CSSE Vancouver 2016

PROFESSIONAL DEVELOPMENT CONFERENCE

NAVIGATING THE FUTURE OF **OH&S**

MONDAY SEPTEMBER 19

CANADA'S SAFETY, HEALTH AND ENVIRONMENTAL PRACTITIONERS

CANADIAN SOCIETY OF SAFETY ENGINEERING

ASBESTOS, SILICA, AND LEAD

"They're everywhere"

CSSE PDC 2016 Vancouver

September 19, 2016 (MUNI-01)

Presented by:
E.W. (Ev) Carefoot, P.Eng., CIH, CRSP
Salus Services Limited

Mother nature's "trinity" of worker exposures

"How can you win against someone who doesn't even know the rules of the game"

Presentation Focus

The presentation was developed in part resulting from proposed changes to BC's Occupational Health and Safety Regulation

Most jurisdictions have required controls for these, and other significant hazardous substances

- Ontario
  - Designated Substances Regulation
    - asbestos, lead, silica, others
- Alberta
  - OHS Code "Code of Practice Requirement"
    - asbestos, lead, silica, others

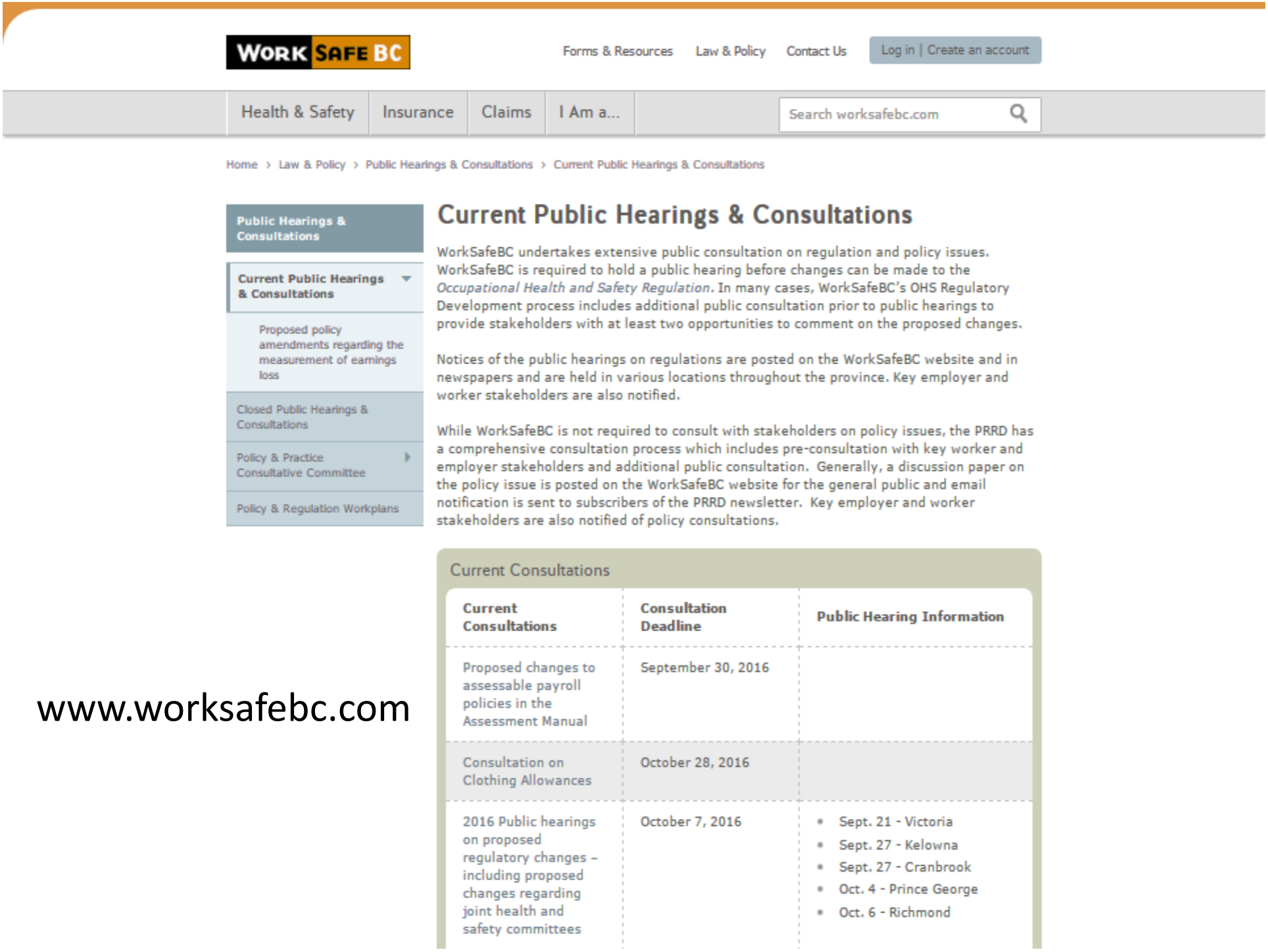
Substance Health Effects

- Asbestos (A1,1)
- Crystalline silica (A2,1)
- Lead (Elemental 2B,R; Other inorganic 2A,R)
- Lead chromate (A2,1,R)
  - IARC group 1 carcinogen - Chromium (VI) compounds as a whole
  - IARC group 2A carcinogen - Lead compounds, inorganic

Human Carcinogens

- IARC notations **1 (known)**, **2A (probably)** and **2B (possibly)**
- ACGIH notations **A1 (confirmed)** and **A2 (suspected)**

R – Reproductive toxin



www.worksafebc.com

Asbestos (limited examples only)

Asbestos

BC Occupational Health and Safety Regulation

- Part 6 Substance Specific Requirements

  Sections (§) 6.1 to 6.32 ASBESTOS

- Proposed 2016 OHSR changes:

  6.4 Inventory

  - "Employer and owner" responsibilities
  - Specific inventory content for known or inaccessible materials

  6.32 Documentation

  - 10 year record retention (not 3/10 year)

Other Proposed OHSR Changes

Part 20 Construction, Excavation and Demolition


Super Save
Disposal
Super Save
Disposal
533-4423


Super
Save
Disposal
533-4423
LEVEL LOAD
NO PARKING
STOP WORK ORDER IN EFFECT - DO NOT ENTER
WORK SAFE BC


WORK SAFE BC
WORKING TO MAKE A DIFFERENCE
STOP WORK ORDER IN EFFECT - DO NOT ENTER
WorkSafe
Tools for building safer workplaces | worksafemagazine.com | March / April 2016
Employer investigation requirements bring clarity p7
Progressive approach to incident prevention p16
A case for investing in road safety at work p20

20.112 Hazardous Materials

BC Occupational Health and Safety Regulation

2) **Before work begins**…all employers responsible for that work, and the owner, must ensure that a qualified person **inspects** the machinery, equipment, building or structure and the worksite to identify the hazardous materials, if any.

