SELECTING HAZARD CONTROLS

CDN Power Pac supervisors and workers will work together on identifying hazards and to select the most appropriate controls. This is the best approach because it allows input from the workers who are most at risk to ensure that they are protected properly on the work site.

There are three common factors that influence the selection of hazard controls.

1. Legislation

- Has the hierarchy of Controls been used?
- Is there a legislated requirement for a Code of Practice?
- Does PPE or other equipment meet adopted standards?
- Are workers aware of how the hazard will be controlled?

2. Scope of Work

- Is this a short term project or long term work site?
- What is reasonably practicable based on the scope of work?

3. Site Management Requirements

- Has site management been involved in the hazard assessment process?
- Are there site management standards to consider when selecting controls?

HIERARCHY OF HAZARD CONTROLS

Hazard control must be a team effort by all divisions within the Company.
Worksite Hazards must be controlled in the following order on all CDN. Power Pac Job Sites:

1. Engineering Controls:

Engineering controls provide the highest degree of worker protection because they eliminate or control the hazard at its source. Engineering controls are the preferred method of eliminating or controlling hazards.

Engineering controls include the following:

a.) Elimination – Getting rid of a hazardous job, tool, process, machine or substance may be the best way of protecting workers. Examples include:

- using material handling equipment rather than have workers lift, lower, carry, etc. materials manually
- eliminating the need to elevate persons or objects above ground level

b.) Substitution – If elimination is not practical, try substituting or replacing one substance or process with another. Examples include:

- substituting a safer substance for a more hazardous one
- replacing hazardous operations with less hazardous operations

c.) Re-design – Hazards can sometimes be "engineered out" through redesign of the work site, workstations, work processes and jobs. Examples include:

- providing fail-safe interlocks on equipment, doors, valves, etc.
- installing guardrails around elevated work areas
- providing non-slip working surfaces
- controlling traffic to avoid collisions

d.) Isolation – Hazards can sometimes be isolated through containment or enclosure. Examples include:

- negative-pressure fume hoods in laboratory settings
- sound reducing enclosures for noisy equipment

e.) Automation – Some processes can be automated or mechanized. Examples include:

- spot welding by industrial robots
- assembly line operations that require repetitive manual handling by workers.

2. Administrative Controls:

If engineering controls cannot eliminate or control a hazard, administrative controls can be used to control the hazard to a level that is as low as reasonably achievable. Administrative controls are less effective than engineering controls since they do not eliminate the hazards. Examples include:

- Safe work practices, job procedures, policies, rules – safe work procedures describe how to correctly perform a job from start to finish
- Work/rest schedules to reduce worker exposure to hazardous substances or conditions
- Limiting hours of work
- Scheduling hazardous work during times when exposure of other workers is limited
- Wet methods as opposed to dry sanding or sweeping

3. Personal Protective Equipment (PPE):

As a last resort, workers may need to use personal protective equipment (PPE) to reduce the potentially harmful effects of exposure to a known hazard. PPE is much less effective than engineering controls since it does not eliminate the hazards.
PPE must be used properly and consistently to be effective. Awkward or bulky PPE may prevent a worker from working safely. In some cases, PPE can increase the likelihood of hazards such as heat stress and tripping and falling. Examples of PPE commonly used include:

- Safety eyewear, hard hats and safety boots
- Hearing protection if workers are exposed to noise that exceeds allowable levels
- Respiratory protective equipment to protect the lungs against harmful dusts and vapors.

4. Combination of Control Methods:

The control of some hazards requires the combined use of all three control methods to reduce the hazard to the lowest level practicable or achievable. Employers are not restricted to a single approach if using a combination achieves a greater level of worker safety than if only one approach was used.

IMPLEMENTING CONTROLS

Managers and supervisors are responsible to inform affected workers of all hazards and their available controls. Temporary controls may be used pending the use of permanent ones.

CPP's Job Hazard Analysis (JHA) shall be one of the main sources of information for hazard controls, training requirements, safe work procedures, and PPE requirements.

Control of some hazards can be implemented with a minimum amount of planning *(eg. Putting on a hard hat).* Others may require more planning *(eg. Installation of a ventilation system)*. Regardless of the control, some level of planning must occur before introducing any hazard control into a work site.

Some considerations when planning controls;

- Does the control require an installation or modification?
- Will there be a work stoppage? And for how long?
- Does an outside organization have to come on site to install the control?
- Who is supplying the control?
- Will the control impact other parts of the operation or equipment?
- Will the control affect manufacturer's specifications?
- Is there any training requirements needed for workers?
- How will all affected workers be informed of the control?
- Will all shifts need to be notified?
- What are the timelines for implementation?
- Is the control covered by existing policies and procedures?
- Is a new policy or procedure required?
- Have other contractors been informed of the control?
- Does the owner of the project need to be informed of the control?

