

<u>Mandate</u>

Accident and illness prevention is the primary goal of Occupational Health and Safety Division.

It is recognized that all workers have a fundamental right to a workplace that neither impairs their health nor imperils their safety. This is achieved by working with stakeholders to establish, promote and enforce

workplace practices, standards and procedures.

Inspection Division

Responsibility Areas:

Safety Inspections
Occupational Health

Industrial Hygiene
Radiation Protection
Ergonomics
Hazardous Materials

Mining Safety



Responsibility of the Division

Maintain up to date legislation to address health and safety in consultation with stakeholders

Maintain standards of health and safety for the protection of workers

Prepare accident and morbidity statistics of workers

Responsibility of OHS Officer

The OHS Officers are responsible for enforcing standards of safety by assessing workplace health and safety conditions to ensure employers and workers are complying with occupational health and safety legislation



Authority of an Officer

Section 26 of the OH&S Act

- For the purpose of ensuring compliance with the Act or Regulations the ADM or an Officer may:
- Enter a place of work at any reasonable hour
- Require production of documentation and remove them
- Conduct tests, take photographs
- Inspect and collect samples
- Conduct Investigations to determine cause
- Compel the attendance of witnesses and take evidence under oath

Legislation Administered by the Division

- The Occupational Health and Safety Act and Regulations
 - OHS First Aid Regulations
 - WHMIS Regulations
 - Asbestos Abatement Regulations
- The Radiation Health and Safety Act and Regulations
- The Mines (Safety of Workers) Regulations

Occupational Health and Safety Act

Rights of Workers

- ✓ To know
 ✓ To participate
 ✓ To refuse
 <u>Authority/Power of:</u>
 ✓ Minister
- ✓ Officers

Responsibilities

- ✓ Employers
- ✓ Supervisors
- ✓ Workers
- ✓ Principal Contractors
- ✓ Suppliers
- ✓ Committees
- \checkmark Division
- ✓ Others

What is Safety?

- Safety is doing something, not just thinking about it.
- Development of safety policy and program
- It's ... a responsibility a commitment ... an obligation.
- It's understanding that hazards exist and a willingness to contribute to control these risks.

Why Do Accidents Occur?

- Lack of training
- Lack of experience
- Not wearing appropriate PPE
- Using incorrect tools
- Not following work practices
- Taking short cuts
- Fatigue
- Lack of concentration



OHS and the Municipality

- A municipality falls within the definition of an "employer" under the Occupational Health and Safety Legislation
- Section 4 of the Act An employer shall ensure where it is reasonably practicable, the health, safety and welfare of his or her workers

OHS and the Municipality (cont'd)

- This must include:
 - necessary equipment, systems and tools
 - information, instruction, training and supervision, including instruction on the use of devices or equipment provided for the worker's protection

 Ensure that workers and particularly supervisors are familiar with the hazards that may be met by them in the workplace

Common Safety and Health Hazards for municipal workers

- Safety Hazards
 - Material Handling
 - Mobile Equipment
 - Electrical Hazard
 - Working at Heights
 - Slips, trips and falls
 - Trenching
 - Compressed gas cylinders

- Health Hazards
 - Chemical
 - Biological
 - Ergonomic
 - Physical
 - Confined Space Hazards

Trenching

- Water and sewer installation and repairs
- Roadside ditching
- Underground tank installation/removal
- Culvert installation





What Workers Must Know and Do

- Requires proper sloping depending on the soil type **OR**
- Proper shoring to prevent cave-ins, OR
- Use of a trench box, properly designed and installed
- An effective means to prevent water accumulation must be provided.



What Workers Must Know and Do

- **DO NOT ENTER** a trench without the appropriate stabilization of the sides of the trench
- Excavations over 1.22 meters depth require a ladder to be provided in the immediate area where the workers are employed
- Excavated material is not permitted to remain within 1.22 meters of the edge of a trench-type excavation nor within 1.52 meters of a pit-type excavation

Diving and Water Safety

- Only commercial divers, NOT recreational divers, allowed to do commercial work
- Minimum crew of 3
- 99% of time not on SCUBA
- Life jackets on wharf edge
- Rescue boat
- Raft must be designed by P.Eng. and have safe working load

Mobile Equipment

- The equipment operator is responsible
- Proper safeguards in place
- Properly maintained
- Manufacturer's instructions followed
- Any problems fixed prior to use



Compressed Gas Cylinders

- Under pressure and pose an explosion hazard
- Must be properly secured (tied in position)
- Must be transported properly
- Shall be returned after task finished
- Handled With Care



Equipment Guarding

- Saw blades
- Conveyers
- Power take off units
- Drive belts and chains



Our latest (and one of our largest!) oil-tight casings for a satisfied Litco client, completed in June 1999.