G20.112 Hazardous materials – Asbestos

- "Ten Steps to Compliance with asbestos abatement requirements for a pre-1990 house/building demolition, renovation, or salvage work"

Proposed §20.2.1 Notice of Project

Hazardous Substances

1) in writing, a notice of project that contains the information required by subsection (4) **at least 48 hours before the work activity begins** at the worksite.
2) The following are work activities for the purposes of subsection (1):
   a) a work activity that involves working with or in proximity to **asbestos-containing material**, as defined in section 6.1, that is a moderate risk work activity or a high risk work activity as defined in that section;
   b) the alteration, repair, dismantling or demolition of all or part of a building or structure in which **asbestos-containing material has been processed**, manufactured or stored;
   c) a work activity that ***significantly*** **disturbs lead-containing material** in buildings or structures;
   d) a work activity that is similar to those described in paragraphs (a) to (c) and that may expose workers to a **significant risk of occupational disease from a biological or chemical agent or ionizing radiation**.

Proposed §20.2.1 Notice of Project

Hazardous Substances

WorkSafeBC 2016 OHSR Proposed Regulation Explanation:

The proposed subsection 20.2.1(2)(d) clarifies the other types of hazardous substances requiring NOPs, such as biological and chemical agents and ionizing radiation. The current Prevention Guideline G20.2 (1)(c)(iv) provides examples of similar work activities that require NOPs, such as:

- *the remediation of indoor marijuana growing operations*
- *remediation of clandestine chemical labs.*
- *The guideline also states that an NOP is also required for mould remediation, clean up, and demolition of mould contaminated areas where the total surface area affected is greater than 10 contiguous square metres (or 100 contiguous square feet).*

*"**Hazardous substances such as thermal stress and noise**, which may expose workers to a significant risk of occupational disease, do not require an NOP to be submitted."*

Proposed §20.2.1 Notice of Project

Hazardous Substances

Workers Compensation Act Part 3 Division 1 - Interpretation and Purposes

"***hazardous substance***" includes

a) a hazardous product within the meaning of the Hazardous Products Act (Canada),

b) a substance designated as a hazardous substance by regulation, and

c) A biological, chemical or **physical agent** that, by reason of its properties, is hazardous to the health or safety of persons exposed to it;

Notice of Project Requirements

BC Occupational Health and Safety Regulation

- Requirement to “contain” a 20.112 hazardous materials report, if one was required by 20.112
- 10 year record keeping requirement from the start of the project for “hazardous substance NOPs” only

Crystalline Silica Presence/Uses

Refractory Agent. In foundry and mold sands and manufacture of refractory brick

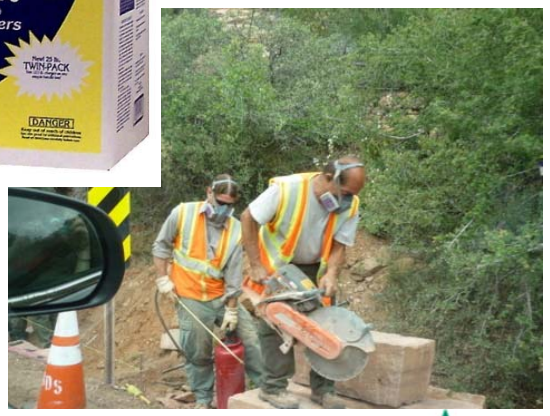
Abrasive Sand. Very effective as a scouring agent to remove paint, rust, scale and other impurities from metal, concrete and wood.

Filtration. Used to remove impurities from water for potable use and for maintaining good permeability in wells and drainage beds (e.g., calcined diatomaceous earth).

Recreational. Placed in sports fields, playgrounds, golf courses, ball fields, horseshoe pits.

Respirable Crystalline Silica

- Abrasive blasting (e.g., of concrete structures).
- Jack hammering, chipping, or drilling rock or concrete.
- Cutting brick or tiles.
- Sawing or grinding concrete.
- Tuck point grinding.
- Road construction.
- Loading, hauling, and dumping gravel.
- Demolition of structures containing concrete.
- Sweeping concrete dust.



Crystalline Silica

Table 1: Crystalline silica concentrations in common materials (Source: Health and Safety Executive (UK): Advice for managers: Control of Substances Hazardous to Health essentials in construction).	
silica flour, cristabolite flour	100%
sandstone, gritstone, quartzite	more than 70%
plastic composites	up to 90%
sand, gravel, flint	more than 70%
calcined diatomite	25% to 65%
shale	40% to 60%
china stone	up to 50%
marl	up to 60%
slate	up to 40%
granite	up to 30%
brick	up to 30%
ball clay	15% to 30%
pumice	up to 25%
ironstone	up to 15%
basalt, dolerite	up to 5%

SOURCE: BC OHSR 2016 WorkSafeBC Proposed Changes Document

Respirable Crystalline Silica

It is believed that silica exposure in BC workplaces are under-reported (particularly the cancers) and misdiagnosed. This is due to the difficulty in relating some cancers to a particular cause and to the presence of contributing factors (e.g., smoking in the construction industry).

In addition, it is believed that many physicians do not take into account a patient's occupational history, or the relationship to early work exposures may be obscure, when they treat a cancer patient.