MONITORING CONTROLS

Monitoring controls involves checking to see if a control is still being effective. There are a number of opportunities for monitoring of controls to occur on a worksite, some opportunities are;

During Inspections

- Formal Inspections
- Informal Inspections

Exposure Testing

- Noise monitoring
- Water testing
- Air sampling and testing

Work Site Documentation

- First Aid records
- Incident reports
- Hazard reports
- Near Miss reports
- Investigation reports
- Hazard Assessments

Worker Feedback

- H&S Meetings
- Toolbox talks
- HSC/HSR
- Internal communications

REINFORCING USE OF HAZARD CONTROLS

CPP Managers and supervisors are responsible to reinforce the use of controls at a work site. Lack of supervision, worker turn over and production demands are all examples of situations where workers may begin to work around controls. In serious cases, CPP may utilize company rules to enforce the use of hazard controls. Opportunities to reinforce Hazard Controls;

- *Pre-Project meetings*
- *Inspections and Hazard Assessments (JHA)/(FLHA)*
- *Safety Meetings/Toolbox Talks/HSC Meetings*
- *Employee Disciplinary Meetings (enforcement)*

PERSONAL PROTECTIVE EQUIPMENT (PPE).

PPE devices alone should not be relied on to provide protection against hazards, but should be used in conjunction with guards, engineering controls, and sound manufacturing practices.

Except for CSA approved footwear, CPP provides all employees with required Personal Protective Equipment (PPE) to suit the task and known hazards.

The minimum required Personal Protective Equipment for all CPP projects is:

- *CSA Approved Eye Wear*
- *CSA Approved Type 1/Class E or G Hard Hat*
- *CSA Approved Foot Protection (usually boot type with ankle protection)*
- *CSA Approved Gloves*
- *High visibility stripes or vest*
- *Hearing protection (May not need to be worn at all times, but must be readily available.)*
- *Cloth Mask or other approved COVID face covering*

Some PPE does not need to be worn all the time and is mainly used when working on certain tasks. Even though this PPE can reduce the risk of incident and injury on certain tasks, if worn for all tasks it does have the potential to increase incidents and injury. For this reason we call this form of PPE; *Specialized Personal Protective Equipment* because of its requirement in "specialized" tasks.

Many different companies have their own classifications of specialized PPE, it does not usually fall under one encompassing umbrella. Specialized PPE for CDN Power Pac usually consist of, but is not limited to three types of specialized PPE; *Arc Flash, Respirators, and Confined Space*.

RULES GOVERNING PPE USE;

- Supervisors/foreman must continually monitor their jobsite for the proper use of PPE.
- Employees observed not using PPE in the proper manner shall be corrected immediately. Continued problems concerning the improper use of PPE shall be documented on the Incident/ Near Miss Report.
- Failure to use PPE in the proper manner is grounds for discipline up to and including dismissal.
- ALL employees with CPP are responsible for inspecting their PPE ***PRIOR*** to use!
- Any damaged, expired or faulty PPE is to be discarded immediately, and new PPE will be issued before work commences.

EYE AND FACE PROTECTION.

The majority of occupational eye injuries can be prevented by the use of suitable/approved safety glasses, goggles, and/or face shields. Each employee shall use appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation. Where eye protection is required under company policy each employee shall use eye protection that provides side protection. Detachable side protectors are acceptable unless a client's policy does not allow.

Each employee who wears prescription lenses while engaged in operations that involve eye hazards shall wear eye protection that incorporates the prescription in its design, or shall wear eye protection that can be worn over the prescription lenses without disturbing the proper position of the prescription lenses or the protective lenses.

Eye and face PPE shall be distinctly marked to facilitate identification of the manufacture and approval.

When required, each employee shall use equipment with filter lenses that have a shade number appropriate for the work being performed for protection from injurious light radiation.

Typical hazards that can cause eye and face injury are:

- Splashes of toxic or corrosive chemicals, hot liquids, and molten metals.
- Flying objects, such as chips of wood, metal, and dust.
- Fumes, gases, and mists of toxic and corrosive chemicals.
- Aerosols of biological substances.

Prevention of eye accidents requires that all employees adhere to this code of practice.

EYE/FACE PROTECTION SPECIFICATIONS.

Eye and face protectors procured, issued to, and used by employees, clients and visitors must conform to the following design and performance standards:

- Provide adequate protection against the particular hazards for which they are designed.
- Fit properly and offer the least possible resistance to movement and cause minimal discomfort while in use.
- Be durable.
- Be easily cleaned or disinfected for or by the wearer.
- Be clearly marked to identity the manufacturer.
- Carry a recognized approval that identifies the equipment as safety equipment, i.e. CSA, ANSI, NIOSH, etc.
- Persons who require corrective lenses for normal vision, and who are required to wear eye protection, must wear goggles or spectacles of one of the following types:

    i. Spectacles with protective lenses which provide optical correction.

    ii.Goggles that can be worn over spectacles without disturbing the adjustment of the spectacles.

    iii. Goggles that incorporate corrective lenses mounted behind the protective lenses.

HEAD PROTECTION.

Hats have been designed and manufactured to provide workers protection from impact, heat, electrical and fire hazards. These protectors consist of the shell and the suspension combined as a protective system. Hard hats will be of nonconductive, fire and water resistant materials. The hard hat must protect the wearer's head against impact and against small flying or falling objects, and must be able to withstand an electrical contact equal to 20,000 volts phase to ground.

Head protection will be furnished to, and used by all CPP employees engaged in all projects.

CLASSIFICATION OF HARD HATS IN COMPLIANCE WITH OH&S REGULATION.

The "Type" and "Class" of hard hat can be identified by the CSA or ANSI label. Some manufacturers also stamp the CSA or ANSI classification into the shell of the hard hat under the brim.

