



The Power of Public Works

2018 Joint Annual Conference & Trade Show

Are you at Risk of Exposure?

Sept 18th 2018



Presentation Objectives

Employer Case Study – serious OH&S Violations

Some Industrial Hygiene Principles

Understanding health hazards – Asbestos / Silica / Lead

Understanding the Risk of Exposure

Brief Legal Review and Employer Obligations

Employer Case Study *(Asbestos)*

School District (BC) Event (2016 ??):

The Employer conducted **renovation** work at a school; the Employer caused its workers to perform work in areas where there was a high risk of disturbing asbestos-containing materials (ACM's)

The Employer had failed to:

- conduct a Hazardous Materials Survey (**OH&S Reg Part 20**)
- obtain an asbestos inventory for the building (**Part 6**)
- inform workers of the presence of ACM's (**Part 6**)
- provide protective clothing & equipment to workers (**Part 6**)

Result: employer stopped work; and following a WSBC Inspection – a Penalty Sanction was imposed: **\$628,034 (High Risk Violation)**

(Source: WorksafeBC Magazine – July / August 2017)



As we get started: Some Industrial Hygiene Principles

Occupational Exposures – or Occupational Exposure Limits (*OEL's*) are established in *Part 5 – specifically 5.48*

An *OEL* is the maximum allowed airborne concentration for a particular substance from which *nearly all workers are believed to experience no adverse health effects over a working lifetime* (Source: *ACGIH – Documentation of TLV's – the exposure “Bible”*)

OELs may be set out as an 8-hour time-weighted average concentration, short term exposure limit, or ceiling limit

By using the expertise, resources, and review process of the ACGIH, WorkSafeBC is able to ensure that *OELs* remain consistent with workplace practices, technological advances and other changes affecting occupational health and safety and occupational environment

As we get started: Some Industrial Hygiene Principles

Ceiling Value (limit) – "*ceiling limit*" means the concentration of a substance in air which may not be exceeded at any time during the work period

Action Level – in regard to OHS Reg 5.54 Exposure Control Plan (ECP):

(1) An Exposure Control Plan (ECP) must be implemented when:

(a) exposure monitoring under section 5.53(3) indicates that a worker is or may be exposed to an air contaminant in excess of 50% of its exposure limit

As we get started: Some Industrial Hygiene Principles

Designated Substances – as it relates to OHS Reg 5.57

(1) If a substance identified as any of the following is present in the workplace, the employer must replace it, if practicable, with a material which reduces the risk to workers:

- (a) ACGIH A1 or A2, or IARC 1, 2A or 2B ***carcinogen***;
- (b) ACGIH ***reproductive toxin***;
- (c) ACGIH ***sensitizer***;
- (d) ACGIH ***L endnote*** (No exposure limit; ALARA applies)

ALARA – "*as low as reasonably achievable*" or "*ALARA*" means, in reference to a substance, that measures must be taken to keep a worker's exposure to a level as low as is reasonably achievable

As we get started: Some Industrial Hygiene Principles

If any work might exceed the Occupational Exposure Limit for Asbestos / Silica / Lead

Air sampling is required at the beginning and throughout the work as necessary

Safe Work Procedures – are predicated on airborne contaminant levels

Risk Classification – is predicated on the potential for airborne contaminant levels