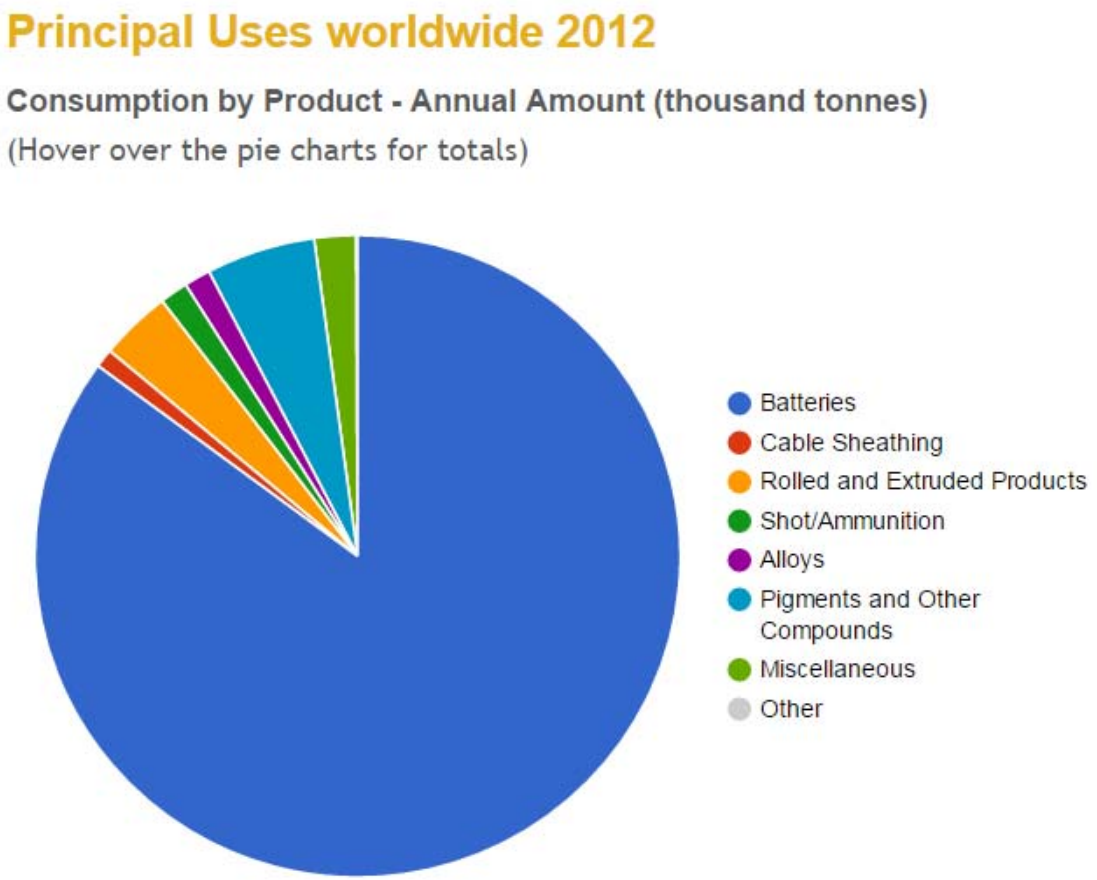
Type of disease	Number of work-related deaths
Cancer	66
Heart attack	29
Pulmonary embolism	10
Silicosis	10
Pulmonary disease	7
Asthma	3
Heart failure	3
Hepatitis C	2
Pneumonia	2
Pneumoconiosis	2
Drowning	1
Thrombophlebitis	1
Lung disease	1
Pulmonary edema	1
Nitrogen gas	1
Emphysema	1
Stroke	1
Heart injury	1
Carbon monoxide poisoning	1
Anaphylactic shock	1
Hepatitis B	1
Aneurysm	1
Cardiac arrhythmia	1
Respiratory failure	1
Total	148

The following table provides a further breakdown of the cancer types.

Type of cancer	Number of work-related deaths
Lung	15
Leukemia	8
Bladder	7
Brain	6
Colorectal	6
Esophageal	5
Kidney	5
Colon	4
Renal	2
Skin	2
Adenocarcinoma	1
Lymphoma	1
Sinus	1
Liver	1
Pancreatic	1
Nasal	1
Total	66

SOURCE: WorkSafeBC 2014 Statistics Period 2005-2014

Lead



Consumer Sources

- Paint
- Household dust
- Water pipes
- Imported canned food and hard candies
- Toys
- Traditional remedies
- Soil
- Pottery, ceramics, china or crystal
- Eyeliner and lipstick
- Vehicle batteries and other industrial uses