CSA	*ANSI*
Z94.1-05: Class E, Type 1	*ANSI Z89.1-2009: Class E, Type I*
Z94.1-05: Class E, Type 2	*ANSI Z89.1-2009: Class E, Type II*
Z94.1-1992: Class E	*ANSI Z89.1-2003: Class E, Type I*
	ANSI Z89.1-2003: Class E, Type II

Other markings that should be found under the brim include:

- manufacturer's identity
- model
- class and type (e.g. Class E, Type 2)
- reverse orientation mark if applicable
- year and month of manufacture
- size or size range

STYLES OF HARD HATS.

Class E hard hats come in three basic styles:

1. Standard design with front brim, rain gutter, and attachment points for accessories such as hearing protection.
2. Standard design with front brim and attachment points for accessories, but without a rain gutter.
3. Full-brim design with attachment points for accessories and brim that extends completely around the hat for greater protection from the sun.

REVERSIBLE HARD HATS.

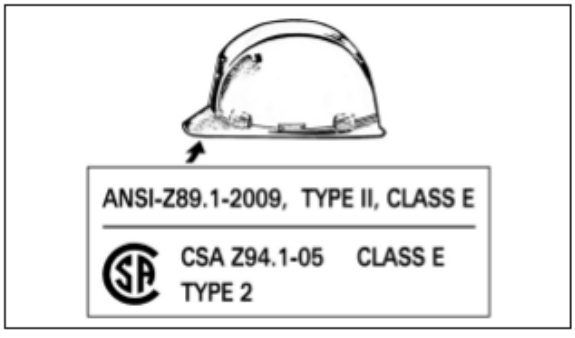
You should normally wear your hard hat facing forward. A hard hat should be worn in reverse only if the job, task, or work environment necessitates wearing it backward *(e.g. a face shield or welding helmet)*, or the hard hat has a reverse orientation mark as shown on Figure1A.

USE AND CARE OF HARD HATS.

Always consult the manufacturer's instructions for use and care instructions of your hard hat. For instance, the instructions should indicate the service life of your hard hat. You may also need to know what components of the hard hat must be inspected before each use. Hard hats are designed to absorb some of the energy of a blow through destruction of its component parts and, even though damage may not be apparent, any partial protective headwear subjected to severe impact should be replaced.

Hard hats must not be painted or cleaned with solvents. Any decals applied to the protective headwear must be compatible with the surface material and known not to affect adversely the characteristics of the materials used in the protective headwear. Any addition or structural modification may reduce the protective properties afforded to the protective headwear.

When hair length poses a potential hazard, precautions must be taken to prevent entanglement.



CSA label, stamped into the shell, indicating Class E, Type 2 hard hat

FOOT PROTECTION.

There are two major categories of work-related foot injuries. The first category includes foot injuries from punctures, crushing, sprains, and lacerations. The second group of injuries includes those resulting from slips, trips, and falls. Slips and falls do not always result in a foot injury but lack of attention to foot safety plays an important role in their occurrence.

These two categories of foot injuries, however, do not exhaust the whole range of foot problems at work. There are also other conditions such as calluses, ingrown toenails or simply tired feet that are common among workers. Although these may not be considered as occupational injuries in the strictest sense, they can have serious consequences for health and safety at the workplace. They cause discomfort, pain and fatigue. Fatigue sets up the worker for further injuries affecting the muscles and joints. Also, a worker who is tired and suffering pain is less alert and more likely to act unsafely. An accident or incident of any kind may result.

Safety footwear is designed to protect feet against a wide variety of injuries. Impact, compression, and puncture are the most common types of foot injury.

Footwear must be chosen based on the hazards that are present. Assess the workplace and work activities for:

- Materials handled or used by the worker.
- Risk of objects falling onto or striking the feet.
- Any material or equipment that might roll over the feet.
- Any sharp or pointed objects that might cut the top of the feet.
- Objects that may penetrate the bottom or side of the foot.
- Possible exposure to corrosive or irritating substances.
- Possible explosive atmospheres including the risk of static electrical discharges .
- Risk of damage to sensitive electronic components or equipment due to the discharge of static electricity.
- Risk of coming into contact with energized conductors of low to moderate voltage *(e.g., 220 volts or less).*
- Type of walking surface and environmental conditions workers may be exposed to *(e.g., loose ground cover, smooth surfaces, temperature, wet/oily, chemicals, etc.).*

Other risks that should be evaluated when assessing footwear are;

- Sprain to ankles from uneven walking surfaces or rough terrain.
- Foot injury due to exposure to extreme hot or cold.
- Slips and falls on slippery walking surfaces.
- Exposure to water or other liquids that may penetrate the footwear causing damage to the foot and the footwear.
- Exposure to rotating or abrasive machinery *(e.g., chainsaws or grinders).*

FOOT PROTECTION FITTING.

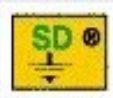
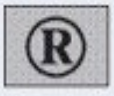
- Try on new boots around midday. Feet normally swell during the day.
- Walk in new footwear to ensure it is comfortable.
- Boots should have ample toe room *(toes should be about 12.5 mm from the front).* Do not expect footwear to stretch with wear.
- Make allowances for extra socks or special arch supports when buying boots. Try on your new boots with the supports or socks you usually wear at work. Check with the manufacturer if adding inserts affects your level of protection.
- Boots should fit snugly around the heel and ankle when laced.
- Lace up boots fully. High-cut boots provide support against ankle injury.