Select the Proper Type of PPE for the Job

Identify the hazards first i.e. Water Hazards

PPE is the last line of defense and only work if you wear it!



Personal Protective Equipment

Hazard	Equipment
Struck on head	CSA hard hat
Eye injury	Safety glasses
Hand abrasion	Gloves
Crushing of foot or puncture	CSA safety boots
Fumes/mists	Proper respirator
Traffic in proximity of work	Highly visible barricades
area	Appropriate traffic control
High noise levels	Hearing protection

Specific Personal Protective Equipment

- SCBA Self Contained Breathing Apparatus
 - Requires Specific Training
 - Special Measures
 - Facial Hair
 - Supervision
 - Maintenance Schedule

Powerline Hazards

- Specific Training for Powerline Hazards
- Contact Utility
- Minimum Clearances
 - Overhead Powerlines
 - Underground Powerlines
- Operation of Backhoes and Mobile Cranes
- Stacking or Piling of Materials

Electrical Safety

- Only qualified workers do electrical work
- Always use GFCI on wet and damp areas
- Working on electrical equipment LOCK AND TAG out.
- Do not remove another person's lock or tag
- Bleed hydraulic and pneumatic pressure



Lockout/Tagout "ISOLATE"

- Electrical, Mechanical, Piping
- Lockout must be performed by qualified personnel "only"
- After isolation procedures have been performed, attempt to start equipment to ensure it has been isolated
- <u>See</u> policy and procedures



Working at Height

Defined as work above 3.05 meters (10 ft.) above a platform or grade.

Examples:

- Building and construction
- Roofing and siding
- Painting Buildings
- Street light repairs
- Sign installation

What Workers Must Know and Do

- Use an appropriate fall protection system
- Be informed and recognise what system is required to ensure your safety
- Work from suitable scaffolds
- Use life nets
- Use travel restriction systems

Fall Protection Equipment

- Inspect all Fall Protection Devices prior to use
- Ensure that it fits properly
- Use life lines and rope grabs where necessary
- Fall equipment includes: harnesses, lanyards, lifelines, rope grabs, tie off adapters, self retracting lanyards, etc. (available at stores)



Fall Protection Required

- 4/12 or greater slope roof
- Within 6 ft. of flat roof edge
- Working from ladders
- Scaffolds with platform on second frame
- Man lifts
- Around holes in floor or trench edge





Figure 2. Properly erected scattold.

Traffic Control

- Trained Flag Persons are required when high traffic volume, high speed or 1/4 of road blocked
- Appropriate Number to control traffic
- Appropriate Communication
 - Hand Signal
 - Radio Communication
- Signage with enough lead time for traffic
- Highly Visible Personal Protective Equipment, hat, glasses, boots

Health Hazards

- Hazards: chemical, biological, ergonomic, physical
- Chemical Hazards: asbestos, silica, lead, solvents, carbon monoxide, etc...
- Biological Hazards: mold, legionnaire's disease, blood-borne pathogens, etc...
- *Ergonomic*: office ergonomics, workstation design, manual materials handling
- *Physical*: radiation, noise, thermal stress

Hygiene Issues at Water Treatment Facility

Chemical Hazards

» chlorine, corrosive materials, hydrogen sulfide

Confined Spaces

- » oxygen deficiency
- » IDLH conditions
- » explosive environment
- » monitoring equipment
- WHMIS
- PPE

Corrosive Chemicals

- *Corrosive* = a substance that will burn or destroy some materials, including metals, plastics and human tissue
- Most common are acids (pH<7) and bases (pH>7) eg. *Hydrochloric acid*, nitric acid, phosphoric acid, sodium hydroxide, ammonium hydroxide
- Effects: burn skin, irritation of eyes, nose, respiratory tract. Can cause blindness, pulmonary edema
- Effects are instantaneous
- May have other toxic health effects



Chlorine

- Chlorine is a very reactive chemical; will react with many substances, including fats, oils and grease
- It is a corrosive material, and is also a very strong oxidizing agent
- Oxidizing agents/materials are: (a) liquids or solids that readily give off oxygen or other oxidizing substances; (b) materials that chemically react to oxidize a combustible (burnable) substance
- Chlorine gas, if mixed with a combustible substance, may cause a fire and/or explosion.
Chlorine Continued

- Chlorine gas is heavier than air and will collect in low-lying areas (eg. near the floor, in pits, confined spaces), therefore, it is a confined space hazard.
- Severe irritant of the eyes, throat, respiratory tract; will cause long term lung damage
- May be fatal if inhaled at high concentrations
- May cause blindness
- Control measures to prevent exposure include: proper engineering controls, wearing of appropriate PPE.