Asbestos is a group of naturally occurring mineral fibers

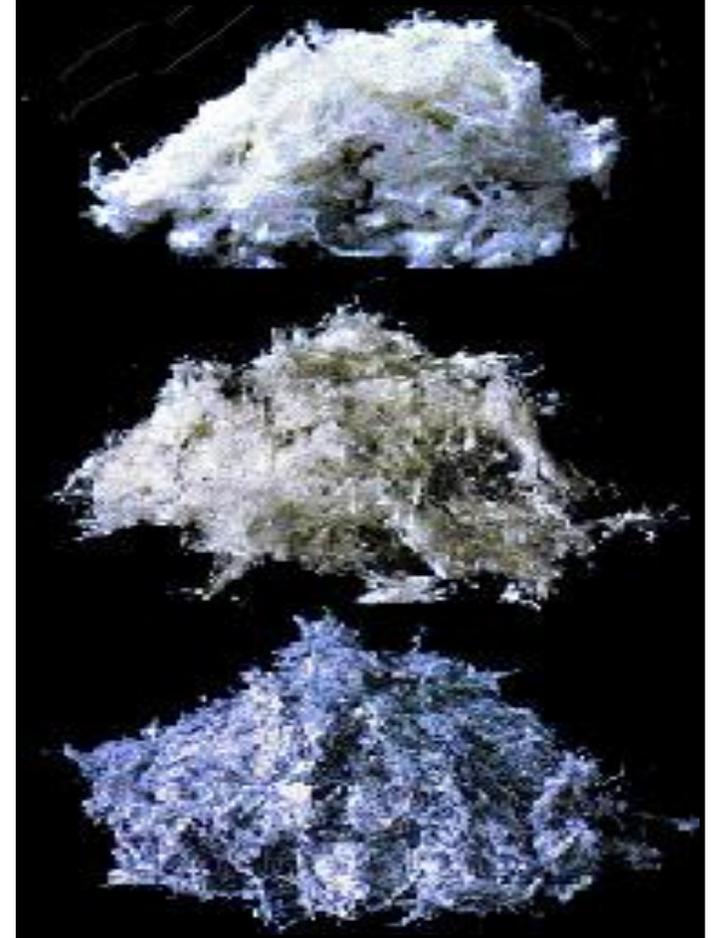


The 3 most common types include:

Chrysotile: White

Amosite: Brown

Crocidolite: Blue

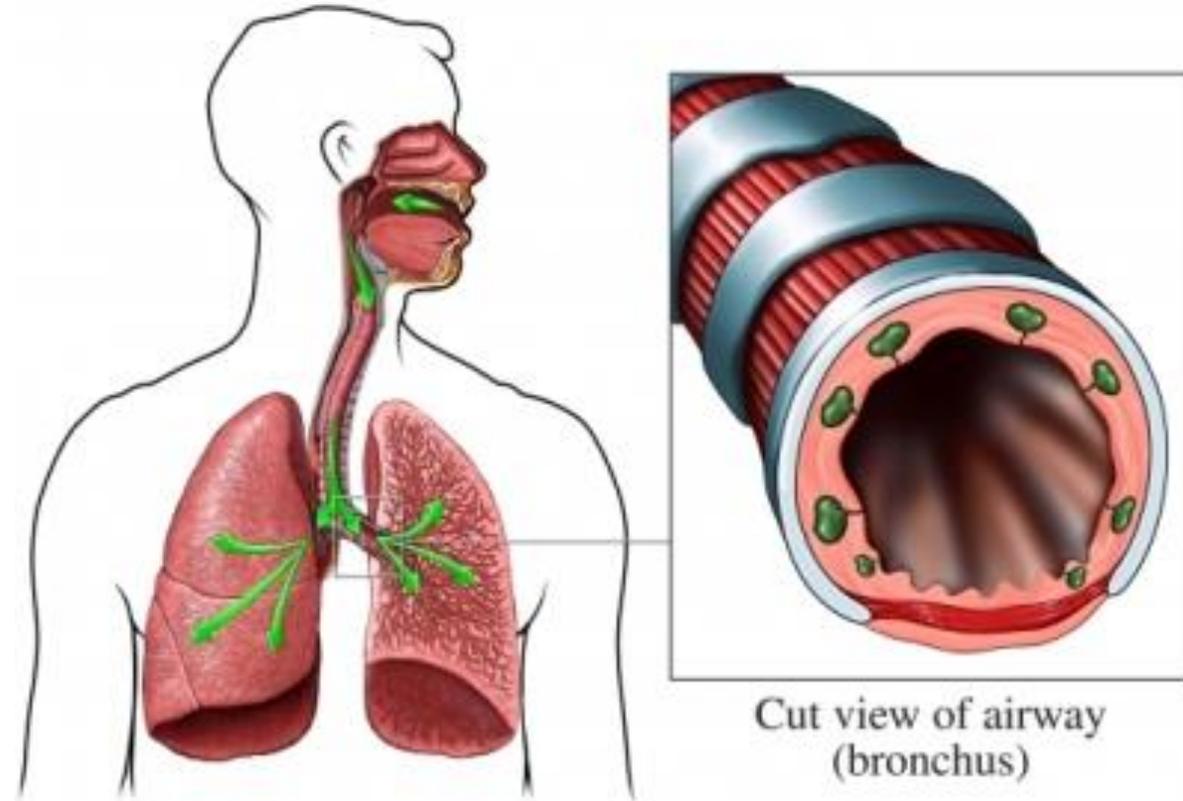


Health Effects of Exposure - Asbestos

Risk from inhaling airborne fibres

There are three main diseases caused by Inhalation of asbestos fibres:

- Asbestosis
- Lung cancer
- Mesothelioma



Asbestos – Exposure Limit: *0.1 f / cc (ACGIH / IARC Carcinogens)*

Airborne asbestos is measured as any number of asbestos fibers per volume of air collected

Fiber counting is a distinctly different analytical technology than bulk sample collection

Bulk asbestos sampling is a sampling method that reports the % (by weight) of asbestos present in a sample of material

In BC: any material > **0.5 %** asbestos by weight = Asbestos Containing Material (*ACM*)

Basic Requirements – for worker protection: Asbestos

At a *minimum* – some of the following worker protection protocols are required to be implemented during any asbestos-related work



Asbestos Control Methods/Options

- Removal
- Encapsulation
- Enclosure
- Survey & Management Plan
- PPE



Asbestos-Cement Pipe

Contains Asbestos and silica

Specific Safe Work Procedures are required

NO power tools are to be used – unless dust control is assured



Exposure Control Program and
Safe Work Procedures:
Part 5 and 6 – OH&S Regs

Asbestos – Controlling Exposures: Administrative Controls

The level of Risk to workers can be categorized as follows:

Low Risk – negligible airborne contaminant below the **Action Level**

Moderate Risk – detectable but below **10 X the Exposure Limit**

High Risk – anything above **10 X the Exposure Limit**

These Risk levels are based on the potential **airborne asbestos** concentration ranges anticipated or expected during work activity

Reference: [WSBC – Asbestos Manual](#) for further details

Silica is commonly found as Quartz

Silica is the second most common mineral on earth and makes up nearly all of what we call “sand” and “rock”

Silica exists in many forms - one of these, “crystalline” silica (including quartz), is the most abundant and poses the greatest concern for human health



Health Effects of Exposure - Silica

Inhaled silica can:

- Lead to scarring of the lungs
- Ultimately give rise to fibrosis of the lung tissue
- Result in a lung disease called “*silicosis*”
- Reduce the lung’s function and ultimately gas exchange

There is no cure

Activities – that generate Silica

Sawing, cutting or grinding concrete, masonry, brick, and tile

Loading, hauling, and dumping gravel

Granite, sandstone, and slate

Fibrous-cement board containing silica

Demolition of structures containing concrete

Activities – that generate Silica

Abrasive blasting (e.g., of concrete structures)

Jack hammering, chipping, or drilling rock or concrete

Road construction - asphalt (containing rock and stone)

Power sanding

Sweeping concrete dust

Silica – Exposure Limit: *0.025 mg / m³ (ACGIH / IARC Carcinogens)*

Many exposures occur for **short time periods**, but at very **HIGH concentrations**

Short-term high exposures can still exceed exposure limits and cause lung damage



Consider this rule-of-thumb:

If dust containing silica is visible in the air there is strong potential for it to be over the Occupational Exposure Level (OEL)

Silica Exposure: How might it happen?