FOOT PROTECTION CARE.

- Use a protective coating to make footwear water-resistant.
- Inspect footwear regularly for damage *(e.g., cracks in soles, breaks in leather, or exposed toe caps)*.
- Repair or replace worn or defective footwear.
- Electric shock resistance of footwear is greatly reduced by wet conditions and with wear.
- Footwear exposed to sole penetration or impact may not have visible signs of damage. Replacing footwear after an event is advisable.

FOOT PROTECTION SYMBOLS AND MARKINGS;

The following symbols, or markings, determines which footwear is appropriate for the job.;

Symbol	Description	Grading	Suitable For
	Green Triangle	Grade 1 sole and toe protection	Heavy Industry e.g. construction sites. Toe impact protection up to 125 joules
	Yellow Triangle	Grade 2 Sole and toe protection	Light Industry. Toe impact protection up to 90 joules
	White with orange omega symbol (Greek)	Soles provide electric shock resistance	Industry with accidental exposure to live electrical conductivity
	Yellow background with green SD letters	Soles dissipate electrostatic charge in controlled manner ie anti-static protection	Industry where static discharge can be hazardous
	Red background, black C letter and grounding symbol	Soles are electrically conductive	Environments where low electrical charges may present a hazard
	White background with a green fir tree	Protection from chainsaws	Forestry workers using hand-held chainsaws or other cutting equipment
	Blue square	Grade 1 toe protection only (up to 125 joules)	Industrial work not requiring sole puncture protection
	Grey background	Grade 2 toe protection (up to 90 joules)	Non-industrial work not requiring sole puncture protection

HAND PROTECTION.

PPE for the hands come in many forms, each designed to protect against certain hazards. Gloves most commonly used in the construction industry are made from leather, cotton, rubber, synthetic rubbers and other man-made materials, or combination of materials. Whatever the task is at hand, the correct type of PPE hand protection must be used.

Hand protection is required when employees' hands are exposed to hazards such as those from skin absorption of harmful substances; severe cuts or lacerations; severe abrasions; punctures; chemical burns; thermal burns; and harmful temperature extremes.

Skin contact is a potential source of exposure to toxic materials; it is important that the proper steps be taken to prevent such contact. Gloves should be selected on the basis of the material being handled, the particular hazard involved, and their suitability for the operation being conducted. One type of glove will not work in all situations.

Most accidents involving hands and arms can be classified under four main hazard categories: chemicals, abrasions, cutting, and heat. There are gloves available that can protect workers from any of these individual hazards or combination of hazards.

Gloves should be replaces periodically, depending on frequency of use and permeability to the substances handled. Gloves overtly contaminated should be rinsed and then carefully removed after use.
Gloves should also be worn whenever it is necessary to handle rough or sharp-edged objects, and very hot or very cold materials. The type of glove material to be used in these situations includes leather, welder's gloves, aluminum-backed gloves, and other types of insulated glove materials.
Careful attention must be given to protecting hands when working with tools and machinery. Power tools and machinery must have guards installed or incorporated into their design that prevent the hands from contacting the point of operation, power train, or other moving parts.

To protect the hands from injury due to contact with moving parts, it is important to:

- Ensure that guards are always in place and used.
- Always lock out machines or tools and disconnect the power before making repairs.
- Treat a machine without a guard as inoperative; and
- Do not wear gloves around moving machinery, such as drill presses, mills, lathes, and grinders.

SELECTION GUIDELINES FOR HAND PROTECTION.

Selection of hand PPE shall be based on an evaluation of the performance characteristics of the hand protection relative to the task to be performed, conditions present, duration of use, and the hazards and potential hazards identified.
Gloves are relied upon to prevent cuts, abrasions, burns and skin contact with chemicals that are capable of causing local or systemic effects following dermal exposure.
There is no glove that provides protection against all potential hand hazards. Commonly available glove materials provide only limited protection against many chemicals.
Therefore, it is important to select the most appropriate glove for a particular application and to determine how long it can be worn, and whether it can be reused. It is also important to know the performance characteristics of gloves relative to the specific hazard anticipated; *(i.e., chemical hazards, cut hazards, flame hazards, etc.).*
Before purchasing gloves, request documentation from the manufacturer that the gloves meet the appropriate test standards for the hazards anticipated.

As long as the performance characteristics are acceptable, in certain circumstances, it may be more cost effective to regularly change cheaper gloves than to reuse more expensive types.

HAND PROTECTION FOR ELECTRICAL SAFETY.

It is important to train workers to select gloves rated for their particular applications. For example, gloves may be selected that meet ASTM D120 standards for protection against circuits up to 500 volts AC (Class 00) or for protection against circuits up to 1,000 volts AC (Class 0). Similarly, gloves also are rated for use in applications where protection against higher voltages is required. Class 1 gloves can be used up to 7,500 volts AC, Class 2 up to 17,000 volts AC, Class 3 up to 26,500 volts AC, and Class 4 up to 36,000 volts AC.