Source: Ecowatch.com

SOURCE: International Lead Association www.ilo-lead.org

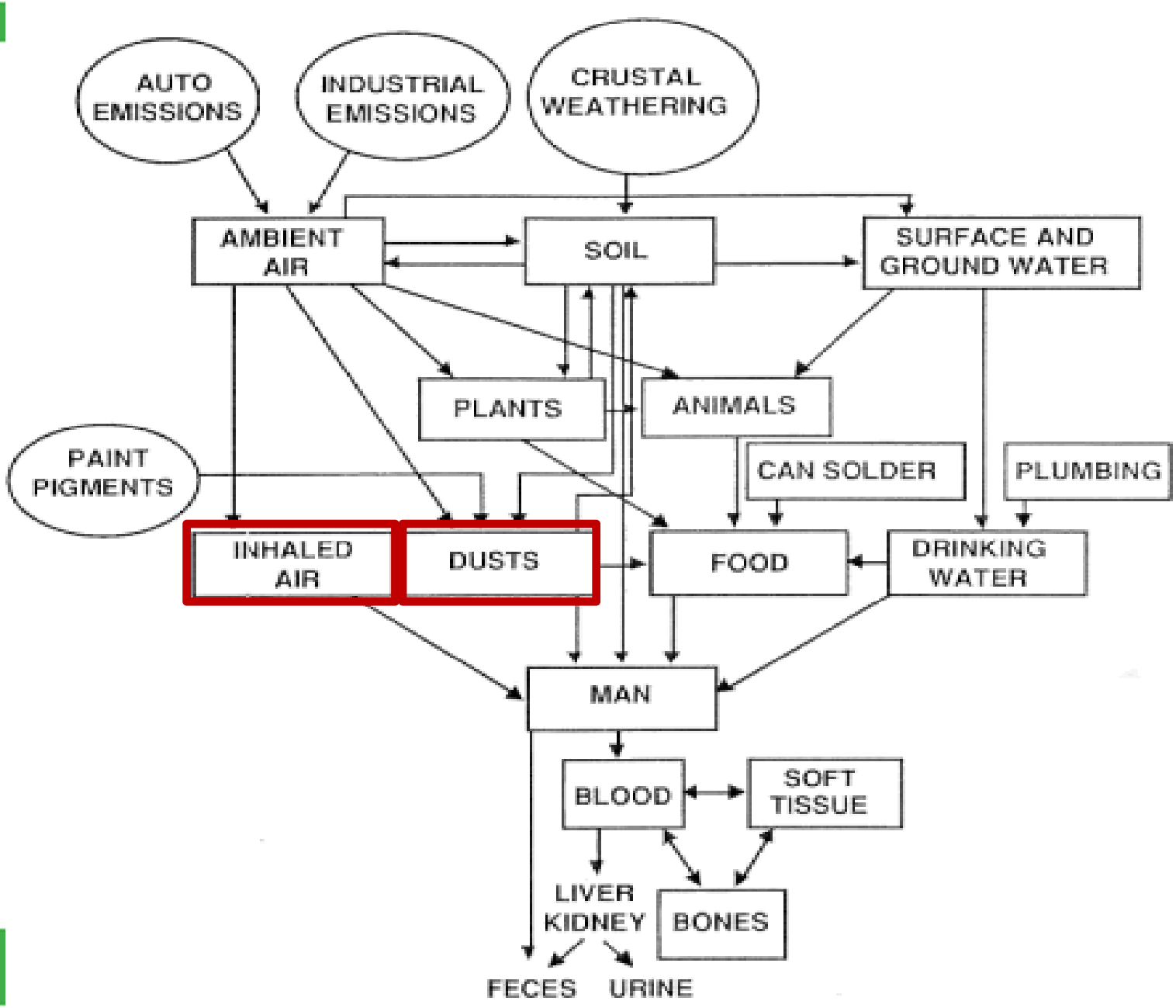


Figure 1 *Pathways of lead from the environment to man, and body disposition of lead (EPA, 1986).*

SUMMER 2016

Lead levels high in some Surrey schools

HEALTH CANADA STANDARDS NOT MET IN A NUMBER OF WATER FOUNTAINS

EVAN SEAL

Twenty-seven water fountains or taps within Surrey schools have been found to have exceeded the Health Canada since May of this year, the Surrey school district has contracted an accredited, independent laboratory to test a total of 621 water sources inside Surrey schools, with many having high lead levels both before and after

A letter sent out by Superintendent of Schools, Jordan Tinney, explained the results of the provincially-mandated water testing program and gave a plan to remedy the situation.

According to Tinney, depending on specific results, schools affected will continue to flush all faucets every morning, along with disconnecting some problem water sources and to replace faucets, install filters or bottling stations until more permanent solutions can be completed.

