected rodents.

Hantavirus begins as a flu-like illness. In the early stage of the disease, a person may have a fever, sore muscles, and headache, feel sick to their stomach, throw up and have shortness of breath.

SUGGESTED PROCEDURES

For most people, the risk of contracting this disease is very low. However, the following activities have been associated with the disease because they can stir up contaminated dust; occupying or cleaning previously vacant cabins or other dwellings, cleaning barns and other out buildings or trapping and/or handling rodents.

- Use gloves when handling rodents.
- Prevent rodents from getting into your home or work area.
- Put away food when hiking or camping.

WEST NILE VIRUS

WNV is a mosquito-borne bacteria that is transmitted via mosquito bites. Many people who are infected have no symptoms, do not get sick or have only mild symptoms. When infection does cause illness, symptoms will usually appear within two to 15 days. In mild cases, there may be flu-like symptoms including fever, headache and body aches. In more severe cases, symptoms of severe headache, high fever, stiff neck, nausea, vomiting, drowsiness and muscle weakness may occur.

NOTE: people over age 50 are at a greater risk of contracting this disease.

SUGGESTED PROCEDURES

- Protect yourself from mosquito bites by covering up with light-coloured clothing.
- Use mosquito repellent containing DEET.
- Repair holes and gaps in screens.
- Empty all outdoor standing water.
- Dispose of areas where standing water may accumulate such as old tires, buckets, etc.

4.0 INDUSTRIAL HAZARDS

4.1 PERSONAL PROTECTIVE EQUIPMENT

4.1.1 PPE CHECKLIST

	Coveralls	Gloves	Goggles	Hard Hat	Hearing	Life Jacket	Respiratory	Safety Boots	Safety Glasses	Safety Vest
Contaminated Fuels	•	•		•			•*	•	•	•
Detergent Compliance	•	•	•	•			dust mask •		•	
Dry Cleaning		•			•		•		•	
Farming	•	•						•		
Gasoline Compliance	•	•						•	•	•
Hazardous Chemicals	•*	•*	•				•*	•		•*
Hazardous Wastes	•	•	•*	•*			•*	•	•	•*
Lead Processing	•*	•	•*	•	•*		•*	•	•	•
New Substances	•	•					•	•	•	
Ocean Dumping	•	•		•	•*	•		•	•	
ODS/FHR	•	•					•	•	•	
PCB Destruction Feed Prep	•	•		•			•	•		
PCB Destruction Incineration	•	•		•			•*	•	•	•
PCB Storage	•	•*		•				•	•	
PCB Treatment Inspection	•	•*		•		•*		•	•	•
PCB Treatment Sampling		•	•	•			•*			•
Petroleum Refineries	•	•	•	•	•*	•*	•	•	•	
Polyvinyl Chloride Plants	•*	•	•*	•	•*		•*	•	•	•
Pulp & Paper Mills	•*	•	•*	•	•*		•*	•	•	
Radiation	•	•					•	•	•	
Stack Witnessing and Air Pollution Control	•*	•	•*	•	•*		•*	•	•	•
Wood Preservation	•		•	•			•	•	•	•

* have available

4.1.2 SAFETY PRECAUTIONS

SAFETY PRECAUTIONS FOR INDUSTRIAL INSPECTIONS

Inspectors should take the safety orientation program that most industries offer for outside contractors. If you cannot take a program, when on site you should be accompanied at all times by the industrial plant guide until you are thoroughly familiar with the site.

A combination of sirens, flashing lights, signs and placement of ropes and barriers across access points are used to indicate hazardous substances, conditions and emergencies. If you are unfamiliar with these warning signs and symbols, enlist the help of your guide. Remember that facilities will use different sounding sirens to indicate different hazardous conditions: many of these symbols are site specific; they are NOT standard.

SUGGESTED PROCEDURES

- Always follow the safety procedures and guidelines of the industry that you are inspecting. Be sure that you are familiar with all process operations and that you understand all safety precautions.
- If the site is not safe, postpone the inspection. Any unsafe condition or activity that you notice should be reported to a facility official immediately.
- Become familiar with all existing or potentially hazardous areas, conditions and substances. Know the WHMIS hazard symbols and any other warning systems used at the site and familiarize yourself with NIOSH or appropriate MSDS for hazard data and safety precautions.
- Know what continuous atmospheric monitoring devices, smoke and heat detectors the site has.
- Know the site emergency response procedures. In the event of an emergency, follow emergency response measures and the directions of site authorities.
- Hard hats must be worn at all times at industrial sites. When PPE is issued, you must wear it as instructed.

DOCUMENTATION

Ask for copies of any written processes regarding chemical hazards, safety and/or emergency procedures. These documents will provide comprehensive information on site specific hazards, chemicals and products used at the facility, correct usage of required PPE, hygiene and housekeeping practices as well as contingency plans for

emergencies, fires, explosions, spills or equipment breakdowns. Read these manuals to familiarize yourself with safety; be certain that you understand evacuation procedures. Keep this material on file for review prior to subsequent inspections.

MEDICAL ASSESSMENT

If you inspect certain industries such as lead processing plants, vinyl chloride plants or other industrial processes such as air pollution control equipment, you should receive a medical assessment prior to your first inspection and a regular assessment afterwards. Occupational health evaluations can be arranged by your supervisor or your local personnel office with the nearest public service health unit or your regional Medical Services Branch Office of Health Canada.

INTRINSICALLY SAFE EQUIPMENT AND ELECTRONIC DEVICES

Use intrinsically safe equipment only when required. All flashlights, motor equipment, etc. must be “ignition-proof” and “explosion-proof". Be aware that cell phone, pagers, PDA's, Blackberries and digital cameras are NOT intrinsically safe equipment Certain plants such as petroleum, chemical, smelters, pulp and paper, air pollution control and hazardous waste facilities may prohibit these items from the process area.

SUGGESTED PERSONAL HYGIENE PROCEDURES

- Practice good personal hygiene and follow site housekeeping standards.
- Do not eat, drink or smoke anywhere except where permitted. If you bring your lunch, leave it in your vehicle.
- Limit time spent in process areas.

SAFE SAMPLING

If you are going to be taking samples, ensure that safe access is available to sample points or outfalls; follow proper sampling techniques safely – do not take shortcuts. If you are sampling after hours, make arrangements with security; always ensure that a site official knows where you are at all times. Follow proper procedures for sampling:

- Do not leave sample bottles in the sun because of the possibility of a fire.
- Do not use the bottles for any purpose other than carrying samples.
- Carry glass bottles very carefully to avoid breaking them.
- Exercise care when sealing a sample bottle. Changes in internal pressure can accompany external changes in temperature and the sample bottle could explode or rupture.

EMERGENCY AND FIRST-AID PROCEDURES

- Know the location of first-aid stations, emergency shower stalls and eyewash stations.
- Know the contacts or numbers for emergency medical assistance.
- Consult the appropriate MSDS for first-aid information.
- You shall report all occupational accidents, illnesses and injuries to your supervisor, even if they are minor. By doing so, you will give Environment Canada the opportunity to advise other inspectors or personnel who visit the facility of potential hazardous conditions.

4.2 INDUSTRIAL HAZARDS

4.2.1 DRY CLEANING FACILITIES

PERSONAL PROTECTIVE EQUIPMENT

- gloves
- hearing protection
- respirator with air-purifying organic vapor cartridge

Close-fitting clothing should be worn when working with or around moving machinery or equipment.

HAZARDS

Key health and safety issues at dry cleaning facilities include exposure to dry cleaning solvents such as Tetrachloroethylene (PERC) and hazards from dry cleaning equipment which can include thermal burns and heat and noise stress.

Surfaces around dry cleaning machines and on waste containers are often contaminated with tetrachloroethylene (PERC).Protect yourself by wearing disposable gloves when touching any surface. Although not common it is possible for poorly operating equipment to cause elevated PERC levels in air. If there is a smell of PERC, test the

air concentration with indicator tubes such as Drauger or Gastech. For levels above 100 ppm, respiratory protection should be worn.

SUGGESTED PROCEDURES

- Avoid exposure to tetrachloroethylene and other dry cleaning solvents through inhalation or direct skin contact.
- Avoid exposure to contaminated laundry.
- Be aware of mechanical hazards from the presence of conveyors and other equipment on site.
- Be aware of potential for heat stress or thermal burns from pressing machines, irons and hot water pipes.

4.2.2 FARMING

PERSONAL PROTECTIVE EQUIPMENT

- coveralls – washable or disposable
- gloves – washable or disposable
- rubber boots – washable or disposable

When conducting farm inspections you should follow safety procedures taken by practicing veterinarians for your own safety as well as to prevent the spread of pathogens or pest species. During animal disease episodes contact the Canadian Food Inspection Agency before visiting farms.

Supplies recommended for staff and field vehicles:

- antibacterial handy wipes
- antibacterial waterless soap
- disinfectant in solution (e.g. Virkon)

- hairnet
- heavy gauge garbage bags
- long handled scrub brush
- pail or tub with lid to contain disinfectant solution
- paper towels
- water for additional solution if needed

HAZARDS

The following are examples of common hazards that inspectors could come across in farming and livestock operations; animal contact (kicks, bites, stepped on), slips and falls (wet or uneven terrain, slippery surfaces indoors and outdoors), contact with moving equipment (transport vehicles, tractors, hay balers and skid steer loaders), contact with cleaning and feeding equipment (feed augers), and contact with other equipment (electric pumps, hoisting equipment).

CHEMICAL HAZARDS

A variety of gases, including nitrogen dioxide ($N0_2$), hydrogen sulphide (H_2S), ammonia (NH_3), carbon dioxide ($C0_2$) and methane (CH_4), as well as dusts, fibres and fumes are produced during many routine farm operations. These gases are commonly produced in areas such as silos and manure pits.

Pesticides (herbicides, insecticides and fungicides), fertilizers (ammonium nitrate), sanitizers (calcium hypochlorite) and battery acid are common farm chemicals which produce harmful fumes.

- Chemical contacts (burns, sensitization).
- Pharmaceutical contacts (inoculation products, hormones, antibiotics, vaccine).
- Exposure to toxic gases and displacement of oxygen (ammonia, hydrogen sulphide, excessive levels of carbon dioxide).
- Exposure to dust levels (environmental dust from feed, dirt, animals).

BIOLOGICAL HAZARDS

- Zoonotics (diseases transmittable from animals to humans).
- Moulds (damp conditions, wet feed/grain/bedding).
- Bacteria (damp conditions, rotting material).
- Animal dander (flakes of skin from animal hides, hair, feathers).

CONFINED SPACES

The following are examples of confined spaces that can be found when conducting farming inspections, see 3.2.3 Guidelines for Entry into Confined Spaces for further details.

- empty water well
- grain bin
- holding tank
- manure pit
- septic tank
- silo

SUGGESTED PROCEDURES

1. To avoid movement of barnyard materials on tires or under carriage, park your vehicle away from the barn area. Some farms may not allow you to drive in past a certain point, but most will not control the laneway. Park by the house.
2. If going near the barn/barnyard change into clean coveralls.
3. Put on disinfected boots (disinfect in and out).
4. Wear disposable gloves when handling equipment or touching surfaces.
5. Although it is unlikely that inspectors would be required to enter the barn, be prepared to have a shower; wear a helmet or hair net if required.
6. When done, brush boots in disinfectant first, then remove coveralls.
7. Some operators may provide disposable clothing and keep it for disposal.
8. Avoid unnecessary contact with livestock, their manure and feed. Avoid recently emptied barns. Do not touch farm pets; they are in routine contact with livestock, the barn and barnyard environment.
9. See information on confined spaces and biological hazards in chapter 3.

4.2.3 LEAD PROCESSING FACILITIES

PERSONAL PROTECTIVE EQUIPMENT

PPE FOR LEAD DUST CONTAMINATION

- gloves
- hearing protection
- safety boots
- safety glasses

Wear clothing made of material designed to reduce dust retention; specially treated cotton or nylon fibres (preferably cotton) developed for this purpose. Coveralls (or other clothing) must not have cuffs, pleats or pockets in which lead dust may collect.

Clothing (including footwear) should be removed carefully at the end of the inspection; never shake clothing after it has been used in contaminated areas; handle clothing as little as possible; double bag all items, seal and label the bag to indicate lead contamination; do not take clothing home.

PPE FOR LIQUID ORGANIC LEAD COMPOUNDS

- Clothing and gloves – wear impermeable material such as PVC, nitrite or neoprene.
- High exposure incidents (spills) – wear an enclosed air-supplied suit made of impermeable material.

RESPIRATORS FOR LEAD (OTHER THAN TEL AND TML)

AIRBORNE LEAD CONCENTRATION	RESPIRATOR REQUIRED
< 1.5 MG/M^3	Replaceable filter-type, air purifying fume respirator or single-use respirator suitable for lead dust, fumes and mist.
< 15 MG/M^3	Powered air purifying positive pressure fume respirator.
< 15 MG/M^3	Positive pressure supplied air respirator.
ESCAPE	Self-contained breathing apparatus with a full facepiece operated in pressure demand (SCBA).

HAZARDS

During an inspection or while sampling at secondary lead smelter facilities you could be exposed to high levels of:

- Airborne toxic dusts or fumes containing lead and other chemicals.
- Lead-containing vapours or mists, particularly from liquid organic lead compounds.
- Other flammable and explosive hazards.

RULES OF HYGIENE FOR SECONDARY LEAD SMELTER FACILITIES

1. Remove all contaminated clothing before entering areas in the plant that are not lead areas or are designated as clean or eating areas.
2. Remove contaminated clothing carefully; minimize the spread of contaminated dust and never shake your dirty clothes or PPE.

SAFETY INFORMATION

1. Portions of the plant may have potentially explosive dusts or vapours. Never take battery-powered portable equipment into portions of a plant where there are potentially explosive dusts and/or vapours; use only intrinsically safe equipment; lighters and matches should be surrendered to plant personnel or left in your vehicle.
2. Ensure that all probes used in gas streams downstream of an electrostatic precipitator or gas streams containing potentially explosive dusts are electrically bonded.
3. Be careful around high voltage equipment, especially electro-static precipitators. The areas adjacent to the process vents and discharge points should be avoided, since plant upset may allow emissions to escape to the atmosphere without any control.
4. In stack witnessing high lead exposure levels can result from:

- Any sudden downdraught from nearby stacks and vents.
- High concentrations that build up in partially confined areas formed by weather enclosures, walkways between compartments, fan houses and areas adjacent to large ducts.
- Entering lead processing work areas.
- Gases leaking out of sampling ports under positive pressure.
- Fugitive emission leaks from the area immediately surrounding the air pollution control system.

• Rising clouds of toxic pollutants released from intermittent process operations.

Know the locations of all confined spaces; if you are uncertain of these, ask a plant official to identify the confined spaces for you. Confined spaces for the lead processing industry include weather enclosures on hoppers and roofs, fan houses, pump houses, walkways between compartments of the collector, protected areas near large ducts, areas on top of floating roof storage tanks and enclosed air pollution control devices. See section 3.2.3 Guidelines for Entry into Confined Spaces.

4.2.4 MINING OPERATIONS

PERSONAL PROTECTIVE EQUIPMENT

- coveralls
- dust mask
- fall protection
- gloves
- hard hat
- hearing protection
- safety boots
- safety glasses/goggles

Close fitting clothes should be worn when working with or around moving machinery or equipment.

Inspectors conducting inspections at mining operations can be exposed to both chemical hazards (e.g. silica, coal mine dust, diesel engine exhaust, methane, hydrogen sulphide, oxygen deficiency and toxic fumes from blasting operations) and physical hazards such as noise, ionizing radiation, vibration and heat stress.

HAZARDS

- Inspectors are subject to blasting hazards in underground mines and open pits. Be sure to use hearing protection as required.
- Know and use the correct visibility aids for that mine e.g. flags or flashing light.
- Be aware of the use of cyanide in gold milling and tailings impoundments as well as radioactive ore at uranium mines.
- Corrosives and oxidizers used in the gold and uranium mill processes.
- Vapor and gas hazard are present in underground, milling and smelting processes. Airborne contaminants such as rock dust, are produced during drilling operations, mineral getting, loading, crushing of rock or ore and blasting.
- The use of diesel engines underground can produce a mixture of hazardous gases, vapors and particulates.
- Exposed ground cables near remote areas like tailings impoundments can produce electric shock. Electrical equipment in mill buildings, remote power generation or supply areas near open pits or tailings impounds can also produce shock or static. Be aware of electrical hazards and avoid these areas.
- There can be exposure to radioactivity at uranium mines through exposure to ore at the mining and milling phases, as well as effluent and wastewater sampling. Follow mine health and safety procedures regarding radiation protection and monitoring.
- Animal attack from large animals such as grizzly bear, black bear and moose are a hazard in remote or bush areas around open pits, tailings impoundments and effluent sample sites.