Hydrogen_Sulfide

- Extremely flammable and combustible substance that smells like rotten eggs at low concentration
- Found in sewage treatment operations
- Extremely poisonous and deadly
- Poor warning properties because sense of smell is rapidly impaired after prolonged exposure to concentrations below 100ppm, and odor is not evident at high concentrations (above 100ppm).
- Confined space hazard

Hydrogen Sulfide

- 0.001-0.13ppm: odor threshold
- 1-5ppm: offensive odor, nausea, tearing, headaches
- 20-50ppm: nose, throat and lung irritation, sense of smell, beginning to become "fatigued"
- 100-200ppm: severe irritation, sense of smell disappears (IDLH is 100ppm)
- 250-500ppm: potentially fatal build up of fluid in lungs
- 500ppm: dizziness, staggering, unconsciousness and death within 4-8 hours
- 500-1000ppm: respiratory paralysis, irregular heartbeat, collapse, death

Confined Space Entry Associated Hazards



Confined Space Entry

- A confined space may be defined as an enclosed or partially enclosed space that is large enough and so configured that an employee can enter and perform assigned work and have limited or restricted means of entry or exit and is <u>NOT</u> designed or intended for continuous human occupancy.
- A confined space can also pose respiratory concerns, such as oxygen levels being too high or too low. High levels of O₂ can also create explosion and fire hazards.

Typical Confined Spaces

 Manholes, sewers, boilers, tunnels, fuel tanks, ballast tanks, storage tanks, tank cars, vats, process vessels, septic tanks, etc.



Why People Die in Confined Spaces

- Do not recognize a confined space
- Trust their senses
- Underestimate the dangers
- Do not realize how quickly they can become overcome
- Let their guard down
- They try to rescue other people

The Basics to Staying Alive

- IDENTIFY
- TEST (have work permit issued)
- EVALUATE and ISOLATE (lockout/tagout)
- MONITOR
- RESCUE



IDENTIFY

- Understand and recognize a confined space
- Do not assume that if you do not see or smell anything, it is safe; you can not see, taste or smell most toxic or deadly atmospheres
- Do not underestimate the danger
- Recognize how quickly you can be overcome by a deadly atmosphere or buried alive
- Recognize that a hazard may develop **AFTER** you have entered the space

TEST

• Testing is the only way to find out if the atmosphere in a confined space is safe to enter

Confined Spaces

- Hazardous atmosphere in a confined space may be due to:
 - (a) Oxygen deficiency
 - (b) IDLH (immediately dangerous to life and health)
 - (c) Unknown contaminant(s)
 - (d) Explosive atmosphere

Oxygen Deficiency

- Breathing atmosphere normally contains ~21% oxygen.
- Oxygen deficient atmosphere: <19.5%
- Oxygen enriched environment: >23.5%
- O₂ deficiency can lead to unconsciousness and death
- O₂ enriched atmosphere can cause fires, explosions

Oxygen Scale

- 23.5%.....O₂ enriched
- 21%.....Normal
- 19.5%......Minimum for safe entry
- 16%.....Impaired judgement and breathing
- 14%.....Faulty judgement, rapid fatigue
- 6%......Difficult breathing, death in minutes

Oxygen Deficiency

- O₂ in a confined space can be reduced by the process (eg. welding) or by a chemical reaction (eg. rusting, fermentation)
- If less than 19.5% O₂ present, cannot enter confined space unless equipped with a supplied air respirator (eg. SAR, SCBA)

IDLH Atmospheres

- IDLH immediately dangerous to life and health
- Eg. Chlorine IDLH is 10ppm
- If IDLH conditions exist, must only enter confined space if equipped with SAR/SCBA
- Follow proper confined space entry procedures first (i.e. ventilate)
- Note: If contaminants in a confined space are unknown, and/or the concentrations of a contaminant are unknown, it should be treated as an IDLH situation.

Explosive Atmosphere

- Explosive limits specify the concentration range of a material in the air which will burn or explode in the presence of an ignition source.
- The LEL (lower explosive limit) is the lowest concentration of a gas or vapour that will burn or explode if ignited. The upper explosive limit (UEL) is the highest concentration that will burn or explode.
- Below the LEL, there is not enough of the gas in the air to support a fire/explosion.
- Above the UEL, there is too much of the gas (i.e. not enough oxygen) to support a fire/explosion.
- If the atmosphere contains within 10% of the LEL, it is considered an explosive atmosphere.