Relatively LOW Risk Silica Work Activity

- Formwork
- Pouring concrete
- Mixing
- Place concrete / grout
- Clean-up of low exposure risk activities
- Wet coring

Silica Exposure: How might it happen?

MODERATE Risk Work Activity

- Grinding
- Drilling (> 15 minutes / shift)
- Chipping
- Cutting
- Demolition
- Clean-up of moderate exposure risk activities
- Tuck point grinding

Silica Exposure: How might it happen?

HIGH Risk Work Activity

If Moderate risk work activities occur:

- (1) - with no engineering controls
- (2) - in space constrained (e.g., stairwells) or enclosed areas or
- (3) if work activities are initiated with unknown information on workers' ***exposure levels*** to airborne silica the work activity will be deemed to be ***HIGH Risk*** activity

In order to assess workers' exposures to silica, personal silica air sampling must be conducted at the start of any work activities depending on the duration of the work activity

Work Activity – Generating Exposures

- Silica Exposures – how can it happen?



Jack hammering



Concrete sanding / grinding

Work Activity – Generating Exposures

- Cutting concrete composite materials (ie: Hardi-board)



Work Activity – Generating Exposures

- Dry sweeping and compressed air during cleaning



Controls – For Reducing Silica Dust Exposures

- Ideally: use a vacuum with High Efficiency Particulate Air (HEPA) filters



Wet cutting of concrete pole



Concrete sander with local HEPA exhaust ventilation

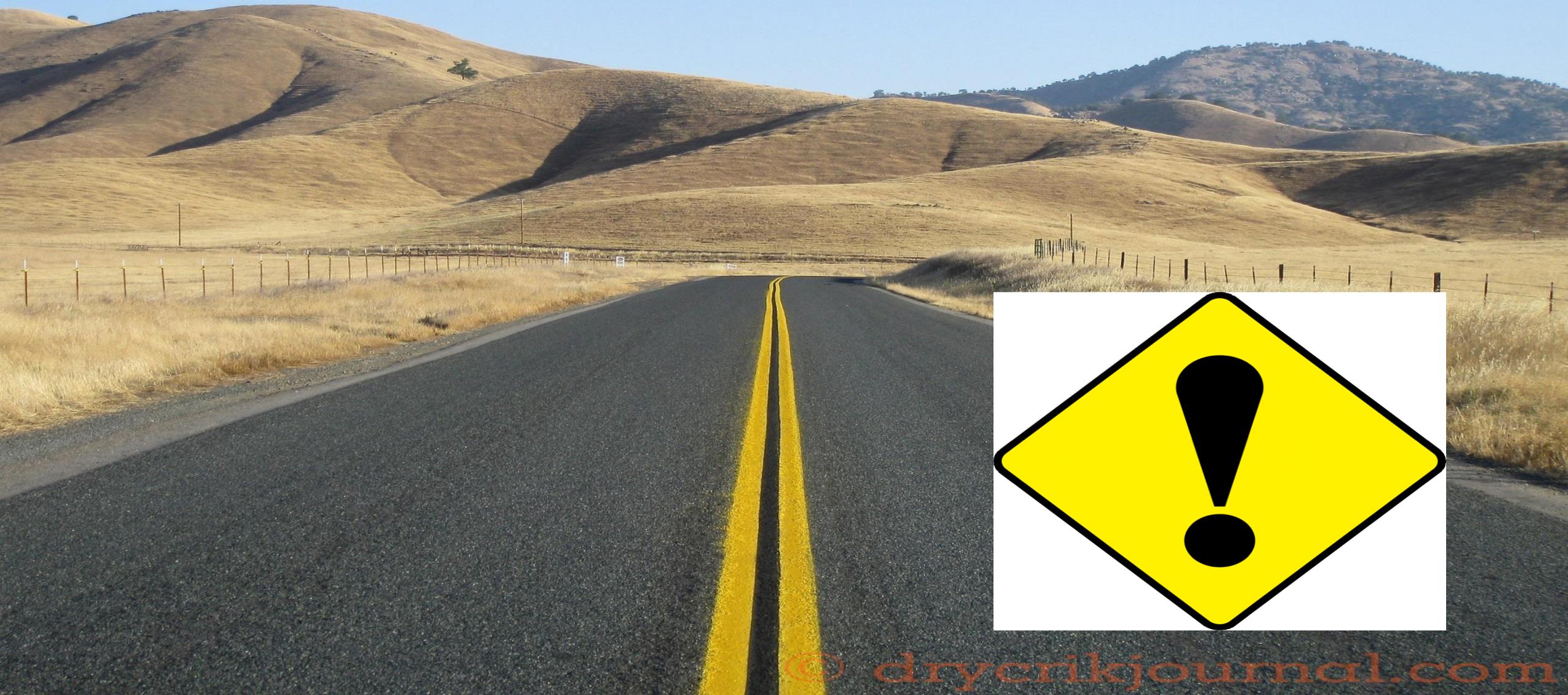
Lead – How can we be exposed?

