



BCIT Safety Manual

LEAD EXPOSURE CONTROL PLAN



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1. Purpose

The purpose of this Exposure Control Plan is to outline responsibilities, procedures and required control measures to eliminate or minimize lead exposure at BCIT.

2. Definitions

2.1 *Supervisor*

A BCIT employee who instructs, directs, and controls employees and/or students in the performance of their duties and activities.

2.2 *Instructor*

A BCIT employee who provides instruction and supervision in a classroom, workshop or laboratory,

2.3 *Student*

A person enrolled in a full-time or part-time program or any courses in BCIT, including students in practicum and apprenticeships.

2.4 *Employee/Worker*

A person employed at BCIT fulltime, part time or auxiliary.

3. Reference Materials

WorkSafeBC [Regulation Guidelines Part 5 – Chemical and Biological Substances](#)

WorkSafeBC [Regulation Part 6 – Substance Specific Requirements](#)

WorkSafeBC Lead – [Preventing Exposure at Work](#)

BCIT Safety Manual – Part 3 Section 42

4. Roles & Responsibilities

4.1 *BCIT Responsibilities*

- Make every practicable effort to replace lead-based solder with lead free solder.

- Support the implementation of the Exposure Control Plan by ensuring that education in the health hazards of lead is available for instructors, students, employees and workers and that mechanical ventilation, personal protective equipment, and facilities for emergencies and decontamination are provided.

4.2 OH&S Committee Responsibilities

- Review the Exposure Control Plan on an annual basis.
- Provide relevant OH&S advice

4.3 OH&S Group Responsibilities

- Develop and maintain an effective Exposure Control Plan for soldering.
- Conduct lead exposure monitoring/sampling, when necessary

4.4 Supervisor/ Course Instructor(s) Responsibilities

- Provide employees and students with information concerning the health hazards associated with lead and the operation and use of the equipment and control measures, including safe work procedures, and the safe use and limitations of respiratory protection (if required).
- Ensure the Exposure Control Plan is read and understood by affected instructors, students and employees in relevant program areas.
- Ensure that safe work procedures are developed and updated.
- Maintain sufficient supervision to ensure that mechanical ventilation is effectively operated, safe work procedures are followed, warning signs are posted, personal protective equipment provided is used, and remedial measures are implemented.
- Ensure records of risk assessment, work procedures, training and inspections are maintained and held on file.
- Set an example for students and employees by using the provided exhaust units, the assigned protective equipment, and following the established work procedures.

4.5 Student, Employee and Worker Responsibilities

- Read and understand the Exposure Control Plan.
- Use the provided exhaust units and the assigned protective equipment.
- Follow the established safe work procedures.
- Practice good personal hygiene.
- Report any unsafe conditions or acts to the Supervisor or Instructor.

5. Risk Identification, Assessment, and Control

The Occupational Health and Safety Regulation (*OHSR*), Table of Exposure Limits for Chemical and Biological Substances, lists an 8-hour time weighted average (TWA) exposure limit to lead of 0.05 mg/m³. It also lists that lead has adverse reproductive effects and is classified as a 2B carcinogen

(possible carcinogen to humans). Lead is considered a designated substance under WorkSafeBC Occupational Health and Safety Regulation (*OHSR*) Part 5 Section 5.57.

5.1 Risk Identification

In the classroom soldering is demonstrated by the instructor and then students practice the technique. Fume generated from lead-based soldering contains lead. Other activities with potential exposure to lead on campus include, but are not limited to, demolition/renovation of structures/buildings where lead-based paints or coatings were used, lead abatement, welding and/or brazing products where lead is in the metal, on the metal or in the solder or braze, and scrap metal salvage and recycling. Surfaces, objects, footwear, skin, hair and clothes may become lead-contaminated.

5.2 Routes of Exposure

The main routes of exposure to lead include inhalation and ingestion. Inhalation occurs when breathing in the vicinity of lead fume or lead-containing particulates. Ingestion occurs primarily due to contact with lead-contaminated surfaces, objects, skin and clothes which leads to the transfer of lead from the operator's hands to their mouth by eating, drinking, smoking or chewing gum.

5.3 Lead Health Hazards

Lead poisoning primarily affects the central and peripheral nervous systems, renal function and blood cells. It also affects blood pressure and causes reproductive and development effects. Once the lead is in the body it is stored primarily in the bones where it has a half-life of approximately 20 years.

Acute Effects

Short-term exposure to high concentrations of lead can lead to weakness, exhaustion, insomnia, facial pallor, anorexia, malnutrition, constipation, abdominal pain, anemia, colic, gingival lead line, tremor, kidney disease, eye irritation and hypotension.

Chronic Effects

Long-term exposure to high concentrations of lead can affect the gastrointestinal and central nervous system, cause hypotension, diminished hearing, male infertility, adverse reproductive effects in women, foetal effects, renal failure, anemia, lethargy and encephalopathy. The severity of the symptoms depends on the blood-lead concentration. Lead is listed by WorkSafeBC and the International Agency for Research on Cancer (IARC) as a possible carcinogen to humans (2B and 2A respectively).