The district will

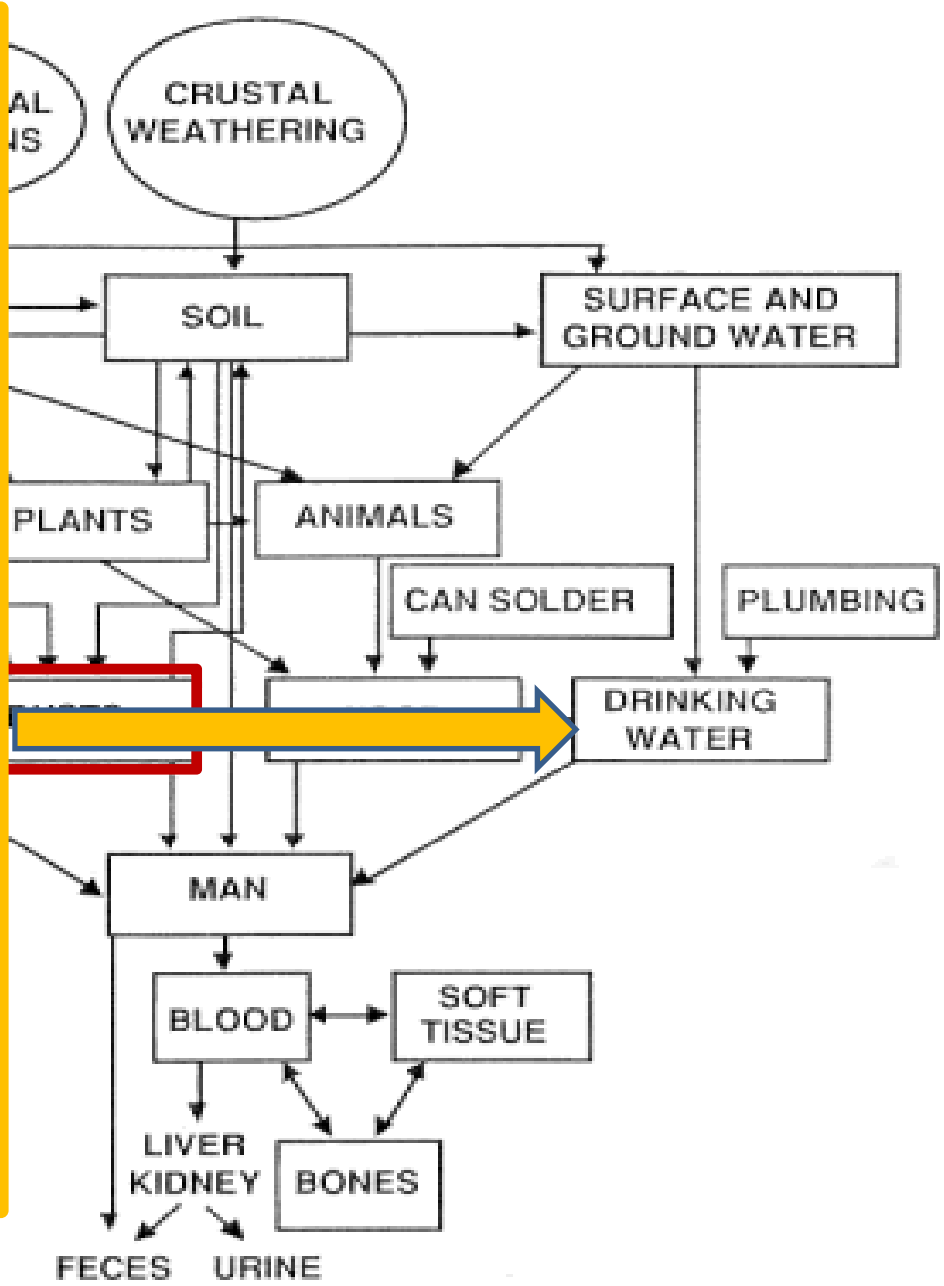
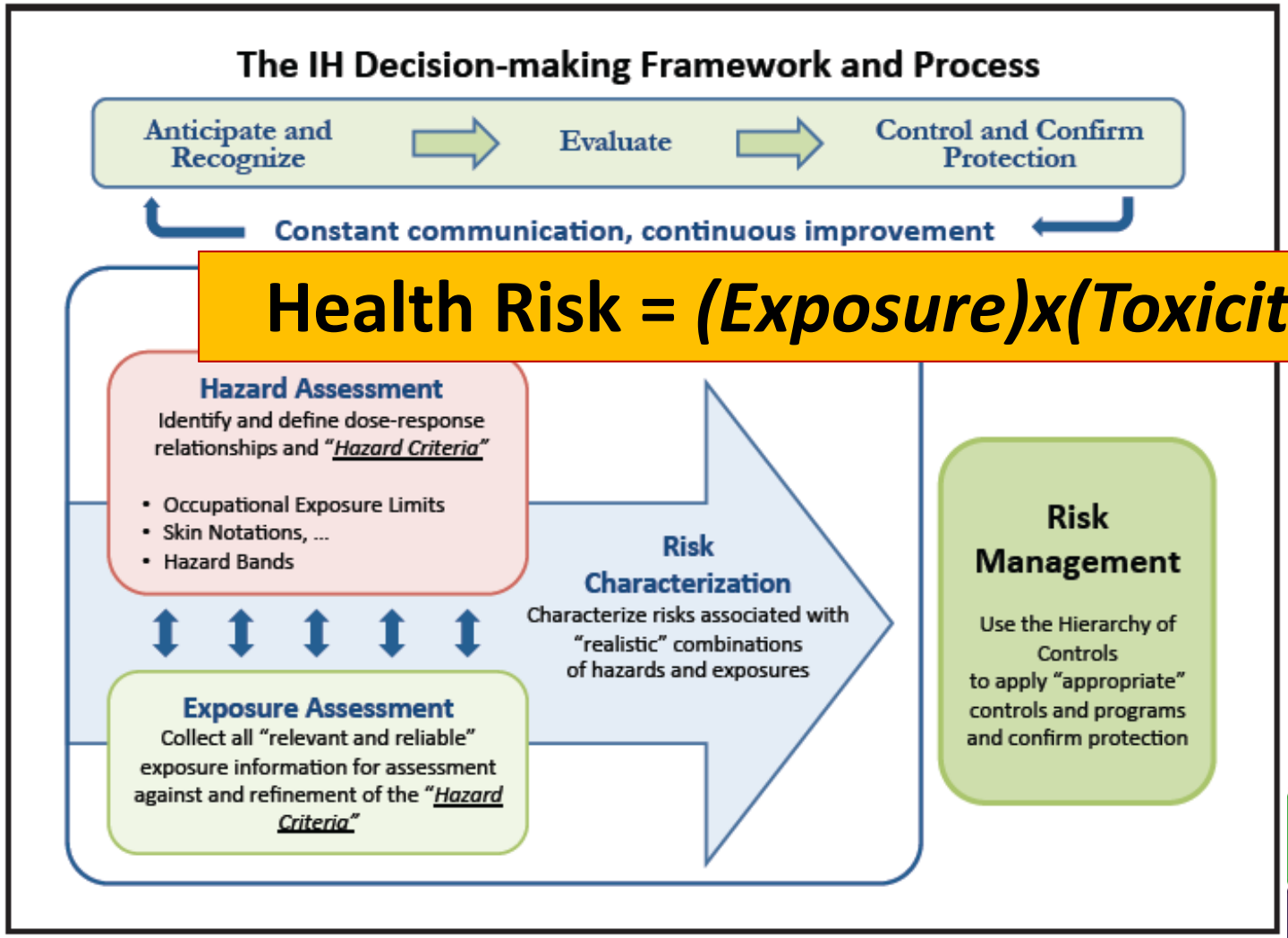
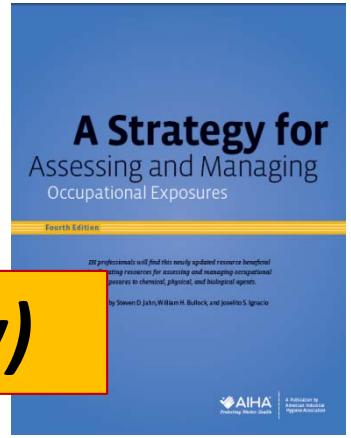


Figure 1 *Pathways of lead from the environment to man, and body disposition of lead (EPA, 1986).*

AIHA "A Strategy for Assessing and Managing Occupational Exposures"





RCS and Lead

2016 Proposed OHSR Change Overview

CONTENT	LEAD	RCS
Definitions	✓	✓
Application	✓	✓
Risk assessment	✓	✓
Exposure Control Plan	✓	✓
Elimination or control of exposure	✓	✓
Air monitoring	✓	✓
Exceptions to monitoring	✓	✓
Housekeeping	✓	✓
Instruction and training	✓	✓

Lead

BC Occupational Health and Safety Regulation

Current wording in Sections 6.59 to 6.69 expanded

Application 6.59

Sections 6.59.1 to 6.69 apply to a workplace where a worker is or may be:

a) engaged in a **lead process**, or

b) exposed to *potentially harmful levels* of lead dust, fumes or mist.