SUGGESTED PROCEDURES

- Be aware of footing on muddy mine roads, climbing steep embankments, quick sand at tailings impoundments and streams or rivers.
- Know the scheduled blasting times. Avoid active mining areas where possible.
- Be aware of explosive gases in confined spaces, e.g. underground mine passages, sumps, pump houses, mill buildings.
- Ask mine personnel about wildlife in the area you are working. Where necessary stay close to your vehicle or avoid the area.
- To prevent insect bites minimize exposed skin area and use DEET to prevent bites or stings.
- Be aware of the toxic effects from contact with certain plants like poison ivy, poison oak and stinging nettle.
- Understand the driving requirements at the mine site.

CONFINED SPACES

There are confined space hazards from asphyxiation in underground cave-ins, oxygen depletion in underground stopes and drifts, water and waste water collection and vapour and gas hazards in underground milling and smelting processes.

DROWNING HAZARD

Be aware of drowning hazards near banks of tailings impoundments, working in boats on tailings impoundments, rivers and lakes, or while conducting inspection or sampling activities near the banks of fast flowing streams and rivers, especially during high rainfall.

4.2.5 OCEAN DISPOSAL INSPECTIONS

PERSONAL PROTECTIVE EQUIPMENT

- flotation suit or life jacket
- gloves
- hard hat
- hearing protection
- safety boots
- safety glasses
- sun screen

HAZARDS

Drowning, slipping and getting trapped or falling between two vessels while transferring at sea are some of the hazards that can be encountered on ocean disposal inspections. You should always wear a flotation device while conducting this type of inspection. Slips, trips and falls on slippery, icy or greasy surfaces of ships, barges, fish plants, are common. Other dangers include the hazards of moving equipment, including cranes, booms, cables and machinery. High levels of noise and exposure to the sun which increase the effects of sunburn, are other hazards you may encounter.

SUGGESTED PROCEDURES

- Every inspector conducting operations on the water should wear a flotation device. For cold or particularly wet jobs, a flotation suit or flotation jacket may be more appropriate. Inspectors must wear a flotation device during transit in small vessels and whenever on a dock or on board a barge.
- Never stand below a person climbing a ladder. Always wait until a ladder is vacated before commencing your ascent or descent.
- Always keep your hands inside the gunwales (sides) of a boat. Don't grip the gunwale.
- Never let any part of your body come between a boat and any other solid object.
- Never stand in a bight of a rope or cable. Never stand beside or directly behind a tensioned rope or cable.
- Never stand under a crane or boom in operation.
- If you are required to take a sample from a barge, use extreme care! The material that you may think is stable or that appears to be secure may be extremely unstable.
- Use extreme caution when transferring between two vessels at sea. This can be an extremely dangerous operation for people who are unfamiliar with the proper technique of transferring. Severe weather conditions can create additional hazards, even for the skilled ocean dumping inspector.
- Keep your hands out of machinery and away from electrical equipment.

4.2.6 PETROLEUM REFINERIES

PERSONAL PROTECTIVE EQUIPMENT

- coveralls or overalls – NOMEX, flash-resistant
- gauntlets – heat-resistant or chemical-protective when handling caustic soda, petrochemicals and other corrosive materials
- gloves – abrasion resistant
- hard hat
- hearing protection
- life jacket
- safety boots

Coveralls should be worn whenever practicable. Some refineries require these in process areas, they may also require that other clothing be made of natural materials.

Life jackets should be worn for all inspection activities around docks and on oil recovery boom boats. Life jackets must also be worn by inspectors when working over water such as lagoons and treatment ponds or within five feet from the face of a wharf.

HAZARDS

Exposure to hazardous substances includes risk of exposure to: toxic solids, liquids, vapours, gases, mists, fumes and dusts from hazardous materials, chemicals and designated substances such as caustics, acids, tetra-ethyl lead and hydrogen sulphide. Be aware of drowning hazards when inspecting around shorelines and wharves. Excessive noise levels are common, as is frequent movement of forklift trucks and hand trucks in the plant area. You should also be aware that fires and explosions can be caused by the ignition of petroleum products from static electrical charges, improper equipment or sampling techniques.

SAFETY INFORMATION

1. When on site, you should be accompanied by a plant official at all times.
2. Ask your guide for a copy of any written safety or emergency procedures. Read these manuals and be certain that you understand the evacuation procedures.
3. Know the hazards of all chemicals in the inspection areas. Ask your guide for a copy of any booklets or guides that may contain comprehensive information on the chemicals and products used at the plant.
4. You are not permitted to use matches, butane lighters, etc. anywhere in the plant area.
5. Use intrinsically safe equipment only. All flashlights, motor equipment, etc. must be “ignition-proof” and “explosion-proof". This means no cell phones, pagers, PDA's, digital cameras or other electronic devices.
6. Avoid entry into confined spaces. If you must enter a confined space, You are required to have departmentally approved training and follow the recommendations in section 3.2.3 Confined Spaces.
7. Always check the surface you are walking on for open trenches, missing grates and misplaced manhole covers.
8. Keep behind all traffic pylons and barricades. Be aware of moving vehicles and equipment.
9. Enlist the help of your guide if you are unfamiliar with the warning signs used at the site (sirens, flashing lights, signs, placement of ropes and barriers).

4.2.7 POLYVINYL CHLORIDE (PVC) INDUSTRY

PERSONAL PROTECTIVE EQUIPMENT

STACK SAMPLING PERFORMED AT INCINERATOR STACK

- coveralls – Nomex
- face covering where required
- fall arrest equipment
- gloves
- hard hat
- respirator – see below
- safety boots
- safety glasses
- vapour mask using organic cartridges

Totally enclosed air-supplied suit made of impermeable material must be used for high exposure incidents (including spills).

Protective clothing should be made of impermeable material such as PVC, nitrite or neoprene.

RESPIRATORS

Follow the guidelines of the industry that you are inspecting. The table below gives Ontario Occupational Health and Safety Act requirements for specific concentrations of airborne vinyl chloride. Follow the respirator requirements or guidelines of the facility that you are inspecting if they offer at least the protection provided by the table below. Always wear your respirator when a reactor is opened or when looking into a reactor opening.

AIRBORNE CONCENTRATION	RESPIRATOR REQUIRED
LESS THAN OR EQUAL TO 26 MG/M^3 OR 10 PPM	Air purifying chemical cartridge or canister-type respirator with half or full face piece.
GREATER THAN 26 MG/M^3 OR 10 PPM	Positive pressure supplied air respirator.
ESCAPE	Gas mask with canister to protect against vinyl chloride or Escape-type SCBA.

Plant personnel will do the actual sampling; taking reactor and slurry samples during annual inspection. You should verify the sample plan being used by plant personnel. If the incinerator is functioning properly VCM levels should be zero. The use of intrinsically safe equipment is necessary.

HAZARDS

PVC is produced from vinyl chloride monomer gas; it is a very toxic product. According to NIOSH the time weighted average exposure limit is 1 ppm. The greatest hazards arise from bulk storage, pressure transfer and process reactions.

The main hazards are:

- Chlorine toxicity.
- Toxic fumes from vinyl chloride monomer (VCM) gas.
- Fire and explosion hazards from ethylene, ethylene dichloride and VCM.
- Other exposure, flammable and explosive hazards from additives to PVC (such as plasticizers, colourants, flame retarders, stabilizers and fillers) or substances formed during the manufacturing process.

PHYSICAL EFFECTS OF SHORT-TERM (ACUTE) EXPOSURE

Vapours can produce dizziness, light-headedness, euphoria, nervousness, drowsiness, headache, blurred vision, impaired hearing and confusion. Vapours are moderately irritating to the nose, eyes and throat. If you experience any of these symptoms, leave and seek medical attention from a hospital immediately.

If liquid vinyl chloride comes in contact with the skin, it may cause frostbite because it evaporates quickly. If liquid vinyl chloride comes in contact with the eyes, it can produce immediate pain, severe irritation and permanent damage.

Extremely high concentrations (greater than 70,000 ppm) may cause unconsciousness and death.

CODES OF HYGIENE FOR PVC PLANTS

- Wear the proper protective equipment for the hazard.
- Absolutely NO sparks, flames or other ignition sources are permitted in designated areas; most process materials are extremely flammable!
- Use only intrinsically safe equipment and flashlights. Leave cell phones, pagers, blackberries, GPS, laptops, cameras and PDA's in your inspection vehicle.

- Practice good personal hygiene and follow plant housekeeping standards.
- Limit time spent in process areas; wash hands thoroughly after handling material.
- Know the locations of emergency protective equipment in the event of sudden leaks, spills or fire.
- If clothing becomes contaminated, remove it promptly; keep contaminated clothing in closed containers.

OTHER SAFETY WARNINGS AND PRECAUTIONS

1. Potentially high exposures to vinyl chloride monomer can result during reactor openings. Do not stand too close to reactors while the operator cracks the seal. Do not look into a reactor without wearing your respirator. Do not look directly into a reactor while wearing loose safety hats or jackets with items in pockets that may fall into the reactor.
2. Installation of test ports to facilitate the measurement of static pressure, temperatures and oxygen concentrations while the equipment is operating may result in an explosion.
3. For control systems that do not have test ports, an inspector must never demand that such ports be installed while the equipment is operating.
4. Often ports are at dangerous locations. DO NOT attempt to use such ports and DO NOT ask plant personnel to make these measurements.
5. Plant upset may allow emissions to escape to the atmosphere without any control. Avoid the areas adjacent to the process vents and discharge points.
6. Confined spaces are extremely dangerous areas and it is possible to enter into them unaware. See section 3.2.3 Guidelines for Entry into Confined Spaces.
7. High pollution exposure levels. Follow the specific safety recommendations covered in the Stack Witnessing section 4.2.10.
8. Portions of the plant may have potentially explosive dusts or vapours. Battery-powered devices can set off an explosion. Never take battery-powered portable equipment into portions of a plant where there are potentially explosive dusts and/or vapours.
9. Ensure that all probes used in gas streams downstream of an electrostatic precipitator or gas streams containing potentially explosive dusts are electrically bonded.

ACCIDENTAL RELEASE PRECAUTIONS FOR SPILLS OF VCM COMPRESSED GAS:

- Do not touch spilled material.
- Evacuate area.
- Allow trained personnel to contact the appropriate fire and/or emergency services.
- Allow trained personnel to supervise cleanup.

Liquid vinyl chloride, when spilled, will spread on the surface of the ground or a water body and evaporate to form a visible vapour cloud. An initial release will result in a large release of vapour (puff). As the vinyl chloride cools as a result of the evaporation, the vapour release will slow down. Particularly if spilled on water, the vapour cloud will tend to hug the surface and spread rather than lifting off the surface and dispersing.

EMERGENCIES

Follow established safety procedures in the case of emergency leaks or sudden fugitive emissions. Gas leaks can persist as invisible, high velocity streams for long distances and contact with them can cause serious or fatal injuries.

Do not attempt to fight a VCM gas fire. Follow the established fire emergency and evacuation plans at the facility. Ask your guide for assistance if required.

VINYL CHLORIDE MONOMER (VCM) GAS AND LIQUID FIRST AID

INGESTION – No food or drink in work areas. Get medical aid immediately.

INHALATION – Do not attempt a rescue until you have summoned for help; if you are going to assist in a rescue, use the buddy system and be sure you have the appropriate PPE. Remove source of contamination or remove victim to fresh air; if breathing has stopped, trained personnel should begin artificial respiration (avoid mouth to mouth contact) or, if the heart has stopped, CPR immediately; contact physician immediately.

SKIN – As quickly as possible, flush contaminated area with lukewarm, gently running water for at least 20 minutes; under running water, carefully cut around clothing that sticks to damaged skin and remove rest of garment; obtain medical attention immediately.

EYES – Immediately flush contaminated eye(s) with lukewarm, gently flowing water for 20 minutes, holding the eyelid(s) open; obtain medical attention immediately.

4.2.8 PULP AND PAPER MILLS

PERSONAL PROTECTIVE EQUIPMENT

MILL TOURS AND AUDITS

- respirator for CI_2 and other gas leaks

SAMPLING

- coveralls
- gloves – impervious
- hard hat
- hearing protection
- respirator – see below
- safety boots
- safety glasses

Ensure that you have no loose clothing.

Respirator cartridge is a combination acid gas, organic vapor and particulate. Check to insure the acid gas cartridge is good for chlorine. See section 1.3.4 Respiratory Equipment

HAZARDOUS CHEMICALS

STRONG ACID AND CAUSTIC CHEMICALS	Sulfur compounds (hydrogen sulphide, methyl mercaptan, dimethyl sulphide, dimethyldi sulphide), sulfur dioxide, chlorine, chlorine dioxide, terpenes and wood dust.
POISONOUS GASES	Hydrogen sulphide and other asphyxiates such as ammonia, chlorine, chlorine dioxide, sulphur dioxide and methyl mercaptan.
FLAMMABLE OR COMBUSTION SUPPORTING GASES	Oxygen, natural gas.
EXPLOSIVE GASES	Natural gas.
CARCINOGENS	As identified in certain studies.
WOOD DUST	
FLAMMABLE LIQUIDS	Fuel oils, liquefied natural petroleum gases, solvents.

Halt work immediately if you suffer any non-specific symptoms of exposure such as: headache, nausea, chills, fever, clammy skin, drowsiness, chest pain, rapid pulse, abdominal cramps or digestive system disorder, shortness of breath, lightheadedness, irritation (eyes, throat, skin, etc.), sudden aches or pains, fatigue and/or exhaustion. Seek medical attention immediately.

SAFETY INFORMATION

1. Request written material to familiarize yourself with mill safety precautions, hazard data, and first-aid measures.
2. Be certain that you understand mill evacuation procedures.
3. Take the safety orientation program which most pulp mills have for contractors. If you cannot take a program you should be accompanied at all times by a mill guide.
4. Wear respirators in all chemically contaminated areas.
5. Always assume that any drips or sprays you see are hazardous, even though 99.9% of the time they are not; watch out for steam leaks.
6. When you enter any area, take a moment to scan the floor, walls, ceilings and to familiarize yourself with the closest exit. Your guide can point out alternate routes that should be taken to avoid hazards. Always check the surface you are walking on for open trenches, missing grates and misplaced man-hole covers.
7. Be on the look out for vehicle activity, particularly fork lift trucks. If the plant has designated safe walking areas delineated by floor markings, where practical use them.
8. If you are going to be taking samples, ensure that safe access is available to sample points or outfalls. If you are sampling after hours, make arrangements with security; always ensure that a mill official knows where you are at all times.

9. Request identification of warning sounds used at the facility. Remember that mills will use different sounding sirens to indicate different hazardous conditions: many of these symbols are site specific; they are NOT standard.

4.2.9 RADIATION HAZARDS

PERSONAL PROTECTIVE EQUIPMENT

- coveralls
- gloves
- respirator
- safety boots
- safety glasses

Inspectors may be required to conduct inspections at industrial sites and medical facilities where sources of radiation are present. This section presents basic information to help protect the health and safety of inspectors and to reduce their potential exposure to sources of radiation. Dosimeter/badge monitoring may be required depending on possibility of exposure.

TYPES OF RADIATION

Naturally Occurring Radiation Material (NORM) is radiation that is present in the environment and can be found in various types of bedrock and soils and at various concentrations. It consists of three types of ionizing radiation Alpha, Beta and Gamma. The average background is 2 mrem/hour.

Radiation can be either “ionizing” or “non-ionizing." Ionizing radiation, such as x-rays and gamma rays, has enough energy to change the make-up of materials at the atomic or molecular level. Non-ionizing radiation, such as microwaves or radio waves, does not change the structure of atoms.

SOURCES OF RADIATION

During the course of routine inspections, inspectors may also come across (NORM) in industrial operations such as:

- Mining – most significantly from uranium mining, radiation may be present in waste rock and tailings piles.
- Waste water treatment plants – radiation is often used in treatment and filtration of water and may be present from various sources in the receiving waters at the plant.
- Oil and gas production – radiation may be present in the fluids and gases generated at hydrocarbon production facilities. Radiation sources may also be present in pipeline leak detection equipment.
- Sources of ionizing radiation that inspectors may be exposed to include x-rays used in medical and dental facilities and gamma rays used in cancer treatment. Other sources include generation of electricity from both coal and nuclear power plants, the transportation of nuclear materials and the storage of nuclear wastes.