Cotton glove liners may be used inside to absorb perspiration and to improve wearer comfort. Wool and thermal liners also are available for use in cold outdoor applications. Various styles of liners are offered by glove manufacturers.

Leather protector gloves should be worn over electrical insulating gloves to provide needed mechanical protection against abrasion or cuts. Even a small puncture in an electrical insulating glove will allow electrical current to reach the hand. Before purchasing a protector glove, make sure it complies with ASTM F696, which is required by OSHA. Also, it is important for the purchaser of the protector gloves to ensure there is enough clearance between the top of the protector gloves' cuffs and the top end of the beads of the rubber insulating gloves

Hand Protection for Electrical Safety (cont.)

While protective gloves offer a first line of defense against electrical hazards, a full range of protective equipment, dielectric tools, lockout or tag-out devices, and other safety equipment and safety procedures are necessary to minimize the danger of many low-voltage electrical hazards.

Knowing your cut hazards on site can dictate which level of cut resistance you may require to mitigate the potential for cuts, scrapes and lacerations..

ANSI CUT-RESISTANT LEVELS.

Old ANSI Cut-Resistant Levels (Grams)	New ANSI Cut-Resistant Levels (Grams)	Applications By Cut Level
1 (200)	**A1** Light cut hazards (200)	Material handling, small parts assembly (sharp edges), packaging, warehouse, general purpose, forestry, construction
2 (500)	**A2** Light/medium cut hazards (500)	Material handling, small parts assembly (sharp edges), packaging, warehouse, general purpose, forestry, construction, pulp ad paper, automotive assembly
3 (1000)	**A3** Light/medium cut hazards (1000	Material handling, small parts assembly (sharp edges), packaging, warehouse, general purpose, forestry, construction, pulp ad paper, automotive assembly
4 (1500)	**A4** Medium cut hazards (1500)	Appliance manufacturing, bottle and light glass handling, canning, drywall work, electrical, carpet installation, HVAC, pulp ad paper, automotive assembly, metal fabrication and handling, packaging, warehouse, aerospace industry, food prep/ processing
5 (3500)	**A5** Medium/heavy cut hazards (2200)	Appliance manufacturing, bottle and light glass handling, canning, drywall work, electrical, carpet installation, HVAC, pulp ad paper, automotive assembly, metal fabrication and handling, packaging, warehouse, aerospace industry, food prep/ processing
	A6 High cut hazards (3000)	Metal stamping, metal recycling, pulp and paper (changing slitter blades), automotive assembly, metal fabrication, sharp metal stampings, glass manufacturing, window manufacturing, recycling plant/sorting, HVAC, food prep/ processing, meat processing, aerospace industry
	A7 High cut hazards (4000)	Metal stamping, metal recycling, pulp and paper (changing slitter blades), automotive assembly, metal fabrication, sharp metal stampings, glass manufacturing, window manufacturing, recycling plant/sorting, HVAC, food prep/ processing, meat processing, aerospace industry
	A8 High cut hazards (5000)	Metal stamping, metal recycling, pulp and paper (changing slitter blades), automotive assembly, metal fabrication, sharp metal stampings, glass manufacturing, window manufacturing, recycling plant/sorting, HVAC, food prep/ processing, meat processing, aerospace industry
	A9 High cut hazards (6000)	Metal stamping, metal recycling, pulp and paper (changing slitter blades), automotive assembly, metal fabrication, sharp metal stampings, glass manufacturing, window manufacturing, recycling plant/sorting, HVAC, food prep/ processing, meat processing, aerospace industry

WHMIS 2015 PROGRAM.

The purpose of this WHMIS 2015(Workplace Hazardous Materials Information System) program is to ensure that all employees receive adequate training and knowledge in the safe handling, PPE, first-aid treatment and disposure of hazardous materials in the workplace.

The Occupational Health and Safety Act Part IV and *Workplace Hazardous Material Information System (WHMIS) Regulation 860*, require all workplaces to follow specific regulations in order to minimize exposure to hazardous materials. CDN Power Pac (CPP) shall comply with the WHMIS 2015 regulations in all its facilities. Applicable hazardous materials used with CPP shall comply with the requirements of WHMIS.

ROLES AND RESPONSIBILITIES:

1. *Suppliers;*

- Classifying hazardous materials into the six WHMIS classes. A supplier must consider the technical criteria of each of the six classes and determine the applicability to its products.
- Providing supplier labels on the hazardous materials going to the workplace.
- Providing MSDSs with the hazardous materials going to the workplace.
- Providing any information available including trade secrets *(confidential business information)* to a doctor or nurse in the case of a medical emergency.

2. *Supervisors;*

- Advising workers of hazards in their workplace (OHSA, sec. 25, 27 and WHMIS (860) sec. 6). Supervisors have a legal duty to be familiar with the WHMIS requirements as outlined in this program and all other hazards associated with the job.
- Identifying equipment, protective devices and measures to be taken to enable the employee to work safely.
- Ensuring that employees work as required, using the required equipment and protective measures identified by the supervisor or by the Occupational Health and Safety Act or regulations.
- Ensuring all hazardous materials in the workplace is properly labelled.
- Maintaining a current file of MSDSs for all controlled products used in a work area. All MSDSs must be current to within three years. New or updated MSDSs should be obtained from the supplier.

WHMIS 2015 Roles and Responsibilities (cont.)