Lead Process

BC Occupational Health and Safety Regulation

"Lead process" means the following work activities and processes, **as well as** any other work activity or process, involving the manufacturing, processing or handling of lead, or of materials, products or coatings containing lead that may expose a worker to lead dust, fumes or mist:

a) abrasive blasting;

b) applying electric arc, oxy-acetylene, oxy gas, plasma arc or a flame for the purpose of welding, cutting or cleaning the surface of any structure;

c) demolishing, removing or encapsulating materials;

d) dry sanding or scraping, grinding, cutting, or buffing;

e) using lead in fire assay;

f) cleaning up contamination;

g) hot cutting in demolition, dismantling or salvage operations;

h) manufacturing, assembling, handling or repairing lead-acid storage batteries, and sorting, packing and handling plates or other lead-containing parts that are removed or recovered from lead-acid storage batteries;

Lead Process (con't)

BC Occupational Health and Safety Regulation

i) manufacturing, assembling, handling, testing or firing of lead-containing weapons, detonators or other explosives;

j) mixing and blending lead in plastics, coatings, moulding powders and stabilizers;

k) mixing and melting processes in the glass industry;

l) constructing, installing, altering, repairing or renovating structures, substrates, mechanical or engineered systems, or parts of any of these;

m) smelting, refining, alloying, melting and casting;

n) spray painting;

o) repairing radiators;

p) recycling or scrap-processing;

q) transporting, disposing, storing or containing lead or materials containing lead;

r) using a power tool, high pressure water jets or other mechanical means to cut, sand, buff or remove a surface coating;

Silica (RCS)

BC Occupational Health and Safety Regulation

Changes from "Rock Dust" to "Respirable Crystalline Silica (RCS) and Rock Dust"

Application 6.111

Sections 6.112 to 6.112.7 apply to a workplace where a worker is or may be:

a) engaged in a **silica process**, or

b) exposed to *potentially harmful levels* of RCS dust.

Silica (RCS)

BC Occupational Health and Safety Regulation

"***Silica process***" means the following processes, **as well as** any other process that may result in the release of RCS dust in concentrations **likely to exceed the exposure limit**;

a) sandblasting;
b) cleaning of castings;
c) abrasive blasting, grinding, sanding or dressing of any surface that contains crystalline silica;
d) blasting, cutting, crushing, drilling, grinding, milling, scaling, splitting or sieving, or other mechanical pulverizing or shattering, of rock, other siliceous stone or gravel;
e) concrete or asphalt milling, shotcreting, pneumatic drilling, tunnelling or other large-scale mechanical processes that may generate RCS dust;
f) using heavy equipment or pneumatics to transfer sand, earth, aggregate or other material that contains silica, and associated transport, recycling and disposal operations;
g) a process in which silica flour is used, including using it as an additive in product manufacturing;
h) manufacturing, dismantling, demolishing or repairing of concrete, masonry or other material that contains silica;
i) using power tools or equipment to abrade, cut, grind, core or drill concrete, masonry or other material that contains silica;

Risk Assessment

To include:

- Hazard, including exposure limit
- Supplier or material information (e.g., lead content)
- Scope, circumstances and nature of the work activity (**including exposure assessment – e.g., AIHA strategy**)
- Effectiveness of planned control measures
- Other information

Can rely on:

- existing monitoring data for the purpose of assessing control measures under subsection 3(d)

Lead

Canadian Regulated Lead Concentrations in Coatings

2010	90 mg/kg (0.009%)
2005	600 mg/kg (enacted)
1991	600 mg/kg (CPCA voluntary agreement)
1978 (US)	600 mg/kg in consumer paint
1976	5000 mg/kg

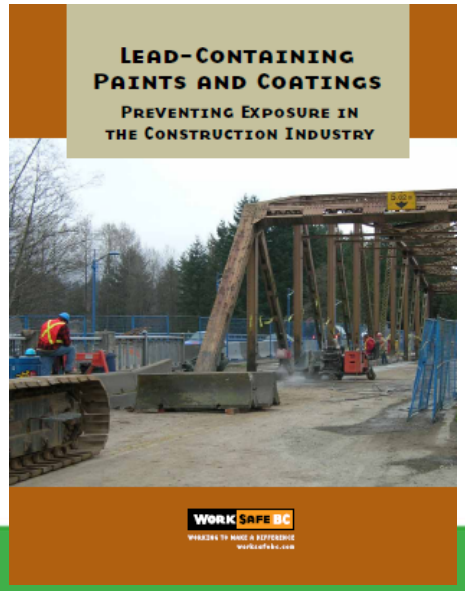
Also in November 2010, the total lead content limit of applied paints and other surface coatings on children's furniture and other articles, toys, equipment, and other products for use by children in learning or play, and on artists' pencils and brushes was reduced from 600 to 90 mg/kg

Lead

Canadian Regulated Lead Concentrations in Coatings

2010	90 mg/kg (0.009%)
2005	600 mg/kg (enacted)
1991	600 mg/kg (CPCA voluntary agreement)
1978 (US)	600 mg/kg in consumer paint
1976	5000 mg/kg

No definition in most Canadian jurisdictions for a “lead based” paint or coating



Exposure Control Plan

1) If a risk assessment indicates that a worker is or may be exposed to [lead dust, fume or mist/RCS dust], the employer must
   a) ensure that a qualified person develops an exposure control plan meeting the requirements of section 5.54 and subsection (3) of this section, and
   b) implement the exposure control plan.

§5.54 Exposure Control Plan

BC Occupational Health and Safety Regulation

a) a statement of purpose and responsibilities;

b) risk identification, assessment and control;

c) education and training;

d) written work procedures, when required;

e) hygiene facilities and decontamination procedures, when required;

f) health monitoring, when required;

g) documentation, when required.