PROTECTION FROM RADIATION SOURCES

All exposures to ionizing radiation carry a risk of biological damage, although this risk decreases as the exposure decreases. Radiation exposure should be reduced to as low as reasonably achievable. There are three basic forms of protection from radiation: time, distance and shielding.

The amount of time spent near a source of radiation affects the amount of exposure received. Therefore, the less time spent near the source, the less the accumulated dose.

Radiation exposure also decreases with increasing distance from the source. Therefore, the farther the distance from the radiation source, the less the amount of exposure will be.

Radiation can be blocked by mass. A shield (specific to the type of radiation) will limit the exposure to radiation.

The most common pathway for exposure is through the transfer of radio active materials from waste or dust onto the clothing, hands or boots of personnel. In order to limit exposure it is important to remove expeditiously this material through hand washing and washing or disposal of protective clothing.

The Canadian Nuclear Safety Commission (CNSC) regulates radioactive materials, sites and equipment. Inspectors who visit industrial sites can contact CNSC to determine the nature of protection needed. In some regions the CNSC will refer you to their provincial counterparts particularly if you require assistance.

If you have monitoring equipment at any site and you are picking up readings of > 2 mrem/hour:

- immediately stop all activities
- shield yourself from the source if known
- evacuate the area
- call CNSC personnel

Do not enter areas where there is a radiation hazard unless:

- You have a need to be in that location.
- You know that there will be no danger.
- You are wearing a passive dosimeter that will record any exposure to radioactivity.
- You follow an SOP as required by Atomic Energy Canada.
- You are accompanied by a site official.
- You ensure you do not ingest anything while in close proximity to the source
- You minimize your time in the potential hazard area.
- You take a reading of your dosimeter (and record it) before and immediately after leaving the hazard area.
- You practice diligent personal hygiene after leaving the area.

4.2.10 STACK WITNESSING AND INSPECTIONS OF AIR POLLUTION CONTROL SYSTEMS

PERSONAL PROTECTIVE EQUIPMENT

PPE FOR STACK WITNESSING AND INSPECTIONS OF AIR POLLUTION CONTROL SYSTEMS

- gloves
- hard hat
- hearing protection
- safety boots
- safety glasses

Wear clothing made of material designed to reduce dust retention; specially treated cotton or nylon fibres (preferably cotton) developed for this purpose.

PPE FOR INSPECTIONS OF FACILITIES CONTAINING HAZARDOUS MATERIALS

- Clothing should be made of impermeable material such as PVC, nitrite or neoprene and provide hand and face covering where required.
- For high exposure incidents – a totally enclosed air-supplied suit made of impermeable material must be used.

Respiratory Equipment – The selection of respiratory equipment should be based on factors such as the concentration of contaminants, forms of contaminants (gas, vapour, fume, dust, etc.) and oxygen levels of inspection areas.

HAZARDS

- Acute exposure to: toxic gases – aromatic hydrocarbons, chlorinated hydrocarbons, nitrogen oxides and sulphur dioxide. Chemical asphyxiants – hydrogen sulphide and carbon monoxide. Toxic fumes and dust containing asbestos, lead, beryllium and arsenic.
- Asphyxiation due to free flowing solids discharged from hopper access hatches; oxygen-deficient atmospheres.
- Inhalation of bacteria, viruses and fungi from material being handled prior to or by the control system.
- Burns from contact with acid spray, steam leaks, hot objects, chemicals, highly alkaline dusts and liquids.
- Absorption of hazardous chemicals through contact with unprotected skin.

RULES OF SAFE HYGIENE WHEN WORKING AROUND AIR POLLUTION CONTROL SYSTEMS

1.Practice good personal hygiene and follow plant housekeeping standards.

2. Never take sparking objects such as matches and butane lighters into any facility.

3. Limit time spent in contaminated areas.

4. Remove all contaminated clothing before entering areas in the plant that are designated as clean or eating areas.

5. Remove contaminated clothing carefully; minimize the spread of contaminated dust and never shake your dirty clothes or protective equipment.

SPECIFIC SAFETY WARNINGS AND PRECAUTIONS FOR STACK WITNESSING

STACK POLLUTION

- High pollution exposure levels can result from any sudden downdraught from nearby stacks and vents. Monitor the wind direction for any changes and place yourself upwind of the stack.
- High concentrations build up in the area immediately surrounding the air pollution control system and partially confined areas formed by weather enclosures, walkways

between compartments, fan houses and other areas adjacent to the stacks and large ducts. Keep your respirator on; if not in use, it should be attached to you.

- Be alert to toxic pollutants released from sampling ports, intermittent process operations and fugitive emissions.

STACK HEIGHTS/SAMPLING LOCATIONS

- Severe physical injuries or fatalities can result from falls. Remember: sampling locations are often more than 50 feet above ground.
- If you are climbing stacks, ensure that the ladder, usually welded to the stack, is sturdy and that a safety rail encompasses the entire catwalk or platform; many stack ladders and elevated platforms have weight restrictions or limits: never exceed these limits.
- Do not attempt to climb stairs or ladders too quickly or in an unsafe manner; only one person should climb or descend the ladder at a time; have a safety harness available.
- Access to the sampling ports should be safe. Take your time and do it safely! Use a safety harness if necessary.
- Do not attempt to climb stacks if you have a fear of heights or suffer from vertigo; report these health conditions to your supervisor.
- Be careful if you are witnessing: there is a potential for stack sampling teams to drop equipment from elevated platforms.

HEAT STRESS

Avoid contact with un-insulated hot objects, including air pollution stacks.

HAZARDS INSPECTING AIR POLLUTION CONTROL SYSTEMS AND EQUIPMENT

Sudden and dangerously high exposure levels to hazardous fumes, dusts, gases and vapours or severe burns can result from:

- Any sudden downdraught from nearby stacks and process vents.
- Gases leaking out of sampling ports under positive pressure.
- Fugitive emission leaks from the area immediately surrounding the air pollution control system.

- Remember that baghouses do not remove gases and vapours! If a baghouse is located downstream of a blower, the force of a door opening under pressure can cause lethal consequences. Never open baghouse inspection doors; use caution when passing in front of them.
- Rising clouds of toxic pollutants released from intermittent process operations such as baghouses.
- High speed mixing devices, fans, blowers and other process equipment which appears to be vibrating or operating in an abnormal fashion.
- Plant upset may allow emissions to escape to the atmosphere without any control. Whenever possible, avoid areas adjacent to process operations, vents and discharge points.

SUGGESTED PROCEDURES

- When outdoors, monitor the wind direction for any changes and place yourself upwind of stacks.
- Know the location of all process vents and pollution control discharge points; be alert to fugitive emissions and leaks from process vents and sampling ports; avoid entering process areas.
- Keep your respirator on; if not in use it should be attached to your belt.
- Be alert to all intermittent process operations.
- Take care around high voltage equipment, especially electro-static precipitators.
- Portions of the plant may have potentially explosive dusts and/or vapours. Flashlights, pH meters, thermocouples and other battery-powered devices can set off an explosion. Never take battery powered portable equipment into portions of a plant where there are potentially explosive dusts or vapours.
- Ensure that all probes used in gas streams downstream of an electrostatic precipitator or gas streams containing potentially explosive dusts are electrically bonded.
- Installation of test ports to facilitate the measurement of static pressure, temperatures and oxygen concentrations while the equipment is operating may result in an explosion. For control systems that do not have test ports, an inspector must never demand that such ports be installed while the equipment is operating. DO NOT look directly into an open port. Particulate and other contaminants may be blown into your eyes (even while wearing safety glasses).
- Do not attempt to climb stairs or ladders too quickly or in an unsafe manner. Ensure the bottom of your boots or gloves are not covered with grease, oil or any other contaminate which may contribute to the likelihood of slipping.
- Always secure yourself to the platform or other secure location with a harness.

- Be absolutely certain that you can contact someone if you need help or are in trouble.
- Learn the warning codes and sirens used to indicate specific plant functions such as blasting or emergencies such as plant fires, chlorine releases, ammonia releases and vinyl chloride releases.

CONFINED OR ISOLATED SPACE

Most air pollution control equipment is at isolated and elevated locations of plants. Permanent and portable ladders are often required to access these locations; you may have to cross elevated and non-secured roofs, catwalks and walkways. Rapid exit from these locations is rarely possible; further more, they are often dark or dimly lit and full of trip hazards such as cables, hoses and debris. Rescue of injured personnel can be very difficult and time consuming.

Before entering isolated or elevated locations, ensure that they are safely accessible, that you know all of the potential hazards and that you are properly equipped.

See section 3.2.3 Guidelines for Entry into Confined Spaces.

4.2.11 WOOD PRESERVATION FACILITIES

PERSONAL PROTECTIVE EQUIPMENT

- coveralls
- chemical splash goggles
- dust mask or respirator
- gloves (nitrile, natural rubber, neoprene, coated vinyl or PVC)
- hard hat
- rubber boots
- safety boots
- safety glasses
- safety vest

Close-fitting clothing should be worn when working with or around moving machinery or equipment.

SUGGESTED PROCEDURES

- Potential health and safety hazards of leaking vessels include poisonings, suffocations, chemical or thermal burns and explosion hazards.
- Stay on designated trails and pedestrian areas.
- Slipping hazards – such as product or wood waste on indoor floor surfaces. Footing on muddy roads, climbing steep embankments at facility.
- Wash thoroughly after skin contact and before eating, drinking, use of tobacco products, or using restroom.
- Leave PPE and equipment at the facility to avoid transfer of contamination outside the work area.

CHEMICAL HAZARDS

Exposure to wood preservation chemicals such as chromated copper arsenate (CCA) and pentachlorophenol (PCP) and organometallic preservatives such as alkaline copper quaternary (ACP) and copper azole (CA-B) can be harmful to inspectors, so appropriate measures must be taken when conducting inspections at wood preservation facilities.

5.0 HAZARDOUS COMMODITIES

5.1 HAZARDOUS COMMODITIES INSPECTIONS

In all types of industrial and commercial activities inspectors routinely sample regulated hazardous commodities. These substances are mostly dangerous goods and can be hazardous. This section covers the following substances or goods: PCBs, hazardous wastes, detergents, fuels, ozone depleting substances and substances new to Canadian commerce.

5.1.1 CONTAMINATED FUELS

PERSONAL PROTECTIVE EQUIPMENT

- coveralls – Nomex
- gloves – disposable nitrile and heavy outer gloves, or neoprene gloves
- hard hat
- respirator equipment with applicable organic vapour filters
- safety boots with non-sparking soles and no bare steel toes
- safety vest
- splash or safety goggles

SUGGESTED PROCEDURES

1. Never sample a trailer if you feel there are any unsafe conditions. Conduct your work at a controlled pace and do not allow the truck driver to hurry you. For inspectors working at night (e.g. the night shift of a border investigation), there are higher risks of accidental injury from decreased visibility, fatigue, cold and damp weather.
2. If inclement weather conditions (especially electrical storms) make any of the inspection procedures dangerous or unsafe, stop the inspection immediately. Always have rain gear readily available and dress appropriately for night shifts and cold or freezing weather.
3. Avoid risk of physical injury from moving vehicles by installing traffic pylons and by keeping alert. Wear the mandatory PPE, including a high-visibility vest.
4. Use only non-sparking tools and intrinsically safe (non-explosive) analytical and safety equipment at the site. This includes an intrinsically safe (non-sparking) flashlight. Turn off and leave all pagers, GPS, cell phones, PDA's, digital cameras and other technology products in your vehicle.
5. Be aware of flammable hazards from the contents of the truck. No matches, butane lighters, ignition source, spark or flame is allowed within 15 metres of any tanker truck or the inspection truck where samples and equipment are stored. Smoking is prohibited at the inspection site.
6. Before sampling any trailer ensure that it is securely parked and the ignition is off – ensure that all traffic cones are in place.
7. Ensure that the trailer or truck is properly grounded, see section 3.2.2 Electrical Hazards.
8. There must be at least 2 persons per truck being sampled: one inspector to climb the trailer and take the sample and another to assist from the ground. Use care when climbing or descending from tanker trucks, all vehicle surfaces can be greasy and slippery.
9. Inspectors require fall protection to work on top of trailers that are higher than 2.4 meters.
10. Use a step ladder for trailers with high ladders. Do not mount the trailer by climbing on the frame, tires, etc. Do not climb the trailer with sampling equipment in hand. Climb half way and have the other inspector hand you the necessary equipment and supplies, place them securely on top of the trailer and climb to the top.
11. Be careful when mounting, walking on or descending from the trailer – your view will be restricted by your respirator and the height of the truck.
12. Avoid exposure to toxic and corrosive fuels and their vapours.
13. Do not attempt to open an unfamiliar hatch. Ask the driver instead. Never sample from a trailer hose or valve. Always sample from the top.

14. Be aware of the presence of automatic opening pressure release valves. If valves are venting, flammable vapours may be present during sampling. Check with the driver before sampling.
15. Ensure you bond sampling equipment such as a sample thief, sludge judies, weighted bottles, COLIWASA etc. to the trailer by keeping the equipment in contact with the lip of the hatch
16. Be careful not to drop anything (sample bottles, etc.) into the trailer.

NOTE: Know the phone numbers for all emergency authorities (customs office, police, local fire department, HAZMAT emergency response, etc.).

5.1.2 DETERGENT COMPLIANCE

PERSONAL PROTECTIVE EQUIPMENT

- corrosive resistant gloves
- coveralls
- dust mask
- hard hat
- safety boots
- safety glasses

SUGGESTED PROCEDURES

1. Wear a dust mask when transferring samples as detergents can create large amounts of dust.
2. Always wear splash proof safety glasses and gloves when sampling. Detergents can be very corrosive to the eyes and skin.
3. Avoid contact with the acid or solution when cleaning re-usable plastic detergent sample containers with sulphuric acid (10%).
4. Clean up any spilled acid.

5.1.3 EXPORT AND IMPORT OF HAZARDOUS WASTES (EIHW)

Also Interprovincial Movement of Hazardous Wastes Regulations (IMHW).

PERSONAL PROTECTIVE EQUIPMENT

- coveralls
- ear plugs and muffs
- face shield
- gloves
- goggles
- hard hat
- respiratory equipment
- safety boots
- safety glasses
- safety harnesses
- safety vest

ACCESSORIES

- Knives can be used when outside of a contaminated environment to cut your way out of a protective suit. It must otherwise be sheathed to avoid accidental puncture.
- Personal dosimeter is used to measures exposure to radiation and certain chemicals. Must be placed close to body to give best results.
- Radios and flashlights.

HAZARDS

When you are inspecting under the EIHW or IMHW regulations always assume the container contains hazardous wastes until testing proves otherwise. Look for one of the four signs:

- Labeling, placarding or any other symbol that identifies the material as belonging to one of the nine classes of dangerous goods.

• Symbols or words that indicate the contents are from a lab.
• Signs of corrosion or leakage.
• Swelling or bulging of the container.

SUGGESTED PROCEDURES

1. Keep all handling to a minimum. Use remote handling equipment whenever possible.
2. Use specialized tools to open and sample containers of hazardous substances.
3. Follow the preventive guidelines of the nine classes of dangerous goods.
4. Never allow direct skin contact with sample container surfaces or their contents.

5.1.4 GASOLINE COMPLIANCE

PERSONAL PROTECTIVE EQUIPMENT

• coveralls – Nomex
• gloves – neoprene or nitrile
• safety boots
• safety glasses
• safety vest

SUGGESTED PROCEDURES

1. Use neoprene or nitrile gloves when working with gasoline, methanol or test kit chemicals. Nitrile gloves are recommended because the disposable latex gloves will have to be replaced more frequently.
2. Carry clean-up materials with you in case of small spills.
3. Do not smoke at retail stations, the laboratory or when working with or transporting gasoline samples.
4. Shut off all running vehicle engines at the sampling site.
5. Use a fire extinguisher when working with or transferring gasoline. All sampling personnel must be familiar with the use of fire extinguishers.
6. All sample transferring and analysis must be conducted in the fumehood. If this is not possible, it should be conducted, very carefully, in the rear of the truck.
7. Keep gasoline samples and other chemicals in the rear of the truck when traveling. They should be kept cool to reduce volatility. Use an icepack and cooler. They should not be carried in the passenger compartment.
8. If a spill occurs, eliminate all possible sources of ignition around the sampling site. Clean the spill up immediately and dispose of the clean-up materials in a safe manner.

EMERGENCY FIRES

- Use fire extinguishers for gasoline fires.
- If the fire is small, while keeping a safe distance from the fire, remove the seal and squeeze the trigger of the extinguisher to release the extinguishing agent. Aim at the base of the fire, being careful not to spread the flames and smother the fire.
- Evacuate the immediate area and contact the fire department for help if the above method fails.