Supervisor (cont.)

- Providing worker education. Employee positions must be rated in terms of the potential risk of exposure to hazardous materials on the job. Supervisors must ensure that adequate and appropriate training is attained by employees who work with or in close proximity to hazardous chemicals.
- Updating hazardous materials inventories on an annual basis, as requested by the Health and Safety Department.

3. *Workers;*

- Working in compliance with OH&S legislation and the WHMIS regulation (860) and following safe work procedures.
- Reporting any hazards or personal chemical exposure incidents to their supervisor.
- Not using any machine, equipment, etc., in such a way, or working in a manner, that places them or others in danger.
- Applying their WHMIS training to work safely on the job.

4. Health and Safety Administration;

- Identifying hazards related to hazardous materials and processes.
- Consulting in the development and review of the CPP WHMIS program.
- Obtaining media information for site offices, trailers and for safety meetings.

WHMIS 2015 CLASS AND DIVISION HAZARD SYMBOLS;

WHMIS 1988 Hazard Class	WHMIS 1988 Symbols	WHMIS 2015 Symbols	WHMIS 2015 Hazard Class
A			Gases Under Pressure
B1 to B6			Flammables, Self-Heating, Emit Flammable Gases, Pyrophoric Gases, Liquids & Solids Organic Peroxides
C			Oxidizing Gases, Liquids, Solids
D1			Acute Toxicity - Oral, Dermal, Inhalation
D2			Eye Irritation, Skin Irritation Skin/Respiratory Sensitization, Carcinogenicity Mutagenicity Reproductive Hazards
D3			Biohazardous Infectious Materials
E			Skin/Eye Corrosion Corrosive to Metals
F			Self-Reactive Substances Organic Peroxides
N/A	N/A		Explosive Substances (Explosives are still covered under WHMIS exclusions for now)
N/A	N/A		Aspiration, STOT (Single Exposure, Repeated Exposure)
N/A	N/A	N/A	Combustible Dusts
N/A	N/A	N/A	Simple Asphyxiants
N/A	N/A	Use appropriate symbol	Physical Hazards Not Otherwise Classified, Health Hazards Not Otherwise Classified

WHMIS Class and Division Hazard Symbols (cont.)

Hazard Symbol	Class of Controlled	Potential Hazard	Handling Instructions	Examples
	**Class A** - Compressed Gas	Poses an explosion danger because gas in cylinder is held under pressure. Container may explode if heated. May be an asphyxiate. Container may explode if dropped.	Do not drop container. Keep container away from all ignition sources. Store only in designated areas.	Acetylene, Oxygen, Carbon Dioxide in Fire Extinguishers, Propane.
	**Class B** - Flammable and Combustible Material	May burn at relatively low temperatures. May burst into flame spontaneously in air or release a flammable gas on contact with water. May cause a fire when exposed to heat, sparks, or flames or as a result of friction.	Keep the material away from heat sources and other combustible materials. Never smoke when working with or around material. Store in a cool fire proof area.	Acetone, Kerosene, Butane, charcoal, varnish, spray paints, Ammonia, Chlorine
	**Class C** - Oxidizing Material	Poses a fire and or explosion risk in the presence of flammable combustible material. May cause fire when it comes into contact with combustible materials such as wood. May burn skin and eyes upon contact.	Keep the material away from combustible materials and store in designated area. Keep the material away from sources of ignition. Wear proper protective equipment, including eye, face and hand protection and protective clothing.	Nitric Acid, Organic peroxides, Hydrogen peroxide

WHMIS Class and Division Hazard Symbols (cont.)

	**Class D**, **Division 1** Poisonous and Infectious Material: Immediate and serious toxic effects	Is a potentially fatal and poisonous substance. May be fatal or cause permanent damage if it is inhaled or swallowed or if it enters the body through skin contact. May burn skin and eyes upon contact.	Handle material with extreme caution. Avoid contact with the skin or eyes by wearing the proper protective equipment, including eye, face and hand protection and protective clothing. Avoid inhaling by working in well –ventilated areas and or wearing respiratory equipment. Wash and shower thoroughly after using Store the material in designated places only.	Sulphuric Acid, Acrylonitrile, Cyanide, Hydrofluoric Acid, Fuming Nitric Acid
	**Class D, Division 2** Poisonous and Infectious Material: Other toxic effects	Is a poisonous substance that is not immediately dangerous to health May cause death or permanent damage as a result of repeated exposures over time. May be a skin or eye irritant. May be a sensitizer, which produces a chemical allergy. May cause cancer. May cause birth defects or sterility.	Avoid skin and eye contact by wearing all protective equipment necessary including eye, face and hand protection and protective clothing Avoid inhaling by working in well-ventilated area and/or using respiratory equipment. Store the material in designated places only.	Lead, Mercury, Toluene, Xylene, Methylene Chloride.

WHMIS Class and Division Hazard Symbols (cont.)