Occupational Health and Safety Regulation

Part 05 Chemical Agents and Biological Agents

*Section 5.57 Designated substances **(existing)***

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…

2) If it is *not practicable to substitute a material* which reduces the risk to workers, in accordance with subsection (1), *the employer must implement an exposure control plan* to maintain workers' exposure as low as reasonably achievable below the exposure limit…

Specific ECP Procedure Requirements

BC Occupational Health and Safety Regulation

For the purposes of section 5.54(2)(d), the written work procedures within an exposure control plan must address at least the following:

a) the containment of [**lead/silica**] processes through the use of enclosures, barriers or encapsulation, if used as a control measure;

b) the effective control of worker exposure to lead dust, fumes or mist, including worker decontamination and personal hygiene;

c) safe work practices and procedures;

d) the correct selection, use, care and maintenance of any required personal protective equipment and clothing;

e) emergency procedures;

f) the removal, cleanup and disposal of [**lead /RCS**] dust and debris, including the measures that will be used for the purposes of meeting the requirements of section [**6.64/6.112.6]**.

Proposed Air Monitoring

BC Occupational Health and Safety Regulation

(1) If there is a potential for **hazardous exposure to** [**airborne lead dust, fumes or mist/RCS dust**] in a work activity or [lead/silica] process, the employer must

a) ensure that air monitoring is conducted using a sampling and analytical method referred to in subsection (2)

   i. during the first shift of the work activity or [**lead/silica**] process, and

   ii. as necessary throughout the work activity or silica process to ensure that control measures are effective to prevent or minimize worker exposure to RCS dust, and

b) keep, for at least 10 years, records of the results of air monitoring conducted under this section.

Proposed Exceptions to Air Monitoring

BC Occupational Health and Safety Regulation

In this section, “equivalent work operations” means work operations closely matching the lead processes, types of materials, products or coatings, work practices, control measures and environmental conditions prevailing in the employer’s current work operations.

…an employer is not required to monitor the concentration of airborne lead if a qualified person determines that

a) existing control measures are effective in keeping worker exposure as low as reasonably achievable below the exposure limit, and
b) the employer
    i. has previously monitored for airborne concentrations of lead during equivalent work operations and there is no reason to believe that the results of the previous monitoring would not continue to apply, or
    ii. has **objective air monitoring data** that was collected during equivalent work operations through industry surveys or peer-reviewed or scientific studies that use sampling and analytical methods, referred to in section 6.61(2).

Lead and Silica Proposed Requirements

BC Occupational Health and Safety Regulation

CONTENT	LEAD	RCS
Warning Signs	✓	
Blasting enclosures		✓
Personal Hygiene	✓	
Housekeeping	✓	✓
No use of compressed air or gas or dry sweeping	✓	
Instruction and Training	✓	✓
Health Protection	✓	
Records	✓	
Other specific industry requirements	✓	✓

Existing Lead and Silica Requirements

BC Occupational Health and Safety Regulation

Part 12 Tools, Machinery and Equipment additional requirements

§12.97 to 12.111 Abrasive Blasting And High Pressure Washing

12.98 Risk assessment

§12.112 to 12.126 Welding, Cutting And Allied Processes

12.115 Coatings on metals

§12.127 to 12.141 Painting, Coating And Work With Plastics And Resins

12.128 Substitution

Proposed OHSR Revision Terms

BC Occupational Health and Safety Regulation

"*Exposure monitoring*" is referenced in the risk assessment requirements

"Exposure monitoring" defined as:

LEAD - Air and surface monitoring conducted in accordance with section 5.53(4)

RCS - Air monitoring conducted in accordance with section 5.53(4)

Lead Surface Sampling

No surface monitoring requirements currently in OHSR –application of other guidelines

- **HUD clearance basis is a health-based "house" standard:**

  "…surface dust in residential dwellings that contains an area or mass concentration of lead in excess of levels determined by the [EPA] Administrator under this title to pose a threat of **adverse health effects in pregnant women or young children)**

- **OSHA Instruction CPL 2-2.58**

  In determining whether an employer has maintained surfaces of hygiene facilities free from contamination, OSHA recommends the use of HUD's recommended level for acceptable decontamination of 200 µg/ft^2 for floors in **evaluating cleanliness of change areas, storage facilities, and lunchrooms/eating areas**.

Exposure Terms Used to Trigger Requirements

LEAD

- …potential for hazardous exposure to airborne lead dust, fumes or mist in a work activity or lead process
- …potentially harmful levels of lead dust, fumes or mist
- …posted at the boundary of any work area where hazardous lead exposures could occur

RESPIRABLE CRYSTALLINE SILICA

- potential for hazardous exposure to RCS dust in a work activity or silica process,
- exposed to potentially harmful levels of RCS dust.

NOTICE OF PROJECT

- …significantly disturbs lead-containing material
- …significant risk of occupational disease

Exposure Terms Used to Trigger Requirements

LEAD

- …potential for hazardous exposure to airborne lead dust, fumes or mist in a work activity or lead process
- …potentially harmful levels of lead dust, fumes or mist
- …posted at the boundary of any work area where hazardous lead exposures could occur

RESPIRABLE CRYSTALLINE SILICA

- potential for hazardous exposure to RCS dust in a work activity or silica process,
- exposed to potentially harmful levels of RCS dust.

Existing OHSR Section 5.55 Type of controls (*hierarchy of controls)*

…control it below **harmful levels** and
below the applicable **exposure limit**

“The more I learn, the more I realize how much I don't know.” Albert Einstein

“Just when you think you've learned it all, that is when you find you haven't learned anything yet.” **GWiens2001**

Locksmiths and Brass

1999 State of California: Attorney General Lockyer Sues Key Manufacturers Over Failure to Warn Consumers About Exposure to Lead from Keys in Violation of Proposition 65

2001 State of California: A dozen major manufacturers of brass door keys have agreed to reduce the amount of lead in their products by up to 40 percent.