5.4 Control Measures

Departments and Schools are required to use the control measures listed below to eliminate or reduce the risk to instructors, students and employees from exposures to lead. Every effort will be made to ensure that the use of lead-based solder is minimized in the workplace or classroom.

Substitution

Whenever practicable, lead-free cored solder wire or solder wire with less lead ingredient must be

used to eliminate or minimize exposures to lead. Before substituting materials, ensure that the new material does not contain another product that is equally as hazardous or more hazardous than lead.

Engineering Controls

Local Exhaust/Source Capture Ventilation

Local exhaust ventilation involves capturing the contaminant prior to it reaching an operators' breathing zone and preventing contaminants from dispersing across work areas.

Flexible extraction units should be installed on workbenches to exhaust solder fumes. The units must be positioned such that they do not pull fumes past the operators' breathing zone. Where source capture is used the filters in the systems or units must be replaced on a regular basis. Appropriate personal protective equipment and safe procedures for filter replacement, decontamination and waste treatment are required.

Note: Section 5.70 and Table 5-1 of the OHSR must be considered when determining the effectiveness of the fume extraction units.

General Dilution Ventilation

Because lead is a substance designated as suspected human carcinogen and reproductive toxin under section 5.57(1) of the OHSR, the use of general dilution ventilation designed to re-circulate the contaminant into the work area is restricted by the provisions of Table 5-1 of the OHSR. General dilution ventilation with recirculation must not be used alone as a means to remove the lead-containing fume or particulates from the workplace.

Enclosure

Whenever practicable, full or partial enclosure of lead-containing activities/operations must be used in order to limit the diffusion of the contaminant to adjacent areas.

Process Modification

Whenever practical, consider modifying processes to reduce the amount of lead fume or particulates generated. For example, wet working methods can reduce lead dust. Pressurized water should be used to remove lead-based paint instead of stripping the paint with a heat gun. Cut lead, or lead-containing materials, by sawing or mechanical shearing instead of arc-air gouging.

Administrative Controls

Task Limitation

The airborne concentration of solder fumes can be decreased by restricting the number of employees or students who are allowed to solder at one time. Task rotation and limitation of work duration should be considered to minimize exposures to lead..



Housekeeping

All surfaces in the work/lab/workshop area must be kept as free as practicable from accumulations of lead dust. Surfaces where soldering has been completed must be wiped down with wet mops/rags following the work task or class instruction to ensure that lead is not transferred onto skin or clothes and brought out of the work space. Surfaces should not be wiped or swept when dry or cleaned with pressurized air.

Equipment Maintenance

Instructors, employees, and students need to work together to ensure that the ventilation system is working properly and report equipment deficiencies immediately.

Personal Protective Equipment

A fit tested disposable dust mask (N95) or half face air purifying respirator with N95 filters may be required in the workplace or classroom during soldering. Reuse of dust mask is not encouraged. Work clothes, gloves, safety eyewear, and appropriate footwear are recommended during soldering to prevent skin and hair contamination.

6. Education & Training

The OH&S Committee perform an annual review of the Exposure Control Plan and relevant training materials. Supervisors will arrange education and training for staff and students. Training and education should cover the following:

- Hazards of lead
- Correct operation and use of any required controls and PPE
- Written safe work procedures
- Purpose and significance of lead monitoring and results
- Purpose and significance of any health monitoring program (if necessary)

Supervisors, instructors, employees and students who are potentially exposed to lead have access to this Exposure Control Plan from the Safety and Security website.

7. Written Work Procedures

The following written procedures must be made available on-site by the Instructor or Supervisor for the direction of employees and students performing lead-containing activities:

- This Lead Exposure Control Plan.
- Safe work procedures and precautions for soldering (department specific).

If a respirator is required, as based on the risk assessment, then the Respiratory Protection Program must be followed.

8. Hygiene & Cleanup Practices

- All people who are soldering in the workplace or classroom must ensure they wash their hands thoroughly prior to eating, drinking or smoking.
- The workplace or classroom has a sign on the door which states “no eating or drinking”. This must be enforced in order to decrease the likelihood of lead ingestion.
- Open toe or sandal style footwear is prohibited in the workplace or classroom.
- The immediate work surfaces in the workplace or classroom will be wet washed down (or vacuumed with high efficiency particulate air (HEPA) filters) following soldering (at the end of the work assignment or class) to decrease the likelihood of lead transfer to other areas.
- If work processes involving lead are high hazard, shower and clothing change are required
- Sponge, rags/mops, clothes, masks, and any other contaminated items must be properly handled, cleaned, or disposed of.

9. Health Monitoring

Health monitoring for lead requires supervisors, employees, instructors and students promptly reporting any symptoms which can be linked to exposure to lead. These symptoms must be reported to BCIT First Aid and their Supervisor or Instructor(s) for further investigation.

10. Documentation

The Supervisor must keep records of the employees and students instruction and training for three years.

11. Annual Review

This Exposure Control Plan should be reviewed annually for the following:

- The effectiveness of control measures and work procedures.
- Substitutions for the lead-containing solder.
- First aid reports and any reported lead exposure related health issues.
- Documentation for training and education.

The annual review should be done in consultation with the Joint Health and Safety Committee.