5.1.5 NEW SUBSTANCE NOTIFICATION

PERSONAL PROTECTIVE EQUIPMENT

- coveralls
- gloves
- respiratory equipment if there are unknown vapours and/or dust
- safety boots
- safety glasses

HAZARDS

Exposure to toxic chemicals and genetically modified organisms can occur when working near or taking samples of potentially hazardous substances, from splashes of liquid or from dust from powders.

Respiratory exposure to hazardous substances may occur from inhalation of fumes, vapours or aerosols.

SUGGESTED PROCEDURES

1. Never allow direct skin contact with unknown substances.
2. See information on respirators, Chapter 1.
3. All inspectors who risk potential exposure to hazardous substances must undergo periodic medical examinations.
4. Observe strict personal hygiene practices.
5. Avoid skin contact with unknown substances.
6. Wash thoroughly after removing protective equipment and before eating, drinking, smoking or using toilet facilities.

5.1.6 OZONE DEPLETING SUBSTANCES (ODS), FEDERAL HALOCARBON RELEASE

PERSONAL PROTECTIVE EQUIPMENT

- coveralls – chemically resistant
- earplugs
- face shield or eye protection
- gloves
- hard hat
- respiratory equipment
- safety boots

HAZARDS

To date, most inspections and investigations under the ODS Regulations have involved the purchase of consumer products containing CFCs. Future inspections may require the sampling of liquids and gases.

Hazardous exposure may occur during sampling. The substances that pose safety and health risks are:

SUBSTANCE	COMMON NAME	FORMAT
Carbon Tetrachloride and 1,1,1-Trichloro-ethane (Groups 1 and 11)	Carbon Tet and MCF	Liquids – 1 gallon bottles tankcars, trailers or drums
Chlorofluorocarbons (Group 111)	CFC 11 and CFC 113	Liquids at room temperature – gallon drums, cylinders; colour coded: orange for CFC 11, green for CFC 113
	CFC 12 and CFC 114	Gases – 15 and 30 lb. containers, squat cylin ders, tank trailers or cars
	Azeotropes R 500 and R 502	Gases – 15 and 30 lb. containers
Bromofluorocarbons (Group V)	Halon 1301 or HCFC 22	Gases – pressurized containers

SUGGESTED PROCEDURES

SAMPLING CARBON TETRACHLORIDE OR MCF

1. When sampling Carbon Tetrachloride or MCF, a self contained breathing apparatus is required if vapours or mists are emitted during sampling.
2. Be extra cautious and take your time.
3. Always practice good personal hygiene after handling these substances or any equipment that has come into contact with them.

OTHER SUBSTANCES

1. Always read the product's warning label and hazard data prior to sampling. Be alert to fire, explosion hazards, incompatibilities and other hazards.
2. Consult WHMIS information for safety precautions, safe handling procedures and first-aid measures.

NOTE: You should not attempt to take samples from pressurized cylinders unless you are specially trained and authorized to do so.

5.1.7 PCBs (POLYCHLORINATED BIPHENYLS)

PERSONAL PROTECTIVE EQUIPMENT

- air-purifying respirators (see further information below)
- aprons – PCB resistant material
- coveralls – must be heat resistant, non-flammable and completely cover arms and legs
- covers for boots – required for high concentration exposure areas
- gloves – PCB resistant material that completely cover the hands and wrists
- hard hat – non-conducting (non-metallic fabrication) if electric hazards exist
- hearing protection
- safety boots – if rubber boots are required, they must be PCB-resistant and steel toed
- safety glasses, goggles or face shield

Refer to Chapter 1 for PPE chemical resistance requirements. Inspect all PPE regularly to ensure it is in good condition. Do not wear Tyvek coveralls more than once as the seams are not leak-proof.

For treatment and destruction sites an air purifying respirator (full face) with organic filters should be used if fluid temperatures exceed 55°C and air-borne concentrations are suspected. Change organic filters regularly. If a fire occurs, escape-type air-supplied respirators are required.

HAZARDS

PCBs have a low volatility so exposure, with exception of fires, is more likely by contact with PCB liquid or material. Trichlorobenzene, which gives the PCB liquid its distinctive odor, is often present in PCB mixtures; inspectors require respirator protection for this substance. Brief exposures (less than 15 minutes) to small amounts of PCBs are not a serious health concern. However, long-term, high-level exposure by ingestion causes toxins to accumulate in tissue and blood. This can result in harmful health effects.

When heated or burned, this includes "burning" from electrical arcing which can occur in high voltage equipment, PCBs can be converted to polychlorinated dibenzofurans (PCDFs) and polychlorinated dibenzo-dioxins (PCDDs). These substances are very toxic and can accumulate in biological tissues.

HAZARDS FOR PCB STORAGE INSPECTIONS

Exposure to PCBs or other hazardous substances may occur from inhalation of fumes that can build up in storage areas or when sampling.

SUGGESTED PROCEDURES

1. Store PPE in non-contaminated places.
2. PCB storage areas must be well ventilated before entry. Use portable fans where necessary.
3. Know the location of eyewash stations, deluge showers and first-aid stations. They should be available at every industrial site that handles PCBs.
4. When sampling, protect your clothes from splashes with coveralls.
5. Wear disposable nitrile gloves.
6. Wear respirator protection with combination cartridge for organic vapours and particulate when sampling.

HAZARDS FOR PCB TREATMENT AND DESTRUCTION SITES

Hazards include burns from the sampling of hot ash. As well there is a risk of exposure to sulphuric acid, a strong corrosive that is often used at treatment and destruction sites. There is also a possible risk of exposure to strong electro-magnetic fields.

SUGGESTED PROCEDURES

1. Always be accompanied by a guide when on site.
2. Be aware of the safety and health hazards associated with the operations. Strictly follow the site-specific safety procedures and requirements.
3. See Chapter 3.2.2 Electrical Hazards.

HAZARDS OF INSPECTIONS OF IN-SERVICE PCB EQUIPMENT

Be aware of the possibility of electrical arcing. Inspections of electrical equipment often involve high levels of voltage and current. Inspections of heat transfer and hydraulic equipment may involve high temperatures and highly pressurized equipment. As well, PCB fluids or soot/ash from PCB equipment involved in a fire may contain highly toxic PCDFs and PCDDs.

SUGGESTED PROCEDURES

1. For inspections of in-service electrical equipment, you must be accompanied at all times by a qualified electrician from the site who will act as a safety watcher. Be sure to follow site procedures and the instructions of the electrician strictly and to obey all warning signs.
2. Ensure that high voltage equipment is grounded and shut down (by a qualified electrician) if you require a sample. Capacitors maintain their charge for a long time.
3. Be careful of open connections outside transformers and electrical arcing. To prevent electrical arcing, the service must be grounded and shut down by a qualified electrician. The qualified electrician must also test the equipment to ensure that the power has been disconnected or isolated.
4. Always observe the requisite delay period before taking a sample from equipment that has been shut down.
5. When inspecting in-service transformers, enter only transformer sound barrier enclosures with two or more exits. The exits must be checked as being operational before entry. Sound barrier enclosures with one exit should only be entered if the transformer is isolated. Transformers located outside can be inspected at a distance using high power binoculars.
6. Use special precautions and protective equipment when inspecting or sampling PCB equipment involved in a fire. This is due to the risk of exposure to PCDFs and PCDDs.

RULES OF HYGIENE FOR WORKING AROUND PCBS

- All inspectors who risk potential exposure to PCBs must undergo pre-placement and periodic medical examinations.
- Observe strict personal hygiene practices.
- Avoid skin contact with PCB liquids.
- Wash first with a dry cleanser, then use soap and water. Wash after removing protective equipment and before eating, drinking, smoking or using toilet facilities.
- Be extremely careful not to transfer contaminants to your skin when removing protective clothing. To avoid this, use the buddy system.
- If clothing is contaminated, properly decontaminate it. If the site has disposal means available, leave your clothing onsite.

TOOLS AND EQUIPMENT

- Wash all metal tools which have contact with PCBs or PCB-contaminated materials with an appropriate solvent (e.g. varsol, kerosene). Ensure that you recover the solvent as it will be contaminated and must be stored and disposed of as PCB waste.
- All towels used for cleaning must be disposed of as PCB waste.

6.0 TRANSPORTATION SAFETY

6.1 TRANSPORTATION

Transportation to and from the inspection site is often a large component on the time spent on the inspection. Transportation has its own risk and hazards. Often traveling to the site can be one of the most dangerous aspects of the job. It is important in planning inspections that you address these risks. As well, for many forms of transport we recommend you take specific training.

6.1.1 TRANSPORTING SAMPLES

Ensuring samples are safely transported is important for both the inspector's safety as well as to preserve the sample integrity, preventing the analyte in question from being compromised from broken, leaking or improperly packaged samples.

HAZARDS

- leaks and spills
- inhaling fumes
- skin contact
- contamination of vehicle

SUGGESTED PROCEDURES

- Samples must be properly packed before they are transported from the sampling site.
- Generally samples should not be carried in the passenger compartment of the vehicle. It is best if the materials can be transported within the trunk or box of the vehicle, unless the samples would freeze or otherwise be compromised. If this is not possible, properly ventilate the cargo and/or passenger compartments and keep passengers away from the containers during transport.
- Avoid using private vehicles. Use a government vehicle for transporting samples.
- All sample bottles should be transported and stored in a secondary container to prevent breakage. The secondary container must be capable of containing the sample if the primary container breaks or leaks. Absorbent materials (e.g. absorbent padding, kitty litter) should be included in the secondary container to absorb any liquids. Cushion the samples with packing material to prevent container breakage .

6.1.2 MOTOR VEHICLE SAFETY

Drivers must have a valid license in their possession and only authorized personnel are permitted to drive departmental vehicles. Drivers must act with care and comply with all applicable laws. Drivers are never required to operate a vehicle considered "unsafe" or loaded in a hazardous manner. "Unsafe" refers to any defect which – according to a responsible supervisor in consultation with a qualified motor vehicle mechanic – could lead to an accident.

Only authorized personnel may ride in motor vehicles. You must ensure that you and your passengers properly fasten safety belts in motor vehicles.

SUGGESTED SAFE DRIVING DISTANCES

In the interests of safe driving, an employee should not drive more than:

- 250 kilometers per day when you have worked a full day
- 350 kilometers per day when you worked one-half day
- 500 kilometers on any day when the employee has not worked

Every itinerary should be arranged to provide for a suitable rest period and/or overnight stop after an approved period of travel and work-related activity.

EMERGENCY EQUIPMENT

To further ensure employee safety, any vehicles being used for government business shall be equipped with the following:

- fire extinguisher
- first aid kit
- safety equipment in case of break-downs, such as flares or reflectors
- required accident report documentation

Please see Treasury Board requirements for additional details.

Depending on the assessed risks associated with any given trip e.g. the season of the year, remoteness of the destination) all vehicles should, in addition to the above items, be equipped with the following:

- GPS unit
- cell phone or, where coverage is lacking, a suitable alternate form of communication, such as a satellite phone or hand-held short wave radio, complete with back-up batteries
- survival kit appropriate to the needs of the season or as required for travel in remote or isolated areas
- booster cables
- snow shovel and traction mats
- tire chains and/or traction sand
- windshield scraper
- flashlight
- sleeping bag

VEHICLE SAFETY CHECKLIST

- Is the vehicle registration and safety inspection current?
- Are the tires and spare in satisfactory condition and properly inflated?
- Are there any leaks apparent under the vehicle?
- Are there any inappropriate noises/sounds upon start up?
- Is there an odour of vehicle exhaust inside when the motor is running?
- Do the headlights/taillights, turn signals and horn work?
- Do the seatbelts work properly?
- Do the brakes and parking brake work properly?
- Does the steering system function properly?
- Are the wiper blades working properly and is the washer fluid full?
- Are articles within the vehicle properly stored to prevent them from striking a person during an emergency stop or collision?
- Are the first aid and emergency vehicle kits intact and up to date?
- Is a fire extinguisher present, properly secured, pin in place and charged?
- Is the vehicle in otherwise satisfactory condition?

6.1.3 TRAILER TOWING SAFETY

If you will be using a trailer, you should attend a formal training course prior to conducting trailer towing. Check with your local associations or regional safety association for available courses.

Always read your operator's guide and follow the operating procedures described within the guide before conducting trailer towing.

SUGGESTED DRIVING TECHNIQUE

Do not exceed a speed of 80 km/hr. Signal well in advance and allow extra distance for passing and use care in returning to the driving lane. When following another vehicle, allow at least one full length of the vehicle and trailer for every 16 km/hr you're driving at.

Other driving tips include; you should allow sufficient clearance by driving beyond the normal turning point; before driving in reverse, park the vehicle and walk around it to check for possible hazards. If someone is available ask them to guide you.

FISHTAILING

- Fishtailing may occur if the trailer is overloaded, has a poorly distributed load, or the towing vehicle is too light or has inadequate suspension.
- Other factors which can cause a trailer to fishtail are: excessive speed, improper the braking and improperly inflated or defective tires.

SUGGESTED PREVENTION TO FISHTAILING

- slow down
- stop your vehicle, evaluate the problem to see if it is due to poor weight distribution or tire problems
- apply the trailer brakes before the towing vehicle brakes

INSPECTION AND SAFETY CHECKS PRIOR TO STARTING

TOW VEHICLE

Ensure that the tow vehicle has sufficient power and an adequate cooling system to safely haul the trailer. The Society of Automotive Engineers (SAE) has established 4 classifications for trailer loads based on the weight of the loaded trailer. In addition, the drivetrain, suspension and tires must meet or exceed the vehicle's Gross Combined Weight Rating, as specified by the manufacturer.

ELECTRICAL CONNECTIONS/ SIGNAL LIGHTS/ MIRRORS

Make sure that the trailer is equipped with lights that conform to all required regulations. Trailer lighting systems should not be connected directly to the lighting system of the towing vehicle. Check signal lights for proper functioning and adjust rear and side view mirrors.

TRAILER HITCH

Trailer couplings for passenger cars, light duty commercial vehicles and multipurpose passenger vehicles that are used to tow utility, boat, camping, travel or special purpose trailers shall conform to Society of Automotive Engineers (SAE) Standard J-684

BALL HITCH AND SOCKET

Ensure that the ball hitch and socket are the same size by checking the size stamp on both units. If the size is not stamped on the unit, lock the ball in place and raise the front of the trailer using a castor jack. If the tow vehicle can be lifted above its normal level without the ball breaking away from the socket, the connection is safe.

TORSION BARS

When equipped with an equalizer hitch, ensure that the torsion bars are properly attached and adjusted. The torsion bars are adjusted to maintain a level tow vehicle-trailer connection. If the tow vehicle is low in the back, raise the chain one link at a time until level.

SAFETY CHAINS

Always use safety chains (single or double-linked) as a precaution in the event that the trailer becomes unhitched. Use only enough chain to permit a full turn and never attach the chain to; the bumper or to the socket or ball assembly. Make sure that the chains are in good condition; never use chains that have been welded. If a double chain is used, cross the chains prior to attachment.

TRAILER TIRES AND BRAKES

Trailer tires must meet or exceed the tire load rating specified by the manufacturer. Ensure that trailer brakes are locking on all braked wheels. The brakes can be tested by pulling ahead slowly with trailer brakes applied and then observing if all braked wheels are locked and skidding. This test should also be performed on trailers with "break-away" switch systems with brakes disconnected from the towing vehicle to ensure the "break-away" system is functioning. In this system, brakes are activated if the trailer becomes detached from the tow vehicle.

LAUNCHING AND RECOVERING (FOR BOAT TRAILERS)

- Disconnect all power before a launch or recovery.
- Do not submerge the trailer longer than necessary.
- Launch ramps and boat slipways are usually covered with algae or other types of marine growth. Watch your step as they can be extremely slippery.

If the trailer has been left idle after one launch (or recovery), check the bearings and repack or replace them, if necessary.