Most common keys are made from brass that contains **1.5% to 2.5% lead**, but the defendants agreed to no longer make keys with more than **1.5% lead**. Some keys are made from nickel-silver, or plated with nickel-silver, and do not give off significant amounts of lead. Those keys are not affected by the settlement.

Locksmiths and Brass

2005 Meixa Tech report – lead presence in keys

2005 International Journal of Environmental Research and Public Health
Kondrashov et.al. 2005, 2(1), 164–169
Even with the very small number of subjects participating in this pilot study, we were able to demonstrate that ***locksmiths had significantly higher current exposure to lead*** *(blood lead concentration) and significantly higher past exposure to lead (tibia lead concentration) than their age, sex and ethnically matched controls.*

2016 Client asks about lead in keys.
Client collects wipe samples in locksmith areas from several sites

WorkSafeBC "Recommended lead clearance"

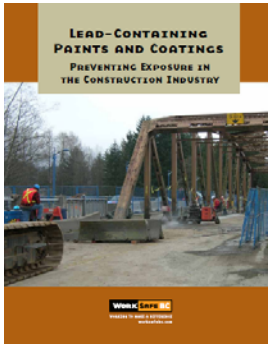


Table 2. Recommended lead clearance criteria for surfaces.

	Floor	Sill/ledge	Trough
Residences, schools, daycare centres, and other public buildings	0.43 mg/m^2 (40 µg/ft^2)	2.7 mg/m^2 (250 µg/ft^2)	4.3 mg/m^2 (400 µg/ft^2)
Commercial buildings, including retail stores, offices (administrative), and laboratories (other than lead assay laboratories)	2.2 mg/m^2 (200 µg/ft^2)	5.4 mg/m^2 (500 µg/ft^2)	8.6 mg/m^2 (800 µg/ft^2)

Additional recommendations:

- Lead levels on clean surfaces in eating areas should not exceed 40 µg/ft^2.
- Lead residue on "cleaned" structural steel (from which a lead-containing coating has been removed) should not exceed 40 µg/ft^2 prior to welding, cutting, or burning.

Locksmith Area Wipe Samples – Lead

SITE	ROOM LOCATION	mg/m^2	µg/ft^2
1	Key Room – Key Cutting Station, Countertop	70.5	6,549
	Key Room – Key Cutting Station, Floor	15.7	1,459
2	Key Room – Key cutting counter	7.9	734
	Key Room – Key cutting station floor	3.5	325
	Key Room – Floor middle of the room	17.2	1,598
3	Key Room – On the key cutting counter	180	16,722
4	Key Room – Key Cutting Counter Far Corner	203	18,859
	Key Room – Floor at Key Cutting Station	692	64,287

"OSHA" surface lead – housekeeping interpretation (change areas, eating/lunchroom) **<200**

"Most of us spend too much time on what is urgent and not enough time on what is important." Stephen R. Covey

<600 ppm lead in paint

or

20000 to 80000 ppm lead in brass

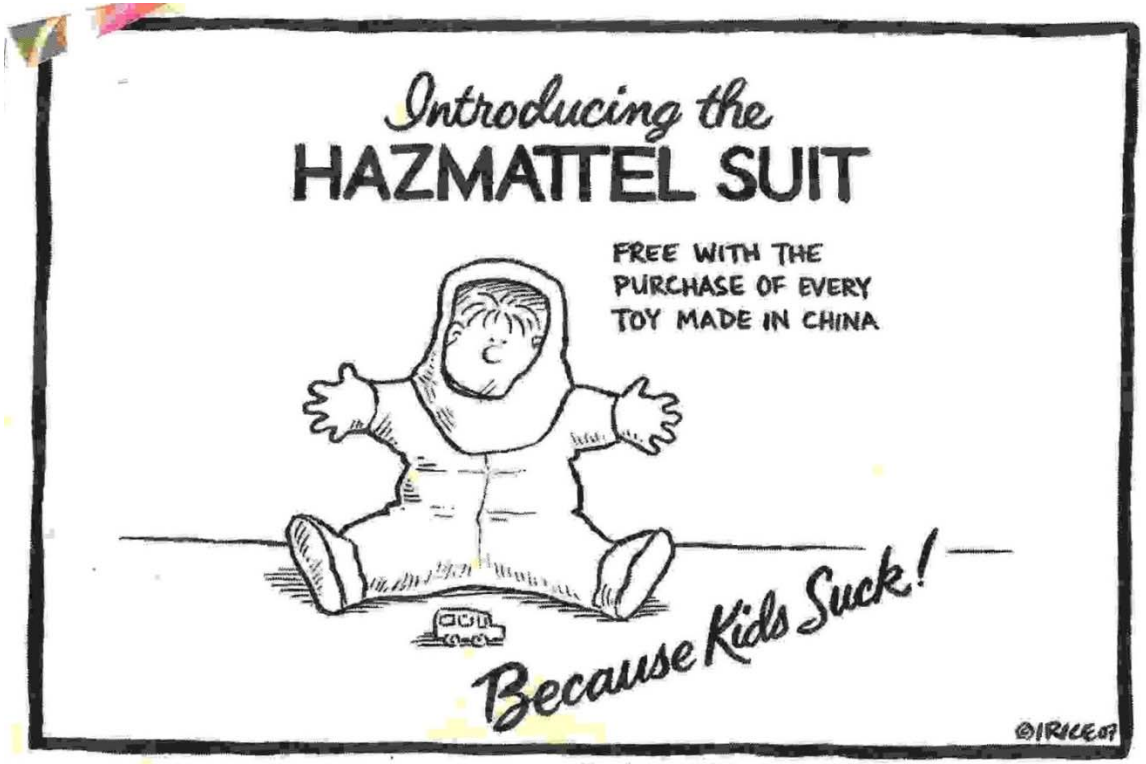
Occupational Health and Safety Regulation 2016 Proposed Amendments

- www.worksafebc.com
  - Current Public Hearings & Consultations
  - Part 6 Substance Specific Requirements
- Consultation: Written submissions will be accepted until

Friday, October 7, 2016

4:30 p.m.

THANK YOU



Ev Carefoot

ecarefoot@salus.bc.ca