Monitoring Equipment

- "Confined Space Meter"
- Usually equipped with multiple sensors, including:
 - O_2 must be at least 19.5% to enter
 - LEL set at 10%
- Other sensors may be:
 - CO (carbon monoxide)
 - H₂S (hydrogen sulfide)
 - Chlorine

Monitoring Equipment Cont'd

- Regular care and maintenance of the equipment must be taken to ensure it performs accurately and consistently.
- Must be calibrated regularly, as according to manufacturer's specifications.
- Must be stored and handled appropriately.
- Users should be trained on how to use the device and how to interpret the readings.

EVALUATE

Know what precautions are required and take them; know what hazards are present or when hazards might develop

MONITOR

 Monitor continuously or test frequently to ensure that you are aware if the atmosphere changes while you are in the space

RESCUE

- **NEVER** enter a confined space to rescue someone without appropriate rescue equipment, training and instruction and the required personnel. This would include a standby person.
- **NEVER** enter a space to attempt to rescue a person on your own.



Workplace Hazardous Materials







WHMIS Overview

- Purpose of WHMIS
 right to know-
- WHMIS
 Legislation
- WHMIS is a Hazard Communication System



Workplace Hazardous Materials Information System (WHMIS)

WHMIS consists of three key elements:

- Labels
- Material Safety Data Sheets
- Worker Education

WHMIS

- Controlled Products Act and Regulations provide a list of hazardous materials that are referred to as WHMIS controlled products.
- 6 classes of WHMIS controlled products:
 - Compressed gas
 - Flammable and combustible material
 - Oxidizing material
 - Poisonous and infectious material
 - 1. Materials causing immediate and serious toxic effects
 - 2. Materials causing other toxic effects
 - 3. Biohazardous and infectious materials
 - Corrosive material
 - Dangerously reactive material



Class A: Compressed Gas



Class D1: Poisonous and Infectious Material



Class E: Corrosive Material



Class B: Flammable and Combustible Material



Class C: Oxidizing Material



Class D2: Other Toxic Effects



Class D3: Biohazardous and Infectious Materials



Class F: Dangerously Reactive Material

PPE

- Personal Protective Equipment
- Includes: safety glasses/goggles, face shield, safety shoes, hearing protection, respirator, protective vest, gloves, aprons
- MSDS states what protective clothing is required (eg. type of respirator, gloves etc.)
- Protects worker from exposure via inhalation (respirator) and dermal routes

What is Asbestos?

- Is a Mineral
- Mined in Open Pit
- Composed of silicon, oxygen, hydrogen, and various metals
- Needle like fibers
- Too small to be seen by the human



Comparative Diameters

Human Hair = 75 Micrometers

Glass Fiber = 5 Micrometers

Asbestos = 0.4 Micrometers

Asbestos Fibers- Magnified



Asbestos Containing Materials (ACMs)

- Asbestos is a term used to describe a group of naturally occurring fibrous mineral silicates
- All building and construction materials containing greater than 1% asbestos are considered ACMs
- Repeated inhalation of asbestos fibre above permissible limits is linked to serious respiratory diseases, such as asbestosis, mesothelioma and lung cancer

Asbestos Containing Materials (ACMs)

- Asbestos fibers can cause disease if they are inhaled
- ACMs are found in:
 - Insulation, siding, ceiling tile, etc. in older buildings
 - Insulation in water reservoirs
 - Old water and sewer pipes

Asbestos Containing Materials (ACMs)

- Asbestos materials that are in good condition and left undisturbed pose little risk to workers
- Any worker required to handle or disturb ACMs must have the required training and wear appropriate personal protective equipment

Asbestos Cement Pipes (A/C)

- Municipal workers may encounter asbestos cement pipes during water services maintenance and upgrades
- Workers who handle such materials require asbestos abatement training
- Follow established safe work procedures for involving ACMs including the appropriate personal protective equipment

Asbestos Cement Pipes (A/C)

- Do not disturb (cut, break, scrape, etc.) ACMs unless absolutely necessary
- Wet methods or containment must be used when cutting asbestos cement pipes
- Disposal of ACMs requires approval from Government Service Centre

- Work requires asbestos abatement training for workers handling ACMs
- Follow an established procedure for ACM removal or repair
- Ensure replacement parts are stored in a manner that prevent fibres from becoming airborne
- Do not cut or break ACMs unless absolutely necessary, and when you do, ensure that proper PPE is used
Conclusion

• Implement Safety Management System

- Set the Example
- Participate in Inspections
- Enforce Safety Procedures
- Perform Accident Investigations
- Do your Part for Safety
- Keep Safety First