TABLE 3 – SAE TRAILER CLASSIFICATIONS

SAE CLASSIFICATION	Description / Weight Limitations
CLASS I – LIGHT DUTY	• up to 2,000 lbs. maximum gross trailer weight • trailers for small boats, motorcycles, snowmobiles, etc. • load-carrying (non-equalizing) hitch
CLASS II – MEDIUM DUTY	• 2,001 to 3,500 lbs. gross trailer weight • single-axle, small to medium length trailers (up to 18 ft.) • load-equalizing hitch required
CLASS III – HEAVY DUTY	• 3,501 to 5,000 lbs. gross trailer weight • dual-axle or large single-axle trailers • load-equalizing hitch required
CLASS IV– EXTRA HEAVY DUTY	• 5,001 to 10,000 lbs gross trailer weight • large multi-axle trailers • load-equalizing or fifth wheel hitch required

TABLE 4 – PASSENGER CARS

SAE TRAILER TOWING LIMITATIONS

Classification		I	II	III
MAXIMUM GROSS TRAILER WEIGHT (GTW)	kg	909	1,590	2,272
	lb	2,000	3,500	5,000
MAXIMUM TONGUE WEIGHT				
Frame Hitch	% of GTW	10%	-	-
Equalizer Hitch	% of GTW	15%	15%	15%
MINIMUM ENGINE SIZE (GASOLINE)	Cylinder	6	8	8
	Litre	3.0	4.3	4.3
	Horsepower	135	190	190

TABLE 5 – LIGHT TRUCKS

SAE TRAILER TOWING LIMITATIONS TABLES

Classification		I	II	III	IV
Maximum Gross Trailer Weight (GTW)	kg	909	1,590	2,272	4,545
	lb	2,000	3,500	5,000	10,000
Maximum Tongue Weight					
Frame Hitch	% of GTW	10%	-	-	-
Equalizer Hitch	% of GTW	15%	15%	15%	15%
Fifth Wheel	% of GTW	-	-	-	25%
Minimum Engine Size(Gasoline)	Cylinder	6	8	8	8
	Litre	3.0	3.8	5.7	5.7
	Horsepower	135	145	190	230
Minimum Engine Size(Diesel)	Cylinder	-	-	6	6
	Litre	-	-	5.9	5.9
	Horsepower	-	-	160	160

6.1.4 ALL-TERRAIN VEHICLE (ATV) SAFETY

REDUCE YOUR RISK OF ACCIDENT OR INJURY

Inspectors should attend a formal training course prior to operating an ATV. Check with your local associations or provincial/territorial safety councils for available courses.

Always read the operator's guide and follow the operating procedures described within the guide before riding an ATV. Become thoroughly comfortable with the vehicle's handling characteristics. Some ATVs have rear brakes only, while others have both front and rear. The operator's manual describes your ATV's braking system.

SAFE RIDING PRACTICES

- avoid risky situations
- never drive at excessive speed
- look well ahead on the trail
- be prepared to react to unfamiliar terrain
- be constantly alert for potential hazards
- ATVs are designed for one operator only, never carry a passenger
- always use a map and compass, or a global positioning system (GPS) when riding in an unfamiliar area
- make a mental note or physical marking of landmarks to prevent becoming lost or stranded

- stay in one place if lost at night, valuable fuel which can be used in the daylight will be wasted by driving around at night

RECOMMENDED STOPPING TECHNIQUES

- release the throttle
- shift to a lower gear to use the engine to slow the vehicle
- shift to a low gear when descending a hill
- do not ride the brake for long periods of time

Notify your supervisor or other colleagues of your travel route and schedule. If you are forced to deviate from your route, ensure that you inform your base contact via radio, phone, etc.

PROTECTIVE GEAR

HELMETS

All ATV riders must wear a helmet that meets or exceeds CSA Standard D230-M85. Full face helmets provide face and head protection. Open face helmets are lighter and cooler but require mouth protection. Helmets should fit snugly and be securely fastened.

FACE SHIELD OR GOGGLES

Wear a face shield or goggles to avoid eye distraction or injury. The shield or goggles should be free from scratches, shatterproof, securely fastened, well ventilated (to prevent fogging), tinted (for bright days), clear (for night riding), or yellow (for overcast days).

CLOTHING AND EMERGENCY EQUIPMENT

GLOVES

Gloves will prevent sore, tired or cold hands and offer protection if an accident occurs. Off-road style gloves (available at motorcycle shops) provide the best protection and comfort.

FOOTWEAR

Strong, over-the-calf boots with low heels prevent feet from slipping off the pegs. Off-road style motorcycle boots provide the best protection for feet, ankles and legs.

SHIRT AND PANTS

A long-sleeved shirt or jersey and long pants are minimal requirements for rider protection. They will also protect the skin from sunburn and scratches.

EMERGENCY KIT

Always carry a pocket first-aid kit and a vehicle repair kit with you. An extra ignition key is also recommended.

PRE-RIDE INSPECTION CHECKS

Inspect the ATV's mechanical condition before each ride. This will reduce the chance of injury or becoming stranded.

SUGGESTED PROCEDURES

- Be sure that all tires are inflated to the proper pressure. Always maintain the manufacturer's recommended tire pressure. Under-inflated tires can cause wheel damage when riding over rough terrain. Check tires for cuts or gouges that could cause air leakage.
- Check the wheel bearings and lug nuts for tightness by grasping the tire and rocking it on it's axle to detect worn out bearings or loose nuts.
- Check throttle and other cables, brakes and foot shifter for excessive wear or looseness.
- Check the ignition switch, engine stop switch and lights (if equipped) to be sure each turns appropriate mechanism on and off.
- Check the oil level with the engine off. Fill the fuel tank if necessary. Look for fuel and oil leaks.
- Inspect the chain for proper adjustment and lubrication.
- Check drive shaft for oil leaks.
- Rough terrain will loosen parts. Look and feel for loose nuts and bolts while the engine is off. Shake handlebars, footrests, etc. before each ride and periodically check major fasteners with a wrench.

RIDING POSTURE

Be sure to practice good posture while operating an ATV. This will help you to operate the controls more easily and help you react more quickly when shifting your body weight. Proper riding posture includes:

- head and eyes up, looking straight ahead
- shoulders relaxed and elbows bent slightly out, away from your body
- hands on the handlebars
- knees in toward the gas tank
- feet on the footrests with toes pointing straight ahead

DRIVING SKILLS

Always be careful when operating an ATV, especially when approaching hills, turns and obstacles and when operating on unfamiliar or rough terrain. Learn how to handle the machine to negotiate proper turns, brake, park, anticipate the terrain, climb and descend hills, traverse a slope, ride through water, ride in the snow and other winter conditions, if required.

6.1.5 BOATING SAFETY

The current standard of training required for Inspectors is the Marine Emergency Duties (MEDA3) and Small Vessel Non-Pleasure Operators course.

As an operator of a boat under the Small Vessel Regulations, you are responsible for equipping yourself for operating your boat safely and for ensuring the safety of any passengers on board. Transport Canada's Safe Boating Guide, www.tc.gc.ca/BoatingSafety contain information concerning mandatory safety equipment that shall

be carried on your boat, pre-trip safety precautions and other regulatory information related to operating a boat. Contact Transport Canada for further information on safe boating practices and also check provincial licensing requirements if you will be operating a power boat.

As well, no inspector or investigator should operate a boat unaccompanied.

PERSONAL PREPARATION

- Always wear a life jacket or personal flotation device (PFD) approved by Transport Canada or the Canadian General Standards Board. One PFD is required for each person in the boat.
- Be sure to obtain the marine weather forecast before you leave the shore and carry current charts and publications.
- Take along the latest edition of the Canadian Coast Guard's "Safe Boating Guide". Copies can be obtained from Transport Canada or your Regional OSH Officer/Coordinator.
- Be sure that you have the mandatory boat equipment required by Transport Canada regulations (see below), emergency provisions and communication equipment.

VESSEL PREPARATION

- Never overload your boat. The capacity plate fitted on or near the transom of the boat gives the maximum load capacity of the boat as determined by Transport Canada.
- Keep the bilges clean and free of oil, gasoline and rags.
- Vent any enclosed areas into the open air before you start the engine. An explosion could occur if a gasoline leak develops inside the engine cover.
- Check the battery to see if it is charged.
- When fuelling a small boat equipped with portable fuel tanks, fill these tanks on shore (not in the boat) to avoid spilling fuel.

FLOAT PLAN

Float plans outline your boating itinerary and include information such as your time of departure and arrival, a description of your boat, etc. You should always complete a float plan prior to departing on any trip. Give a copy of your plan to your supervisor and one other responsible person. Float plans can also be filed with the Canadian Coast Guard.

Your float plan should include:

- **VESSEL IDENTIFICATION** – year, make, name, engine type and registration number.
- **COMMUNICATIONS** – type of radio and frequency.
- **LIST OF PEOPLE ON BOARD** – names and descriptions of operator and other persons on board.
- **SAFETY** – description of survival equipment (PFDs, life rafts, etc.), distress signal types.
- **ITINERARY** – destination and expected time of arrival; proposed route and expected return date and time.
- **CONTACT INFORMATION** – phone and cell numbers of friends, family or co-workers.

EMERGENCY PLAN

On your boat you should have written procedures available for anyone to read. All able persons aboard your vessel should know the basics of what to do in an emergency. Much of the information contained in the float plan can also be incorporated in the emergency plan. At a minimum, the plan should outline what do to in the following situations:

FIRE

If a fire occurs on board your boat:

- turn off the engine and/or fuel supply
- apply cold water to the fire to reduce the heat
- smother the fire with CO_2, dry powder, or foam from an extinguisher or cover tightly with a flame proof and airtight cover

FIRE PREVENTION

To prevent fires from occurring, never smoke while fueling and make sure there is adequate ventilation. Remove combustible materials such as oily rags. Maintain the electrical systems on your boat to prevent short circuits and sparks.

- Have a fire extinguisher on board that is best suited to a particular type of fire (e.g. electrical, gasoline). A dry powder extinguisher is a good general purpose type.
- Make sure extinguishers are kept outside the engine space in places where they can be reached quickly.

SINKING

Should your boat start taking in water, try to locate the cause of the leak and reduce the flow of water by plugging up the hole.

- Bail the water out as best you can.
- Should the boat submerge or turn over, stay with the boat. This will increase your chances of survival as well as give you have a better chance of being found.
- Once in the water, reduce your energy use by keeping as still as possible. If you are in the water for any length of time you will need all of your energy to ward off hypothermia.
- You should wear your life jacket at all times. It is very difficult to put a lifejacket on once you are in the water and if safety equipment is stowed in the bow of a boat, it may become inaccessible if the boat turns over.
- All occupants of the boat should stay together. Use your safety equipment to attract attention if possible.

MAN OVERBOARD

If someone falls in the water call out loudly **MAN OVERBOARD!** and keep the victim constantly in sight.

- Turn the bow of the boat towards the side the victim fell overboard to keep the moving propeller away from the victim.
- Slow the engine and throw the victim a flotation aid such as a lifebuoy, buoyancy aid or flotation cushion
- Stop the engine when nearing the victim – so you can get them aboard or they can swim to you.
- In small open boats – and those with a low freeboard – boarding should be over the boat's bow or stern. If your boat doesn't have a boarding ladder, use a rope to make one.
- Make sure everyone on the boat knows what to do.

MANDATORY EQUIPMENT

Transport Canada regulations require a variety of mandatory pieces of equipment depending on the length of the boat. The requirements for small boats (up to 6 m) are given below. Consult the latest edition of the Canadian Coast Guard “Safe Boating Guide” for the mandatory equipment requirements for boats greater than 6 m in length.

TRANSPORT CANADA REQUIREMENTS FOR SMALL BOATS

Transport Canada regulations require that all boats up to 6 m in length must be equipped with the following items:

- One approved life jacket or PFD for each person on board.
- Two oars with rowlocks or two paddles.
- A bailing bucket or pump; the bailer should have a cord attached; a manual pump requires a capacity of 70 litres (15 gallons) per minute.
- One class B-1 fire extinguisher if the vessel has an inboard gas engine, fixed fuel tanks or is carrying cooking or heating appliances that burn a liquid or gaseous fuel.
- Navigation lights (complying with the "Collision Regulations" if permanently fitted for travel at night).
- Some type of sound signaling device capable of being heard for 1/2 nautical mile or more.

ANCHOR

For ocean dumping inspections, be sure that the transporting vessel is carrying an anchor and a sufficient length of cable, rope or chain (at least five times the average anchorage depth). The inboard end of the line must be fastened securely.

COMMUNICATIONS EQUIPMENT

Be sure that a method of communication with the shore is available, such as radio or portable phone. VHF radio operators can contact the Vessel Traffic Services (VTS) stations directly on local VHF working frequencies.

EMERGENCY BAG

Always carry an emergency bag. Use a watertight plastic bag. Depending on the size of the boat and the number of personnel, pack the emergency bag with the following items:

- spare clothing
- flashlight
- flares, whistle, loud hailer or other signaling device
- an adequate first-aid kit

- emergency rations
- emergency blanket
- matches

ON THE WATER

BOAT NAVIGATION/COLLISION REGULATIONS

Boat operators must be fully aware of Transport Canada's "Collision Regulations", as well as general boat navigation rules. These include the Canadian Aids to Navigation System.

- Avoid areas where divers may be working. If you are in an area where divers are working, slow down. Ask the diving supervisor for instructions on how to leave the area safely.
- Slow down when passing rowboats and canoes, especially in narrow waters.
- Leave adequate space when anchoring near other boats.
- Sound your horn or use your spotlight only when necessary.
- Do not cruise at high speed near other boats that are anchored.
- Stop and turn slowly. Stopping too quickly or making too sharp a turn could allow the wake to swamp your craft.
- Before starting an outboard motor, ensure that the motor is in neutral. A motor started in gear can cause a small boat to capsize. Position the motor so that it is facing straight ahead. Maintain a stable position when you are starting an outboard motor.
- To move around in a small boat, crouch low, keep your weight on the centre line and hold onto both gunwales. Avoid standing up or changing seats in a small boat, especially when it is loaded.
- Watch for varying water depths.
- On rivers watch out for floating debris such as ice and tree limbs, especially during high flow river conditions

EMERGENCIES AND BAD WEATHER

- If a storm threatens, head for the nearest safe anchorage or landing.
- Always reduce speed in bad weather.
- You are required by law to assist any boat in distress. Watch for distress signals. If in doubt about a signal you have seen, investigate.
- In the event of an emergency be sure your local office will contact CCG Search and Rescue Centres (see Appendices).

COLD WATER SURVIVAL

The life-threatening condition of hypothermia will progress rapidly if you are in cold water. Here are the most important things you can do to retain your body temperature:

- Get out of the water as soon as possible. Cold water saps the body's core heat much faster than air.
- Never leave an overturned boat to swim to shore! Climb onto an overturned boat or other object if possible.
- If you can't get out of the water, protect your core heat by moving into a fetal position.
- Remain calm and still. Don't try to swim; unnecessary movement will use up valuable energy that your inner core requires for survival.
- If you are in the water with others, use the huddle technique: huddle together so that everyone's chests are close, with arms around mid to lower back and legs intertwined. Your group may increase its survival time by 50 percent.

6.1.6 AIRCRAFT SAFETY (FIXED WING & ROTARY)

Prior to take off/departure, ensure that the pilot has provided a safety briefing and that you familiarize yourself with the location of all emergency equipment including flotation devices, first aid kits, fire extinguishers, fire exits, Emergency Locator Transmitter (ELT) etc. Always follow the instructions the pilot provides.

Never throw anything from the helicopter while in flight or on the ground as it may collide with the main or tail rotor.

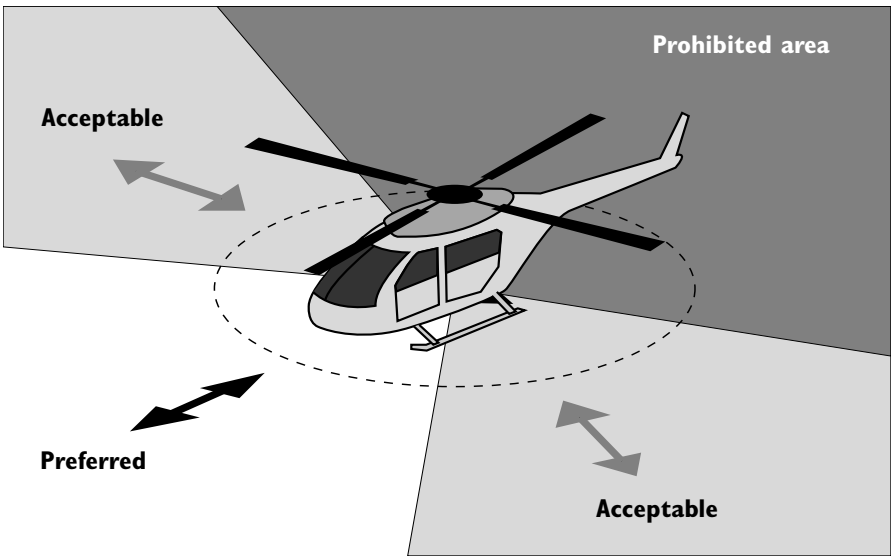
LOADING GUIDELINES

- Keep clear of the landing area when an aircraft is landing or taking off. Ensure that landing pads are kept clear of loose articles such as tarps, cardboard boxes, clothing, rope, wire, and anything else that might be swept up into the air stream of the rotor blades.
- Establish weight limits/luggage allowances in advance if possible.
- Discuss with the pilot when you should load or unload an aircraft. Ensure all equipment and materials are secured prior to approaching an aircraft.