In its natural form lead is a heavy, soft, bluish-gray metallic element

Commercially-used lead comes from an ore called Galena (Lead Sulfide)



What: is the ingredient in the highway paint?



Lead – the “Surface Lead” Hazard (dilemma)

Surface lead contamination usually contributes more to lead exposure in the workplace than airborne lead dust or fume

Poor personal hygiene in lead contaminated environments can result in lead poisoning even when there is little or no airborne exposure

Lead – the Hazards

If lead is absorbed faster than it can be eliminated, it will accumulate in the body and contribute to **Lead Poisoning**

Acute poisoning is rare and results from very high, short term exposures

Chronic (long term, lower exposure) poisoning is more common among lead workers and can cause a number of health problems

Lead – disposition in our body

Approximately **6 percent** of all lead ingested or inhaled is deposited in the blood or soft body tissues (ie: the kidneys, brain, or other vital organs)

The remaining **94 percent** is deposited in bone

Because the body mistakes lead for calcium, it presumes that, once deposited, the lead needs to be stored

Lead – disposition in our body

Lead in the bloodstream and in soft body tissue has a half-life of approximately 30-40 days and is excreted through urine, bile, sweat, hair, and nails

However, lead deposited in bone has a half-life of approximately **20 years**

That is, half-life of the lead dosage absorbed by the body through only one exposure and deposited in the bone would still be present approximately 20 years later

Lead – Monitoring Exposure at Work

WorkSafe BC sets an “allowable Occupational Exposure Limit” (OEL)

Amount of lead allowed in the air during lead-based work activity

Currently - ***0.05 mg/m³***

8 hr. Time Weighted Average (TWA)

(This – is extremely low)

(ACGIH / IARC Carcinogens and Reproductive Effects)