	**Class D, Division 3** Poisonous and Infectious Material: Biohazardous infectious materials	May cause a serious disease resulting in illness or death.	Take every measure to avoid contamination. Handle the material only when fully protected by the proper, designated equipment. Handle the material in designated areas where engineering controls are in place to prevent exposure.	Aids, Hepatitis B, Salmonella, Malaria.
	**Class E -** Corrosive Material	Causes severe eye and skin irritation upon contact. Causes severe tissue damage with prolonged contact. May be harmful if inhaled.	Keep containers tightly closed. Avoid skin and eye contact by wearing all necessary protective equipment, including eye, face and hand protection and protective clothing. Avoid inhaling by using in well-ventilated areas only and/or wearing the proper respiratory equipment.	Bleach, Hydrochloric Acid, Sulfuric Acid, Ammonium Hydroxide, Sodium Hydroxide
	**Class F -** Dangerously Reactive Material	Is very unstable. May react with water to release a toxic or flammable gas. May explode as a result of shock, friction or increase in temperature. May explode if heated when in a closed container.	Keep material away from heat. Open containers carefully, Do not drop them. Store the material in a cool, flame -proof area.	Ozone, Picric Acid, Florine, Hydrogen Cyanide, Sulfuric acid

WHMIS CLASSES AND POTENTIONAL HEALTH EFFECTS.

CLASS A : COMPRESSED GAS -

A substance that at room temperature (20 ºC) is in the gaseous state and kept under pressure. *(e.g. oxygen, anhydrous ammonia, chlorine, acetylene, etc.).* Examples found on campus are acetylene, helium, ammonia, argon, chlorine, hydrogen, nitrogen, oxygen, and propane.

- If the head of a gas cylinder is broken off, the escaping gas can propel it like a rocket.
- If overheated, the cylinder could explode even if the gas is not explosive or flammable.
- Some gases such as chlorine and ammonia are poisonous.
- If a leak develops, concentrations of the gas in the air could become life threatening.
- A major leak from a cylinder in an enclosed space will replace some of the air.
- Some compressed gases (e.g. acetylene, propane and hydrogen) are flammable. An air-gas mixture leak of this nature in a room can be dangerously explosive.
- All cylinders of compressed gases must be secured by chains or straps so they won't fall over.
- Cylinders are strapped or chained to a cart, and are always transported with the protective cylinder cap (not a regulator) in place.
- Pressurized cylinders should be stored where they will not be exposed to temperatures above 50ºC.
- Empty cylinders should be labelled as such and stored separately from full ones.

CLASS B : FLAMMABLE AND COMBUSTABLE MATERIALS -

A solid, liquid or gas that will ignite and continue to burn if exposed to a flame. Combustible liquids have a flash point between 37.8 ºC to 93.3 ºC, whereas flammable liquids have a flash point below 37.8 ºC. Flash point is defined as the lowest temperature at which a flammable liquid gives off sufficient vapor to form an ignitable mixture with air near its surface or within a vessel.
This class includes *six types* of materials:

WHMIS Classes and Potential Health Effects (cont.)

Class B : Flammable & Combustible Materials (cont.)

- Many solvents and lubricants are flammable or combustible liquids (e.g. diethyl ether, varsol) and many aerosols (e.g. spray paints, WD-40) contain flammable compressed gases as propellants.
- If inhaled, solvent vapors can affect the brain. Symptoms include dizziness, nausea, staggering, fainting, and slurred speech. Some solvents (e.g. diethyl ether) are anesthetics. If excessive amounts of the chlorinated vapors (i.e., carbon tetrachloride, methylene chloride) are inhaled regularly over months or years, they may cause cancer or chronic liver and kidney damage.
- Solvents tend to remove protective oils from the skin, causing chapped skin, dermatitis or skin rashes after prolonged or repeated exposures.
- Solvents splashed into the eyes can cause severe irritation.
- Petroleum distillates (e.g. varsol, gasoline) can cause a severe reaction if the liquid gets into the lungs.
- Avoid sparks and flames near solvents, especially flammable or combustible solvents.
- Do not store solvents, particularly flammable ones, in sunlight or where they may be heated above room temperature.
- Do not store or transport solvents together with strong acids or with oxidizers.
- Move victims of vapor inhalation to fresh air and give artificial respiration if required.
- If the material is splashed into the eyes, flush with plenty of water for at least 15 minutes.
- Use a non-abrasive soap when washing these materials from the skin.
- If a spill occurs, identify the spilled material, get help immediately, use protective equipment, and contain the spill using a suitable absorbent such as sand.
- Use a respirator when handling spills in an enclosed space.
- Use the buddy system when cleaning up hazardous spills.

WHMIS Classes and Potential Health Effects (cont.)

CLASS C : OXIDIZING MATERIAL -

Any material that causes or contributes to the combustion of another material by yielding oxygen or any other oxidizing material, whether or not the material itself is combustible, e.g. hydrogen peroxide, oxygen, potassium permanganate.

CLASS D : POISONOUS AND INFECTIOUS MATERIAL -

This class includes three further divisions:

Class D1: Materials causing immediate and serious toxic effects.

These are materials which cause serious harmful effects, including death, within a short period of time after exposure. This division has two further subdivisions:

◊ *Subdivision A:* Very Toxic Material. i.e., LD50 (oral)<50mg/kg *E.g. chlorine, potassium cyanide*.

◊ *Subdivision B:* Toxic Material. i.e., 500mg/kg>LD50 (oral)>50mg/kg *E.g. hydroquinone.*

NB: LD50 is lethal dose 50 – the single dose of a substance that causes death in 50% of a test animal population by exposure to the substance via absorption, ingestion or injection. It is expressed as milligrams of substance per kilogram o f the animal's body weight. The route of exposure and the species of animal is often also indicated.