- Carry equipment such as survey rods and tools in a horizontal position, below waist level.
- Always ensure the luggage compartment door is closed and locked before take-off. Ensure that the helicopter's doors are closed and locked before take-off.

PERSONAL SAFETY

- Never approach, leave, or board an aircraft until the pilot signals you to do so.
- Avoid approaching an aircraft when the propellers/rotors are still in motion.
- Always approach and depart a helicopter from the front, away from the rear rotor, remaining in the pilot's field of view.
- At all times, keep away from the tail rotor area.
- Never go behind the cabin doors as this puts you outside the pilot's field of vision.
- Never approach or leave the helicopter from an uphill side.
- Always walk in a crouched position and keep your head down. If you are not carrying anything, hold on to the front of your knees with your hands. Otherwise, maintain a crouched position.
- Keep your seat belt fastened at all times during the flight. If you want to undo your seat belt, ask the pilot's permission.
- Always wear protective eye shielding.
- Properly secure loose articles of clothing (scarves, caps, hard hats, mitts, etc.) before approaching or leaving a helicopter.



6.1.7 SNOWMOBILE SAFETY

Riders should attend a formal training course prior to operating a snowmobile. Check with your local snowmobile associations or safety council for available courses.

All provinces and territories have legislation that requires registration/licensing of snowmobiles. Be sure to check the requirements in your area. Always read the operator's guide and follow the operating procedures described within the guide.

Learn to read and anticipate snow conditions and terrain. Maintain a speed limit that's right for these conditions. Hard-packed snow has a more stable base to ride on, while soft, deep snow may require the rider to shift their weight when steering. Be cautious of branches, rocks and tree stumps that may be hidden under the snow.

If you get stuck:

- Do not spin your track as this makes the snowmobile sink deeper.
- If your snowmobile has reverse, you may be able to back out.
- Never try to lift the machine out unless there is no other way. Back strain and even heart attacks occur this way.
- Tramp a clear path ahead of the machine by packing the snow into a firm base. In the standing position, gently rock the machine as you steadily and slowly apply the throttle.

MAINTENANCE CHECK

Keep the snowmobile in good working order at all times to reduce the chances of being stranded in the cold and snow. Follow the daily, weekly and monthly maintenance and lubrication procedures as specified in the owner/operator manual.

PREPARATIONS BEFORE EACH TRIP

Before you start, conduct a pre-ride safety inspection before you turn on the ignition of your machine and ensure you have the basic equipment necessary to be safe.

Take the time to complete the maintenance and basic equipment checklist listed below.

- Ensure the handlebar works freely and turns both ways.
- Check the belt for wear, frayed edges, gouges and cracks. Replace belt if necessary according to owner's manual.
- Check for free movement by pressing and releasing the throttle and brake levers.
- Ensure that the headlight, tail light and stop light are working and free of snow. Remember to pack a flashlight and spare bulbs.
- Make sure that the emergency switch is working properly. Some machines have emergency switches that automatically shut off the engine if the driver falls off.
- Check fuel and oil and make sure you have adequate supplies.
- Ensure the track turns freely and is free of ice, snow or other foreign objects.
- Listen to weather reports before leaving on a trip. Environment Canada's Weather radio, located on the VHF-FM radio band, broadcasts weather information in both official languages 24 hours a day. Check local avalanche conditions in avalanche-prone areas; there is a web site for this at www.avalanche.ca/.

SAFETY PRECAUTIONS

- Never add fuel while the engine is running.
- Do not smoke while fuelling or checking the fuel level.
- Keep all spark or ignition sources away from potentially explosive fuel vapours.
- Be careful not to get gasoline on exposed skin when refueling.
- When gasoline touches the skin in sub-zero temperatures it evaporates almost immediately reducing skin temperature and increasing the risk of frostbite. If this happens, clean the skin immediately and cover the affected area to restore warmth.

MECHANICAL SAFETY

- Always turn off the ignition key before opening the hood for any reason. The engine should not be running while the hood is open. Even at idle, a snowmobile engine is turning approximately 1,800 revolutions per minute and loose clothing could easily become caught.
- Do not remove any original equipment. Each vehicle has many safety features built in, including guards, consoles, reflective materials and warning labels. Fingers and hands should be kept away from moving parts in the engine area.
- Never raise the rear of the vehicle while the engine is running. Snow, ice or debris could be thrown back at an observer. When trying to free a snowmobile that is stuck in snow, use proper lifting techniques to prevent back injury. Make sure the engine is turned off.
- To clear the track, turn the engine off, tilt the vehicle on its side and remove the blockage with a piece of wood or other device.
- Always carry an emergency tool kit, the owner's manual, an extra ignition key, a drive belt and spark plugs.

SAFE RIDING PRACTICES

Snowmobiles can travel into areas where other vehicles cannot. These areas are often hazardous. Stay alert at all times. Remember that visibility is reduced by darkness and it is much more difficult to spot and identify potential hazards. Only drive as fast as you can see, slow down when snowmobiling after dark and do not exceed the visibility of your headlights. You should try to avoid unfamiliar terrain. If the weather turns bad, take cover or return to your base.

Most provinces and territories have restrictions in place regarding operating snowmobiles on or crossing certain roads and highways. Be sure to check appropriate provincial or local by-laws. If riding in a highway ditch or right-of-way, always travel in the same direction as the nearest highway lane.

When crossing roads of any kind, adhere to the following:

- Bring the snowmobile to a complete stop before entering onto the highway or road.
- Look in both directions to make sure no traffic is approaching.
- Yield right-of-way to all vehicles using the road or highway.
- Always cross at a right angle to traffic and take the shortest and safest route available.

Always assume that drivers **DO NOT SEE YOU**. Most drivers are looking out for other cars, not snowmobiles.

Never ride on railway tracks. The noise from a snowmobile may drown out the sound of an approaching train. If it is necessary to cross railway tracks, do so at authorized crossings (e.g. level crossings) only. Watch for and obey railway crossing warning signs and signals. Use the same procedure as for crossing a highway. Look both ways along the railway tracks and listen for an approaching train. When it is safe, cross the tracks at a 90-degree angle.

Do not tailgate other snowmobiles. Keep a safe stopping distance behind them. At times, stopping may require more distance than anticipated. Be prepared to use evasive driving.

HAZARDS

ENVIRONMENTAL HAZARDS

There are numerous environmental hazards you may encounter when snowmobiling, use extra caution in unfamiliar terrain as these objects may be hidden by deep or drifting snow; ditches may become obscured as they fill with snow, hidden wires and fences can cause serious accidents, give a wide berth to telephone poles and other posts, watch for raised surfaces in the snow. If riding a trail with hidden wires, mark them with reflective tape or other markings. You may have difficulty in controlling, steering and stopping on snow-free ice. Reduce speed if traveling in unfamiliar terrain. Above all, be aware of your surroundings.

Drowning as a result of a vehicle falling through thin ice is a major cause of snowmobile fatalities. If possible, do not cross frozen lakes and rivers. If it is necessary to do so, the minimum ice cover must be 15 cm (6 inches) thick. Listen for local radio warnings regarding ice cover. When riding on frozen surfaces avoid areas where currents or springs may cause a thinning of the ice. If possible, stay close to the shoreline where the water depth may be shallow. Do not operate a snowmobile over open water or on exposed turf. It is recommended that you wear a flotation device approved by Transport Canada.

PERSONAL SAFETY

Venturing out alone on a snowmobile is potentially dangerous. If possible, drivers should use the “buddy system”. Always tell someone your destination, the route (if known) and the approximate time of return.

Excessive speed can be fatal. Ride at a speed which is compatible with the conditions of the trail. Observe posted maximum limits. Reduce speed when carrying a passenger.

Ensure that the passenger rides safely by keeping their feet on the running boards. Advise the passenger to maintain a firm grasp of the passenger strap, grips or the driver. Show the passenger how to lean into turns with you. Drive slowly in rough terrain as unexpected bumps can throw the passenger from the machine.

PROTECTIVE GEAR

HELMETS

All snowmobile drivers and passengers must wear an approved helmet that meets or exceeds CSA Standard D230-M85. A helmet should fit snugly and be securely fastened.

EYE AND FACE PROTECTION

Wear a face shield or goggles to avoid eye distraction or injury. They should be free from scratches, shatterproof, securely fastened and well ventilated (to prevent fogging). Regular sunglasses or eye glasses do not provide adequate eye protection on a snowmobile.

FACE SHIELDS AND GOGGLES

Face shields can be attached to most helmets. Shields and goggles help prevent windburn, frostbite, the blinding effect of the sun and the eye-watering effect of the wind. They will also protect you from branches and other objects on the trail. Tinted or anti-glare goggles or face shields are best for riding on bright days; clear ones for dull, cloudy days or night riding; and yellow or amber for late afternoon trips.

CLOTHING

- Wear an appropriate snowmobile suit (with gloves and boots) over a sufficient layering of warm clothing.
- In colder temperatures or with higher winds, all body parts should be covered to guard against frostbite. To protect the face, use a face shield or wear a ski mask with goggles.
- Do not wear long scarves or other loose items. They could get caught in the moving parts of the machine, distract a passenger or catch tree branches or other items along the trail.

EMERGENCY FIRST-AID

- Always carry an emergency pocket first-aid kit.
- On longer trips, take a survival pack. Include emergency food (high energy), shelter and heat-generating supplies and warm blankets. If traveling to an unfamiliar area, take along maps, trail maps, a compass, reflective tape, hunting knife, hatchet, fuel reserves and matches in a waterproof box.
- Always carry a tool kit that includes a screwdriver, pliers, wrenches, rags, litter bags, electrical/duct tape, starter cord, spark plugs, spark plug socket, drive belt.

7.0 APPENDICES

7.1 TERMS, DEFINITIONS AND ACRONYMS

7.1.1 TERMS AND DEFINITIONS

ACCIDENT/HAZARDOUS OCCURRENCE – Any undesired event that results in a human fatality,injury, illness or disease, property damage, material loss or damage to the environment; motor vehicle accidents are included.

HAZARD – Any dangerous material, object, condition or work procedure/ practice with the potential for causing a human fatality, injury, illness or disease, property damage, material loss or damage to the environment.

HAZARDOUS SUBSTANCE – A hazardous substance includes a controlled product and a chemical, biological or physical agent that, because of a property it possesses, is hazardous to the safety or health of a person who is exposed to it. The term includes hazardous waste, radiation-emitting objects or devices and other dangerous substances that are not controlled products.

INCIDENT (NEAR MISS) – Any undesired event that could have but did not result in a human fatality, injury, illness or disease, property damage, material loss or damage to the environment.

OCCUPATIONAL INJURY/ILLNESS (WORK INJURY) – Any injury, disease or illness incurred by an employee in the course of employment.

QUALIFIED PERSON – In respect of a specified duty, a qualified person is a person who, because of knowledge, training and experience, is qualified to perform that duty safely and properly.

SAFETY OFFICER – A person designated as a safety officer pursuant to the Canada Labour Code, Part II; the term includes a regional safety officer.

SAFETY AND HEALTH – A committee established at the workplace pursuant to Section 135 of Part II of the Canada Labour Code.

WORKPLACE – Any place where an inspector or investigator is engaged in work for Environment Canada.

7.1.2 ACRONYMS

ACGIH	American Conference of Governmental Industrial Hygienists
AEC	Atomic Energy Canada
AECB	Atomic Energy Control Board
AECL	Atomic Energy of Canada Limited
APR	air-purifying respirator
BLEVE	boiling liquid expanding vapour explosion
CAN	National Standard of Canada Designation
CANUTEC	Canadian Transport Emergency Centre
CAR	carcinogenic effect
CB	citizens band (radio)
CCG	Canadian Coast Guard
CCOHS	Canadian Centre for Occupational Health and Safety
CGSB	Canadian General Standards Board
CLC	Canada Labour Code
CMA	Canadian Medical Association
COSHR	Canada Occupational Safety and Health Regulations
CPC	Chemical Protective Clothing
CPR	cardiopulmonary resuscitation
CSA	Canadian Standards Association
CSC	Canada Safety Council
CSSE	Canadian Society of Safety Engineering
EC	Environment Canada
EIHW	Export and Import of Hazardous Wastes (Regulations)
ELT	emergency locator transmitter
EPA	Environmental Protection Agency (USA)
GCW	gross combined weight
GCWR	gross combined weight rating
GECA	Government Employees Compensation Act

GTW	gross trailer weight
GVW	gross vehicle weight
GVWR	gross vehicle weight rating
HC	Health Canada
HEPA	high-efficiency particulate air (filter)
HRDC	Human Resources Development Canada
HRMM	Human Resources Management Manual (Environment Canada)
IARC	International Agency for Research on Cancer (USA)
IDLH	immediately dangerous to life and health
LC	lethal concentration
LC_{50}	median lethal concentration
LD_{50}	median lethal dose
LEL	lower explosive limit
LFL	lower flammability limit
MPC	maximum permissible concentration
MPD	maximum permissible dose
MPE	maximum permissible exposure
MPL	maximum permissible level or limit
MRC	Medical Research Council
MSDS	material safety data sheet
NFPA	National Fire Protection Association (USA)
NIOSH	National Institute for Occupational Safety and Health (USA)
NIPTS	noise induced permanent threshold shift
NRC	National Research Council of Canada
OSH	occupational safety and health
OSHA	Occupational Safety and Health Administration (USA)
PCBs	polychlorinated biphenyls
PEL	permissible exposure limit
PFD	personal flotation device
PMM	Personnel Management Manual
PPE	personal protective equipment

PTS	permanent threshold shift
RAD	radiation absorbed dose
RCMP	Royal Canadian Mounted Police
RLSSC	Royal Life Saving Society Canada
SAE	Society of Automotive Engineers (USA)
SCBA	self-contained breathing apparatus
SCUBA	self-contained underwater breathing apparatus
SPF	sun protection factor
STEL	short-term exposure limit
STIL	short-term inhalation limit
TB	Treasury Board
TC	Transport Canada
TDGA	Transportation of Dangerous Goods Act
TDGR	Transportation of Dangerous Goods Regulations
TLV	threshold limit value
TOC	threshold odour concentration
TTS	temporary threshold shift
TWA	time weighted average
TWAEC	time weighted average exposure criteria
UEL	upper explosive limit
UFL	upper flammability limit
UV	ultraviolet
VCM	vinyl chloride monomer
VIN	vehicle identification number
WHMIS	Workplace Hazardous Materials Information System

7.1.3 UNITS OF MEASURE – ABBREVIATIONS

A	ampere; area; atomic mass number; radioactivity
ac	alternating current
alk	alkali
amp	ampere
aq	aqua; aqueous; water
at, atmos	atmosphere
av, avg	average
bar	barometer
bp	boiling point
Bq	becquerel
Btu	British thermal unit
C	Celsius; centigrade; concentration; coulomb
ca	circa; approximately; about
cal	calorie
c	centimetre
conc	concentration; concentrated
cps	cycles per second or Hertz
cu	cubic
cyl	cylinder
D	density; dose; absorbed dose
dB	decibel
dc	direct current
dil	dilute
dyn	dyne
f	frequency
F	farad; Fahrenheit; force
ft	foot
g	gram
G	gravitational constant; giga (prefix)

GI	gastrointestinal
h	Plank constant; height; hour; hecto (prefix)
H	henry
ha	hectare
Hz	hertz
I	intensity of radiation
in	inch
insol	insoluble
J	joule
k	kilo (prefix)
K	kayser; Kelvin; absolute temperature
KE	kinetic energy
km/h	kilometres per hour
l	length
L	litre
lb	pound
LD_{50}	median lethal dose
lim	limit
lin	linear
liq	liquid
log	logarithm
m	mass; metre; minute; meta; milli (prefix)
M	mega (prefix); molar
m^2	square metre
m^3	cubic metre
max	maximum
med	medium
mg	milligram
min	minute
ml	millilitre
mol	mole; molecule
mole	gram-molecule weight
mp	melting point

MPC	maximum permissible concentration
MPD	maximum permissible dose
mph	miles per hour
mrem	millirem
mR	milliroentgen
mrt	mean radiant temperature
mu	mass unit
MW, mol wt	molecular weight
n	nano (prefix)
N	neutron; newton; number; numeric; normal
no	number
^{o}**C**	degree(s) Celsius
^{o}**F**	degree(s) Fahrenheit
oz	ounce
P	pico (prefix); pressure; momentum
P.E.	potential energy
Pa	pascal
$\mathbf{P_c}$	critical pressure
pH	measure of acidity / alkalinity
ppb	parts per billion
ppm	parts per million
precip	precipitated
$\mathbf{P_s}$	standard pressure
psi	pounds per square inch
pt	point; pint
Q	electric charge; energy; quantity
QF	quality factor
r	radius; radial distance;
R	resistance; range (radiation); rate, count; roentgen;
rad	radian
rf	radio frequency
rpm	revolutions per minute
s	distance; linear; second; soluble

S	observed standard deviation
sol	soluble
SSD	source-to-skin distance
stp	standard temperature and pressure
t	general temperature; time; tonne
T	absolute temperature; tera (prefix)
$T_{1/2}$	physical half-life
T_b	biological half-life
T_c	critical temperature
T_{eff}	effective half-life
T_s	standard temperature
µ	micro; micron (prefix)
µg	microgram
UHF	ultra high frequency
v	velocity, linear or particle
V	volt; volume; potential
VHF	very high frequency
W	watt
wt	weight
x	absorber thickness
Z	atomic number

7.2 SAFETY AND HEALTH LEGISLATION

THE REGULATORY REGIME OF SAFETY AND HEALTH IN THE FEDERAL PUBLIC SERVICE

THE LABOUR CODE

Federal departments and agencies are subject to the regulatory provisions of the Canada Labour Code. Regulations promulgated under the Code include the Canada Occupational Safety and Health Regulations, the Workplace Hazardous Materials Information System (WHMIS) and the Safety and Health Committees and Representatives Regulations. The Labour Program of Human Resources Development Canada (HRDC) enforces the provisions of the Code and its Regulations. Under the Code, employers and employees can be held legally accountable for non-compliance.