Lead – Controlling Exposures: Engineering Controls

Reduce the hazard before exposures can be experienced

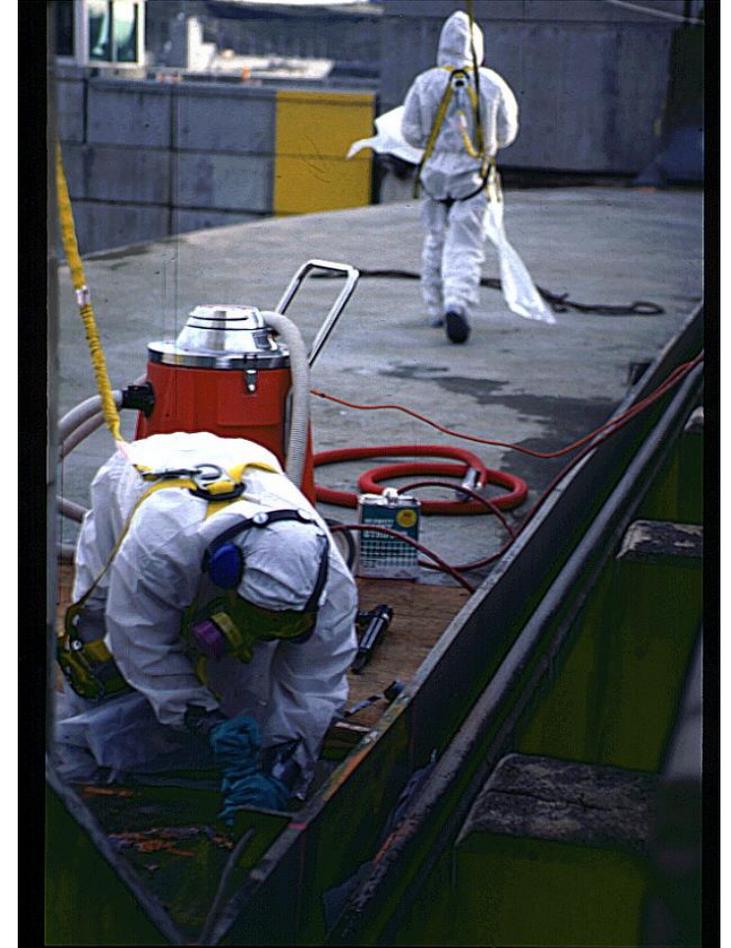
The effectiveness of engineering controls used in the workplace does not depend on worker behavior

Examples of Engineering Controls:

Review the process and find ways to minimize the amount of lead released to the atmosphere

Local exhaust ventilation through filters

Enclose work process



Personal Protective Equipment (PPE) – “Universal Precaution”

Clothing - Impervious

Fits snugly

Immediately repair / replace

Disposable or laundered separately

Respirators (1/2 or full face; PAPR) NIOSH approved and include P-100 (HEPA) filters

Respirators fit tested to CSA Standard (Z-94.4 - 18) prior to use

Respiratory Protection Program (RPP)

Eye and hearing protection



Lead – Controlling Exposures: Administrative Controls

The level of Risk to workers:

- Low
- Low-moderate
- Moderate
- Moderate-high
- High

These Risk levels are based on the potential *airborne lead* concentration ranges

Reference: WSBC – Lead Manual for further details

Registering exposure to a hazardous substance

Due to the latency and long period of exposure required for the onset of some occupational diseases, WorkSafeBC has developed an [Exposure Registry Program](#) as a way for workers, employers, and others to register a worker's exposure to a harmful substance at work

The information obtained through the registry will be kept as a permanent record of a worker's exposure and will assist WorkSafeBC in the adjudication of any future claim for occupational disease caused by the workplace exposure.

In Conclusion...

The law (BC):

OH&S Regulation - Asbestos

Part 6 (Sections 6.1 to 6.32) of the Regulation – refers specifically to Asbestos Containing Materials (ACMs) and requirements for working in / around ACM's

Part 20 Construction; Excavation; Demolition - refers to any renovation or demolition work involving asbestos

The law (BC):

WorkSafeBC OH&S Regulation – Part 20

Construction, Excavation and Demolition

“Construction project” means any erection, alteration, repair, dismantling, demolition, structural or routine maintenance, painting, land clearing, earth moving, grading, excavating, trenching, digging, boring, drilling, blasting, concreting, the installation of any machinery or any other work deemed to be construction by the Board...

Remember: *Ensure a Safe Work Environment*

The Municipality as an Employer:

Section 115 of the WC Act gives every employer the **duty** to ensure the health and safety of any other workers present at a workplace at which that employer's work is being carried out

Applies – whenever the “Owner’s” or **other workers** are present at a workplace at which municipal work is being carried out

Once the **duty** applies, the WC Act requires the municipality take **all reasonable steps** in the circumstances to ensure the health and safety of the **ALL** workers present

THANK YOU