Class D2: Materials causing other toxic effects.

This division includes materials which cause chronic toxic effects. This division has two further subdivisions:

◊ *Subdivision A:* Very Toxic Material. This includes materials which can cause: Chronic toxicity, Teratogenicity, Carcinogenicity, Reproductive toxicity, Respiratory tract sensitization.

◊ *Subdivision B:* Toxic Material. This includes materials which can cause: Chronic toxicity, Skin or eye irritation, Skin sensitization, Mutagenicity.

Class D3: Bio hazardous infectious material.

An organism or its toxins that may cause serious infectious disease. e.g. viruses, bacteria.

WHMIS Classes and Potential Health Effects (cont.)

CLASS E : CORROSIVE MATERIAL -

A substance that will erode steel or aluminum or destroy animal tissues, e.g. sodium hydroxide *(caustic soda),* hydrochloric acid. Some examples of acids are sulphuric, nitric and muriatic acids. Some examples of alkalis are sodium hydroxide (caustic soda, lye), potassium hydroxide, ammonium hydroxide (ammonia), and liquid drain opener. Some examples of other chemical irritants are formaldehyde and calcium chloride.

- Many acids and alkalis are corrosive when concentrated. They will burn the skin and eyes.
- If diluted, they are better described as irritants. Irritants will cause reddening and pain, but probably no permanent damage if washed off promptly.
- Strong acids should be stored separately from other types of chemicals.
- Many strong acids and alkalis generate heat when mixed with water which could cause them to boil.
- Always add acid to water, not water to acid.
- For splashes on the skin or in the eyes, wash with water for at least 15 minutes and seek medical attention.
- If a spill occurs, identify the spilled material and get help immediately. Sweep up solid materials or soak up liquids with a neutralizer (available from Spill Kits).
- Always wear protective equipment.

CLASS F : DANGEROUSLY REACTIVE MATERIAL -

A material which will react with water to produce a poisonous gas or which will undergo a reaction if the container is heated, pressurized or agitated, e.g. hydrogen peroxide and aluminum sulphide produce hydrogen sulphide gas in water.

WHMIS LABELLING;

1. Supplier Labels:

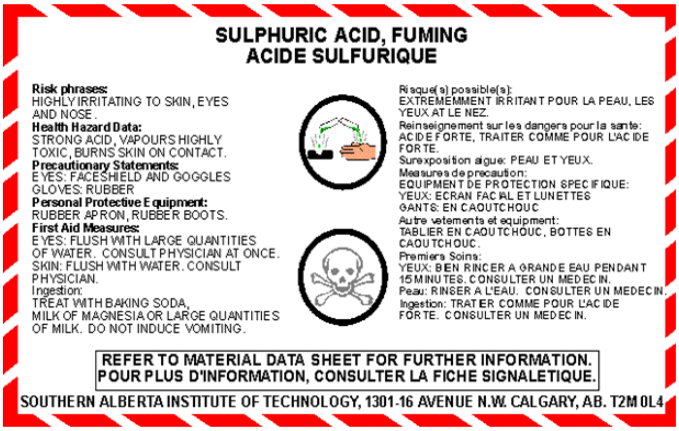
A "supplier" is anyone who manufactures, processes, packages or imports controlled products. The supplier is obligated to provide package labelling and MSDS's. The "supplier label" will have the following seven categories of information:

1. *Product Identifier - The product name or number must be identical to the product identifier on the MSDS.*
2. *Supplier Identifier - This will include the supplier, manufacturer or importer's name and the location of the principal place of business.*
3. *Reference to MSDS - A statement such as "SEE MATERIAL SAFETY DATA SHEET" is required and must appear on the WHMIS label when an MSDS is required.*
4. *WHMIS Hazard Symbols - These must meet the regulatory specifications. All symbols will have a distinctive circular border, and must be displayed in a color that will not be confused with TDG safety marks, such as the orange explosive symbol found in TDG regulations. Prohibited colors are contained in the WHMIS Regulations. Often these symbols appear in black and white only.*
5. *Risk Phrases - Wording which clearly indicates the risks involved when using the product.*
6. *Precautionary Measures - Safe handling, use and storage information for the product.*
7. *First-Aid Measures - A clear description of the immediate steps to be taken in the event of harmful contact with the product.*

In addition to the above, supplier labels must also have a distinctive "hash mark" border, letters, numbers which contrast distinctly from any other markings on the containers. For "suppliers labels" information must be in English and French, for all seven categories. For containers of 100 milliliters [ml] or less only the following four categories of information need be provided on a supplier label:

1. Product identifier *2. Supplier identifier*

3. A reference to the MSDS *4. Hazard symbols*



WHMIS Labelling (cont.)

2. Workplace Labels:

If a controlled product is transferred at the workplace to other containers, the employer may need to apply a workplace label to the new container. Workplace labels provide the following information:

Product Identification, Information for safe handling, A statement indicating that the MSDS is available.

Workplace labels may be in the language of choice at the workplace.

A workplace label is not needed when the product is used in a laboratory, the product will be under the control of the employee who transferred the product to the new container for use on the same shift, or a controlled product is produced in a laboratory for research and development work in the same laboratory.