TREASURY BOARD PERSONNEL MANAGEMENT MANUAL ON OCCUPATIONAL SAFETY AND HEALTH

The Treasury Board Manual on Occupational Safety and Health sets out the policies, directives, standards and procedures to ensure that federal departments comply with the intent and provisions of the Labour Code and its Regulations. In some cases, the Treasury Board requirements are more stringent than the Code.

ENVIRONMENT CANADA

Environment Canada has established a number of safety and health policies, procedures and guidelines which are consistent with the Treasury Board requirements and the Labour Code.

DUTIES OF EMPLOYERS (SECTION 125 OF THE CANADA LABOUR CODE)

The general duty of the employer is to "ensure that the health and safety at work of every person employed by the employer is protected."

The following specific duties of employers and employees relate directly to the field operations of inspectors and investigators.

. . (.)every employer shall, in respect of every workplace controlled by the employer:

ACCIDENT INVESTIGATION AND REPORTING

"investigate, record and report in the manner and to the authorities as prescribed all accidents, occupational diseases and other hazardous occurrences known to the employer. " [part (c)]

FIRST AID

"provide prescribed first-aid facilities and health services." [part (h)]

POTABLE WATER

"provide, in accordance with prescribed standards, potable water." [part (j)]

VEHICLES AND MOBILE EQUIPMENT

"ensure that the vehicles and mobile equipment used by the employees in the course of their employment meet prescribed standards." [part(k)]

PERSONAL PROTECTIVE EQUIPMENT

"provide every person granted access to the workplace by the employer with prescribed safety materials, equipment, devices and clothing." [part(l)]

FIRE AND EMERGENCY MEASURES

"comply with prescribed standards relating to fire safety and emergency measures." [part (o)]

INFORMATION AND TRAINING

"provide, in the prescribed manner, each employee with the information, instruction, training and supervision necessary to ensure their health and safety at work."[part (q)]

HAZARD AWARENESS

"ensure that each employee is made aware of every known or foreseeable health or safety hazard in the area where the employee works." [part (s)]

MACHINERY, EQUIPMENT AND TOOLS

"ensure that the machinery, equipment and tools used by the employees in the course of their employment meet prescribed health, safety and ergonomic standards and are safe under all conditions of their intended use." [part (t)]

SAFETY CODES AND STANDARDS

"adopt and implement prescribed safety codes and safety standards." [part v]

USE OF PERSONAL PROTECTIVE EQUIPMENT

"ensure that every person granted access to the workplace by the employer is familiar with and uses in the prescribed circumstances and manner all prescribed safety materials, equipment, devices and clothing," [part w]

ORAL AND WRITTEN DIRECTION

"comply with every oral or written direction given to the employer by an appeals officer or a health and safety officer concerning the health and safety of employees." [part(x)]

DUTIES OF EMPLOYEES (SECTION 126 OF THE CANADA LABOUR CODE) While at work, every employee shall...

PERSONAL PROTECTIVE EQUIPMENT

"use any safety materials, equipment, devices and clothing that are intended for the employee's protection and furnished to the employee by the employer or that are prescribed." [part (a)]

PRESCRIBED PROCEDURES

"follow prescribed procedures with respect to the '...health and safety...' of employees." [part (b)]

PRECAUTIONS

"take all reasonable and necessary precautions to ensure the health and safety of the employee, the other employees and any person likely to be affected by the employee's act or omissions." [part (c)]

INSTRUCTIONS

"comply with all instructions from the employer concerning the health and safety of employees," [part (d)]

HEALTH AND SAFETY COMMITTEE

"cooperate with the policy and work place committees or the health and safety representative." [part (f)]

HAZARDS

"report to the employer any thing or circumstance in a work place that is likely to be hazardous to the health or safety of the employee, or that of the other employees or other persons granted access to the work place by the employer." [part (g)]

ACCIDENTS AND INJURY

"report in the manner prescribed every accident or other occurrence arising in the course of or in connection with the employee's work that has caused injury to the employee or to any other person." [part (h)]

ORAL AND WRITTEN DIRECTION

"comply with every oral or written direction of a health and safety officer or an appeals officer concerning the health and safety of employees." [part (i)]

WORKPLACES NOT CONTROLLED BY ENVIRONMENT CANADA

Many of your inspections and investigations will occur at other federal facilities or at private facilities regulated by provincial legislation. The legislative protection under the Canada Labour Code still applies, no matter where you are working.

FEDERAL FACILITIES

If you are inspecting another federal facility, Environment Canada must continue to protect your safety and health. The federal facility must also ensure your safety and health. To them, you are a visitor or "person granted access to the workplace." [Section 125, parts (l) and (w)]

PROVINCIAL FACILITIES

If you are inspecting private corporations or facilities regulated by provincial health and safety legislation, both you and your employer continue to be responsible for your health and safety. Some provincial occupational health and safety standards may differ from federal standards. However, the differences will probably be insignificant. Most provincial Occupational Health and Safety legislation protects you as a visitor (or a person granted access to the workplace) in the same manner as the Labour Code.

Under Section 128 of the Labour Code, there are provisions for employees to refuse dangerous work. You should familiarize yourself with the procedures and conditional clauses of this section, so that you fully understand its limitations.

TREASURY BOARD POLICIES, GUIDELINES AND PROCEDURES

All inspectors and investigators should familiarize themselves with the following Treasury Board Directives, Standards and Guides, etc. which may be applicable to the nature of their field duties:

TREASURY BOARD OSH

CHAPTER	TITLE
Directive 2-05	First-Aid Safety and Health Directive
Directive 2-07	Hazardous Confined Space
Directive 2-09	Tools and Machinery Directive
Directive 2-11	Motor Vehicle Operations Directive
Standard 2-13	Occupational Health Evaluation Standard
Directive 2-14	Personal Protective Equipment Directive
Directive 2-16	Elevated Work Structures Directive
Directive	Hazardous Substances Directive
Guide 5-3	Safety Guide for Operations over Ice
Guide 5-4	Safety Guide for Field Operations
Advisory Notice 6-3	The Effects of Extreme Cold
Advisory Notice 6-4	Occupational Exposure to Benzene

OTHER LEGISLATION

You must always be aware of and comply with:

- provincial/territorial OSH legislation
- municipal safety and health laws
- bylaws and other regulations that govern local jurisdictions

If you are uncertain as to the applicability of any laws, statutes or regulations, consult:

- your supervisor
- your local safety and health committee
- a regional safety and health advisor or the appropriate governing authority

7.3 EMERGENCY CONTACT NUMBERS

7.3.1 CANADIAN COAST GUARD SEARCH AND RESCUE CENTRES

CENTRE	TELEPHONE NUMBER
EAST	
St. John's, Nfld.	(709) 772-5151
Halifax, N.S.	(902) 427-8200
	1-800-565-1582
Other areas in the east	1-800-563-2444
CENTRAL	
Quebec City, P.Q.	(418) 648-3599
	1-800-463-4393
Trenton, Ont.	(613) 965-3670 / 3875
	1-800-267-7270
Other central areas:	1-800-661-5631
(including the Prairies and the Northwest Territories)	
WEST	
Vancouver, B.C.	(604) 666-6011
Victoria, B.C.	(604) 363-2333
	1-800-567-5111

7.3.2 CANUTEC (CANADIAN TRANSPORT EMERGENCY CENTRE)

CANUTEC is the Canadian Transport Emergency Centre operated by the Transport Dangerous Goods Directorate of Transport Canada. They provide bilingual (French & English) emergency response advice.

In an emergency, CANUTEC may be called collect at 613-996-6666 (24 Hours), or *666 cellular.

In non-emergency situations, call the information line at 613-992-4624 (24 hours).

7.3.3 HEALTH CANADA, OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES: REGIONAL OFFICES

DIRECTOR
OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES
PACIFIC REGION
Suite 515
Federal Building
757 West Hastings Street
Vancouver, British Columbia V6C 1A1
(604) 666-7310 / (604) 666-7487

DIRECTOR
OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES
PRAIRIE REGION
264-9777-102 Avenue
Edmonton, Alberta T5J 4G9
(403) 495-5598 / (403) 495-2177

DIRECTOR
OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES
ONTARIO REGION
301 Elgin Street
Ottawa, Ontario K1A 0L3
(613) 954-6541 / (613) 952-2017

DIRECTOR
OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES
QUEBEC REGION
Suite 202
East Tower-Place Guy Favreau
200 René-Lévesque Blvd. West
Montréal, Québec H2Z 1X4
(514) 283-2463 / (514) 283-4317

DIRECTOR
OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES
ATLANTIC REGION
1557 Hollis St
Suite 402
Halifax, Nova Scotia B3J 3V4
(902) 426-5023 / (902) 426-4833

7.3.4 LABORATORY CONTACTS – ENVIRONMENT CANADA

ATLANTIC REGION

ECB Laboratory

Moncton, New Brunswick

Organics	(506) 851-2892
Inorganics	(506) 851-2896
Toxicology	(506) 851-2885
Sample submission	(506) 851-2899
General	(506) 851-6606

QUEBEC REGION

ECB Laboratory

St. Lawrence Centre
Montreal, Quebec

Chemistry	(514) 283-2665
Toxicology	(514) 496-7106
General	(514) 283-7000

ONTARIO REGION

ECB Laboratory

National Capital Region

Organics	(613) 990-8559
Inorganics	(613) 990-8560

Waste Water Technology Centre
Burlington, Ontario

Organics/Inorganics	(905) 336-4750
Sample Submission	(905) 336-6933
General	(905) 336-6447

PRAIRIE AND NORTHERN REGION

EP Laboratory

Edmonton, Alberta

Organics	(403) 435-7251
Inorganics	(403) 435-7376
Toxicity	(403) 435-7242
General	(403) 435-7335

PACIFIC AND YUKON

ECB Laboratory

North Vancouver, British Columbia

Scientific Support	(604) 924-2532
Chemistry	(604) 924-2531
Environmental Toxicology	(604) 924-2513
General	(604) 924-2500
Sample Submission	(604) 924-2507

7.4. TABLES – SAMPLE CONTAINERS, PRESERVATION, HOLDING TIME

To get the best quality analytical results the correct handling of sample collection and its prompt delivery to the laboratory is crucial. The tables in this section outline container and preservation usage. Samples should be delivered to the laboratory as soon as possible to ensure the analytical results are representative of the collection site. Two definitions you should be aware of:

HOLDING TIME - is the length of time between when the sample is collected and when the sample is analyzed or fixed (i.e. extracted out of the matrix into solvent).

TURNAROUND TIME - is the length of time it takes from the laboratory receiving the sample, to the time of issueing a result of analysis to the submitter.

In most cases, it will be critical to get the sample to the lab as soon as possible. You should always keep holding time as short as possible and submit samples promptly. Samples will be flagged in the laboratory analytical report if holding times are exceeded and the submitter will be informed.

SAMPLE PRESERVATION

Since it is difficult to know what physical, biological and chemical changes may occur during holding time, samples should be refrigerated at approximately 4°C to reduce biological activity and the rate of chemical decomposition. Chemical preservatives should be added to the sample where required to fix the analyte in question from loss or breakdown.

NOTE: The following tables are also found in **THE INSPECTOR'S FIELD SAMPLING GUIDE**, please refer to this manual for full details on sampling protocols.

7.4.1 INORGANIC CHEMISTRY

Parameter	Substance	Sample Container	Preservation	Holding Time (days)+
ACIDITY, ALKALINITY	water	HDPE, 1 L++	4°C	14
AMMONIA	water	HDPE, 1 L++	4°C	5
BIOCHEMICAL OXYGEN DEMAND	water	HDPE, 1 L	4°C	3
BROMIDE, CHLORIDE, FLUORIDE, NITRATE, NITRITE, PHOSPHATE, SULPHATE, TOTAL NITROGEN	s/s/b	tissue cup, 125 mL	4°C	30
CHEMICAL OXYGEN DEMAND	water	HDPE, 250 mL	H_2SO_4 < pH 2*** (at lab)	30
CHLORIDE, FLUORIDE, SULPHATE	water	HDPE, 1 L++	4°C	30
CHLORINE, RESIDUAL	water	on site test	4°C	immediately
COLOUR	water	HDPE, 1 L++	4°C	3
CONDUCTIVITY	water	HDPE, 1 L++	4°C	30
CONDUCTIVITY	s/s/b	tissue cup, 125 mL	4°C	30
CYANIDE	water	HDPE, 250 mL	field NaOH > pH 12***	14 (7 for MMER)
CYANIDE	s/s/b	tissue cup, 125 mL	4°C	30
DISSOLVED OXYGEN	water	HDPE, 1 L	none; fill to exclude air; 4°C	ASAP
HEXAVALENT CHROMIUM	water	HDPE, 250 mL	4°C	24 h
LEACHATE	water	amber glass, 1 L		7
LEACHATE	s/s/b	amber glass, 1 L		7

Parameter	Substance	Sample Container	Preservation	Holding Time (days)+
MERCURY, dissolved	water glass, 100 mL	acid washed amber cellulose acetate filter, $K_2Cr_2O_7$ <	field filtered thru 0.45µ & HNO_3 pH 2*** (at lab)	30
MERCURY - total	water 100 mL	amber glass, < pH 2*** (at lab)	$K_2Cr_2O_7$ & HNO_3	30
MERCURY - total	s/s/b	amber glass, 180 mL or tissue cup, 125 mL	4°C	30
METALS - dissolved	water	new certified clean or acid washed HDPE, 250 mL	field filtered thru 0.45µ cellulose acetate filter, HNO_3 < pH 2 or filter & preserve at lab (source dependent)	180
METALS, total	water	new certified clean or acid washed HDPE, 250 mL	field HNO_3 < pH 2 or at lab (source dependent)	180
METALS, total	s/s/b	tissue cup, 125 mL	4°C	180
MOISTURE	s/s/b	tissue cup, 125 mL	4°C	30
NITRATE, NITRITE, PHOSPHATE - total, dissolved, ortho	water	HDPE, 1 L++	4°C	3
NITROGEN - total, dissolved	water	HDPE, 1 L++	4°C	5
NITROGEN, total kjeldahl	water	HDPE, 1 L++	4°C	28
NON-FILTERABLE RESIDUE - total, total dissolved, suspended also known as total suspended solids	water	HDPE, 1 L++	4°C	24 h pulp & paper effluent; 7 days other

Parameter	Substance	Sample Container	Preservation	Holding Time (days)+
PH	water	HDPE, 1 L++	4°C	3
PH	s/s/b	tissue cup, 125 mL	4°C	30
RADIONUCLIDE, RADIUM - 226	water	HDPE, 1 L		30
SULPHIDE	water	HDPE, 500 mL	field ZnAc	7
SULPHIDE	s/s/b	tissue cup, 125 mL	field ZnAc	30
TURBIDITY	water	HDPE, 1 L++	4°C	3
VOLATILE RESIDUE IN SEDIMENT	s/s/b	tissue cup, 125 mL	4°C	7

7.4.2 TOXICOLOGY

Parameter Name	Sample Container	Preservation	Holding Time (days)+
DAPHNIA (chronic 21d, chronic EC25)	20 L bioassay container	4°C	5
DAPHNIA (LC_{50}, LT_{50})	2 x 1 L HDPE	4°C	5
TROUT (LC_{50})	4 x 20 L bioassay containers	4°C	5
TROUT (LT_{50})	2 x 20 L bioassay containers	4°C	5

7.4.3 ORGANIC CHEMISTRY

Parameter	Substance	Sample Container	Preservation	Holding Time (days)+
ADSORBABLE ORGANIC HALIDES	water	amber glass, 500 mL**	field HNO_3 < pH 2***	30
ANTI-SAPSTAINS	water	amber glass, 1 L	4°C (refer to sampling protocol)	30
ANTI-SAPSTAINS	s/s/b	amber glass, 180 mL	4°C (refer to sampling protocol)	30
BEAR BILE	water	amber glass, 180 mL**	4°C	30
BEAR BILE	s/s/b	amber glass, 180 mL**	4°C	30
CARBON - total inorganic, total organic, dissolved inorganic, dissolved organic	water	HDPE, 250 mL	HCl < pH 2, 4°C	28
CARBON, total	solid	tissue cup, 125 mL	HCl < pH 2, 4°C	28
CHLORINATED PHENOLS	water	amber glass, 1 L**	4°C	30
CHLORINATED PHENOLS	s/s/b	amber glass, 180 mL**	4°C	30
DIOXIN & FURAN	s/s/b	amber glass, 180 mL**	4°C	30
DIOXIN & FURAN	water	amber glass, 1 L**	4°C	30
FATTY ACIDS	s/s/b	amber glass, 180 mL**	4°C	30
FATTY ACIDS	water	amber glass, 1 L**	4°C	30
GLYCOLS	water	amber glass, 1 L**	4°C	7
GLYCOLS	s/s/b	amber glass, 180 mL**	4°C	7
HERBICIDES (AEH)	water	amber glass, 1 L**	4°C	7
HERBICIDES (AEH)	s/s/b	amber glass, 180 mL**	4°C	30
HYDROCARBONS	water	amber glass, 1 L**	4°C	7
HYDROCARBONS	s/s/b	amber glass, 180 mL*/**	4°C	14

Parameter	Substance	Sample Container	Preservation	Holding Time (days)+
HYDROCARBON IDENTIFICATION	water	amber glass, 1 L**	4°C	7
HYDROCARBON IDENTIFICATION	s/s/b	amber glass, 1 L**	4°C	7
HYDROCARBON, OIL & GREASE	water	amber glass, 1 L**	HCl < pH 2*** (at lab)	30
HYDROCARBON, OIL & GREASE	s/s/b	amber glass, 180 mL**	4°C	30
OZONE-DEPLETING SUBSTANCES	container	2 cans of product	4°C	7
PCBS	water	amber glass, 1 L**	4°C	30
PCBS	s/s/b	amber glass, 180 mL**	4°C	30
PESTICIDES	water	amber glass, 1 L**	4°C	7
PESTICIDES	s/s/b	amber glass, 180 mL**	4°C	30
POLYCYCLIC AROMATIC HYDROCARBONS	water	amber glass, 1 L**	4°C	7
POLYCYCLIC AROMATIC HYDROCARBONS	s/s/b	amber glass, 180 mL**	4°C	30
RESIN ACIDS	water	amber glass, 1 L**	NaOH > pH 12*** (at lab)	30
RESIN ACIDS	s/s/b	amber glass, 180 mL**	4°C	30
SUBSTITUTED PHENOLS	water	amber glass, 1 L**	4°C	14
SURFACTANTS	water	amber glass, 1 L**	4°C	30
TRIHALOMETHANE	water	2 x amber glass, 40mL septum vials*	4°C	14
TRIHALOMETHANE	s/s/b	amber glass, 180 mL*/**	4°C	30
VOLATILES	water	2 x amber glass, 40mL septum vials*	4°C	7
VOLATILES	s/s/b	amber glass, 180 mL*/**	4°C	14

7.4.4 BACTERIAL SAMPLING

Parameter	Sample Container	Preservation	Holding Time (days)+
FECAL COLIFORM	aseptic 250 mL container	4°C; for chlorinated samples add sodium thiosulphate	6 hours max

BOTTLE DEFINITIONS

HDPE	**HIGH DENSITY POLYETHYLENE BOTTLE**
AMBER GLASS	**HEAT TREATED AMBER GLASS BOTTLE**
S/S/B	**SOIL/SEDIMENT/BIOTA *NO HEADSPACE/AIR BUBBLES IN CONTAINER**

**Containers must have Teflon lined cap
***Corrosive – wear protective gloves

+Holding time is from sampling to start of analysis (or fixed)
++Only one HDPE, 1 L bottle is required for all analysis

7.4.5 TEST SELECTION BY INDUSTRY TYPE

Depending on the situation, toxicology testing could be requested for any of these industry types.

AGRICULTURAL RUNOFFS
Herbicides, NO_{2+3}, Pesticides, Phosphorous, pH

CHEMICALS & PLASTIC
Metals

COAL MINES
NFR, PAHs

CONTAMINATED SITES
BTEX, EPH, VH/VPH, Metals, PAHs

DUST SUPPRESSION OILS
PCBs

FISH FARMS
Available Phosphorous, H_2S (field), Redox (field), Sediment Grain Size, Temperature (field), Total Metals, TVR

FISH HATCHERIES
Ammonia, NFR, Total Phosphorous

FOOD PROCESSING
Ammonia

GROUNDWATER
Bromide, Chloride, Fluoride, Metals, NO_{2+3}, Pesticides, pH, Turbidity

HAZARDOUS WASTE
Metals, PCBs, Pesticides

INDUSTRIAL EFFLUENT
Acidity, Alkalinity, Ammonia, Bacteria (Total/Fecal Coli), Bioassays, (Trout/Daphnia LC_{50} & LT_{50}), BOD, Bromide, COD, Chloride, Fluoride, Metals, NFR, NO_{2+3}, TOC, Turbidity

LANDFILL LEACHATES
Mercury, NO_{2+3}, pH

LAUNDROMATS
Ammonia, Phosphorous, pH, PERC

MEAT & POULTRY
Oils & Grease, pH

MINING & METAL FINISHING EFFLUENTS
Ammonia, Cyanide, Mercury, Metals, NFR, PAHs, pH, Sulphides

MUNICIPAL EFFLUENTS
Ammonia, Bacteria (TC, FC, Strep.), BOD, Bioassay (Daphnia and Trout), COD, Conductance, Metals NO_{2+3}, Ortho-P, pH, TOC, Total-P, Turbidity

PETROLEUM PRODUCTS (REFINERY)
VH/VPH for gasolines, mineral spirits, paint thinners
EPH for diesel fuels, lubricating oils & grease, hydraulic oils
BTEX, Oil & Grease, TOC, Metals, Sulphides, Turbidity, NFR, pH, Phenols

NOTE: Test for EPH in conjunction with VH to capture the quantitative values of most petroleum products. Let lab know if need to distinguish between naturally occurring vs. petroleum HC's

PULP AND PAPER
Ammonia, BOD, Dioxin/Furans, LC50/LT50 Fish & Daphnia, Metals, NFR, pH, Resin Acids

SMELTERS
Mercury, Metals, NO2+3

SURFACE WATER
Acidity, Alkalinity, Bacteria (enteroccus, E. coli, total/fecal coli), Chloride, Fluoride, NFR, Ortho-P, pH, TIC, Total-P, Turbidity

TRANSFORMERS, CAPACITOR
PCBs

WASTE OILS
EPH, Oil & Grease, PCBs, SWOG

WOOD CHIPS
Chlorinated Phenols

WOOD PRESERVING FACILITIES
Antisapstains (DDAC, IPBC, Cu-8, TCMTB), Chlorinated Phenols (penta, tetra, tri, di-chlorophenols, guiacols, catechols), PAHs

7.4.6 SCIENTIFIC ACRONYMS

AEH	Acid extractible herbicide
AOX	Adsorbable organic halides
BOD	Biochemical (Biological) oxygen demand
BTEX	Benzene, toluene, ethylbenzene, and xylene (see VOC)
CGI	Combustible gas indicator
COD	Chemical oxygen demand
COLIWASA	Composite liquid waste sampler
CP	Chlorinated phenols
CR^6	Hexavalent chromium
CRM	Certified reference material
Cu-8	Copper 8
DDAC	Didecyldimethylammonium chloride
DI	Deionized water
DIC	Dissolved inorganic carbon
DO	Dissolved oxygen
DOC	Dissolved organic carbon
DQO	Data quality objective
EPH	Extractible petroleum hydrocarbon
FC	Fecal coliform
GPS	Global positioning system
HEPH	High extractable petroleum hydrocarbons
H_2S	Hydrogen sulphide
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IPBC	3-iodo-2-propynylbutyl carbamate
LC_{50}	Lethal concentration
LEL	Lower explosive limit
LEPH	Low extractable petroleum hydrocarbons
LT_{50}	Lethal time
LOD	Limits of detection
MMER	Metal mining effluent regulation
NFR	Non-filterable residue (also know as TSS)

NO_{2+3}	Nitrite + Nitrate
NP	Nitrogen phosphorus
OC	Organochlorine
OD	Outer diameter
ODS	Ozone-depleting substances
OP	Organophosphate
Ortho-P	Ortho Phosphorous
PAH	Polycyclic aromatic hydrocarbons
PCB	Polychlorinated biphenyl
PCDD	Polychlorinated dibenzodioxins
PCDF	Polychlorinated dibenzofurans
PERC	Tetrachloroethylene
ppb	parts per billion
ppm	parts per million
SRM	Standard reference method
Strep	Streptococci
SWOG	Special waste oil and grease
Redox	Oxygen reduction potential
TC	Total coliform
TCDD	tetrachlorodibenzo-para-dioxin
TCDF	tetrachlorodibenzo furan
TCLP	Toxicity Characteristic Leaching Procedure
TCMTB	2-(thiocyanomethylthio) benzothiazole
TDG	Transportation of Dangerous Goods (Act and regulations)
THM	Trihalomethane
TIC	Total inorganic carbon
TOC	Total organic carbon
Total-P	Total Phosphorous
TSS	Total suspended solids, also known as NFR non-filterable residue
TVR	Total volatile residues
SAD	Strong acid dissociable
UEL	Upper explosive limit
VACSAM	Vacuum sampler
VH/VPH	Volatile Hydrocarbon/Volatile Petroleum Hydrocarbon
VOC	Volatile organic carbon
WAD	Weak acid dissociable

7.5 PHONETIC ALPHABET

Alpha
Bravo
Charlie
Delta
Echo
Foxtrot
Golf
Hotel
India
Juliet
Kilo
Lima
Mike
November
Oscar
Papa
Quebec
Romeo
Sierra
Tango
Uniform
Victor
Whiskey
X-ray
Yankee
Zulu

7.6 TYPICAL SURVIVAL KIT

EQUIPMENT

- first-aid kit (see Section 7.5.1 of this guide)
- 1 or more sleeping bags in a waterproof container
- 1 packet of flares
- 15 m of strong cord
- 1 radio or radiotelephone, where appropriate
- rations sufficient for the party for 3 days (see below)
- 2 L of fresh water per head (except where sea ice is abundant)
- large piece of plastic sheet or nylon tent fly, for making a temporary shelter
- matches or lighter in waterproof package
- stove and fuel
- waterproof flashlight (except in Arctic in summer)
- metal signal mirror.

FOOD

- chocolate
- granola bars
- dried fruit
- canned meat
- hard tack
- freeze-dried foods
- packet soups
- tea bags;
- sugar.

CONTAINER

The best container for a survival kit is a plastic barrel with a tight-fitting lid which clamps shut with a metal hoop. The barrel must be roped in such a way that it can be securely fastened down, with a handle to allow easy transport. This same barrel is available in a model with a strapping system that allows the barrel to be carried like a backpack. The design also allows for easy securing in boats, etc.

7.6.1 FIRST-AID SUPPLIES (TB MANUAL)

Taken from: Appendix B of Chapter 2-5, Treasury Board Manual on Occupational Safety and Health

DESCRIPTION	ABBREVIATION
Standard First-Aid Kit*	S
Intermediate First-Aid Kit*	I
Pocket First-Aid Kit*	P

KIT'S CONTENTS	QUANTITY		
	S	I	P
Acetaminophen tablets,100s	1	1	0
Adhesive tape, surgical, 7.5 cm x 4.6 m	1	1	0
Aluminum hydroxide and magnesium carbonat gel tablets, 50s	2	2	0
Applicator, disposable, 100s	1	0	0
Bandage, adhesive, butterfly closure, 100s	1	1	0
Bandage, adhesive, 25s	0	1	1
Bandage, adhesive, 100s	1	0	0
Bandage, cotton, elastic, 7.5 cm	4	2	0
Bandage, self-adhering roller 7.5 cm x 4.6 m	6	4	2
Bandage, triangular, 2s	8	4	1
Bath, eye	1	0	0
Pocket emergency blanket	2	2	1
Book, First Aid, English	1	0	0
Book, First Aid, French	1	0	0
Book, Pocket Guide			

to First Aid	0	1	1
Nail scrubbing brush	1	0	0
Calamine lotion	0	1	0
Case, First-Aid Kit	1	0	0
Case, thermometer	1	0	0
Cotton, purified, 28.0 g	6	6	0
Depressor, tongue, 25s	4	0	0
Dressing, first-aid, field	12	6	1
Forceps, hemostatic	1	0	0
Forceps, splinter	1	1	0
Form, Medical Field Card	20	0	0
Gloves, disposable (pair)	4	2	0
Litter, folding	1	0	0
Mask, resuscitation with disposable one-way valve	1	1	0
Mask, surgical disposable	2	2	0
Pad, cotton, eye	12	6	0
Pad, nonadherent, 200s	1	0	0
Pin, safety, 9s	4	0	0
Povidone-Iodine swabs,**10s	2	2	1
Scissors, bandage	1	1	0
Scissors, super shears	1	0	0
Shield, eye, surgical	1	0	0
Soap, surgical	1	0	0
Splint set, wood	1	1	0
Sponge, surgical, 10.0 cm x 10.0 cm, 2s	12	4	0
Thermometer, clinical	1	0	0
Waste, matted yarns	1	1	0
Water purification tablets, 100s	2	1	0

* = Not stocked as a complete kit. Kit contents must be ordered separately.

** = Shelf-life of 18 months maximum from date received for kit.

REFERENCES

Many of the following references are distributed or sold on the internet, please see the indivdual websites for the most recent information.

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Canada Safety Council. *All-Terrain Vehicles: ATV Smart Rider,* CD-ROM. Available from the Canada Safety Council. www.safety-council.org 1765 St. Laurent Blvd., Ottawa, Ontario, K1G 3V4.

Canadian All-Terrain Vehicle Distributors Council. *Like A Pro*, CD- ROM, website www.mmic.ca.

Canadian Centre for Occupational Safety and Health. Website, www.ccohs.ca. "ChemInfo" releases (printouts) on vinyl chloride and PCBs.

_____. *PCBs-The Current Situation*. K. Loralee Idler, Occupational Health and Safety Division, Ontario Ministry of Labour, 1986.

Canadian Coast Guard. “Safe Boating Guide”, 2003; see Transport Canada.

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Canadian Dermatology Association. Website, www.dermatology.ca, "Sun Facts." Information Pamphlet.

Canadian General Standards Board. Website, www.pwgsc.gc.ca/cgsb, standards for life jackets, and personal flotation devices.

Canadian Standards Association. Website, www.csa-intl.org, source of standards for compressed air breathing systems, emergency planning for industry, fall-arresting devices, personnel lowering devices and life lines, fall-arresting safety belts and lanyards for the construction and mining industries, industrial eye and face protectors, industrial protective headwear, lineman's body belt and lineman's safety strap, protective footwear and selection, care and use of respirators.

Environment Canada. Website, ec.gc.ca.

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_____. All regulations promulgated under the Canadian Environmental Protection Act (CEPA). Regulatory Affairs Division, Program Integration Directorate, Environmental Protection Service.

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_____. Field Operations and Safety Manual. Canadian Wildlife Research Centre, Canadian Wildlife Service, 1994.

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_____. Prairie and Northern Region Health and Safety Manual. Prairie and Northern Region, 1994.

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Gasoline Compliance Monitoring at Retail Outlets.

Contaminated Fuels Program

Detergent Compliance Monitoring

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