

# Lead in the Workplace: A Guide to Working with Lead

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## Application – Code of Practice

Where lead is present or believed to be present in a workplace to which the Occupational Health and Safety Act applies, the employer has a duty under the Act to take all reasonable precautions to ensure the health and safety of persons at or near that workplace as a result of exposure to this potential hazard. Employees have a similar duty to protect their own health and that of others in their workplace.

This document may be used as guidance for any establishment where lead may be present. In addition, this document may be adopted as a code of practice by an employer who is ordered to establish or adopt a code of practice by the Director of the Occupational Health and Safety Division, or a delegate of the Director, under Section 66 of the Occupational Health and Safety Act.

## Definitions

Words used in this code of practice will have the same meaning as defined by the Occupational Health and Safety Act, and:

- a. “Director” means the Executive Director of the Occupational Health and Safety Division of Nova Scotia Labour and Advanced Education or the Executive Director’s delegate
- b. “Lead” means elemental lead and inorganic compounds of lead containing greater than 0.1% lead, but does not include organic compounds of lead.
- c. “NIOSH” means the National Institute for Occupational Safety and Health of the United States Department of Health and Human Services.

## Workplace Assessment

Every employer must assess the use, handling and storage of lead with respect to the exposure or likelihood of exposure of any employee to lead.

Where the assessment identifies that an employee is likely to inhale, ingest or absorb lead to such an extent that the health of the employee may be adversely affected, the employer must develop a Lead Control Program.

The Lead Control Program must incorporate those measures and procedures required to:

- a. maintain employee exposures to lead to under 50 micrograms per cubic metre of air and,
- b. maintain employee blood lead levels at less than 200 micrograms per liter or 0.97 micromoles per litre of blood.

Where it has been identified by a medical professional that an employee's blood lead level is approaching or exceeding 200 micrograms/L or 0.97 micromoles/L, there is a requirement to reassess the Lead Control Program and implement improvements where needed.

When a change is made in any process involving the use of lead, the workplace assessment must be reviewed to determine if changes to the Lead Control Program are warranted.

Where either a Joint Occupational Health and Safety Committee or a Health and Safety Representative are present in the workplace, the assessment defined in this section must be performed in consultation with the committee or representative.

## Requirements for Air Sampling

Where a Lead Control Program is established, air sampling to quantify lead exposure in the workplace is required.

The air sampling program is to be developed in consultation with the occupational health and safety committee or the occupational health and safety representative, as appropriate.

Where reasonably practical, employee exposures must be assessed using personal sampling.

Where air sampling is required, it must be conducted in accordance with the current method noted in the NIOSH Manual of Analytical Methods or methods which are equivalent or better.

Workplace air sampling for lead will be conducted at least once each calendar year.

Where the airborne level of concentration of lead exceed 50 percent of its occupational exposure limit over the period of time for which the limit is set, workplace air sampling will be conducted at least once every six months.

Written copies of the results of air sampling must be provided to:

- a. the Joint Occupational Health and Safety Committee, or Health and Safety Representative (where present), and
- b. the employees from whom personal samples were collected.

Where the air sampling report identifies airborne concentration of lead, the joint occupational health and safety committee, or the occupational health and safety representative, as appropriate, shall review the report and any recommendations and advise the employer of any additional controls, practices and other measures that should be implemented to maintain airborne concentrations at less than 50 per cent of the occupational exposure limit.

Results of air sampling must be posted for a minimum of 30 days in a conspicuous place in the workplace in such a manner so as not to identify specific individuals.

Records of air sampling results must be maintained by the employer for at least 5 years.

## Requirements for Health Monitoring

Where a Lead Control Program is established:

- a. Health monitoring in accordance with Appendix A must be provided by an appropriate health care professional to all employees exposed to lead.
- b. The employer must ensure that the health care provider conducts periodic examinations as specified in Appendix B.
- c. The health care provider must form an opinion on an employee's fitness to work based on the actions listed in Appendix B corresponding to the blood lead levels,
- d. The health care provider must, based on the actions defined in Appendix B, provide advice to the employer on the fitness to work of each employee examined, and
- e. Individual health records must be created and maintained.

Health records created pursuant to this code of practice or extracts or excerpts thereof:

- a. are to be considered confidential documents and must be kept in a secure manner,
- b. must not be released except in a form calculated to prevent the information from being identified with a particular person or case or with the permission of the employee, and
- c. must be kept by the employer in a place for a period of 30 years from the time of the last entry.

## Requirements for Personal Protective Equipment

Where reasonably practicable, employee exposures must be maintained below 50 micrograms per cubic metre of air without requiring the use of personal protective equipment.

Where respiratory protection is used, it must be a type which is approved by NIOSH as suitable for protection under the expected conditions of use.

Where respiratory protection is used, the employer must design and implement a program for the use of respirators in accordance with CSA Standard Z94.1, Selection, Care and Use of Respirators.

## Requirements for Personal Hygiene

No eating, drinking or smoking is permitted in an area where lead containing materials are used, handled or stored.

Where required as part of a Lead Control Program:

- a. Street clothes, including boots/shoes, must be removed and stored in a clean lead free area at the workplace;
- b. Prior to leaving the work area, lead contaminated clothing must be removed and stored awaiting laundering or disposal;

- c. Showers with hot and cold running water must be available between the work area and a clean lead free area; and
- d. Towels, soap, and shampoo will be supplied as needed.

Products that should be considered for use in any workplace hygiene program include:

- a. commercially prepared soaps to improve lead removal from the skin, and
- b. skin testing products to test for the presence of lead on the skin.

## Education/Training Requirements

The employer must ensure that all employees who are, or may be exposed to inorganic lead are:

- a. Educated in the health effects of lead and the symptoms of lead poisoning; and
- b. Trained in:
  - i. the contents of this code of practice,
  - ii. all safe work procedures established by the employer that are related to lead, and
  - iii. the proper use of any necessary personal protective equipment.

# APPENDIX A

## Health Monitoring

### A Guide to Working with Inorganic Lead

The health monitoring provisions of the Lead Control Program must include the following health monitoring components:

#### Pre-placement Examination

A pre-placement examination must be performed within seven calendar days of hiring. The pre-placement examination must consist of a detailed history, including:

- a. Past and current exposures to lead at work or home.
- b. Personal habits (e.g. smoking, hobbies, nail biting, alcohol use)
- c. Health problems (gastrointestinal, hematologic, renal, hepatic, respiratory, neurological and psychological).
- d. Genetic history.

#### Periodic Examination

A periodic examination must be performed at the frequency set out in Appendix B

Special attention must be given to potential system for lead absorption such as skin, gastrointestinal system and respiratory system.

During a periodic examination, laboratory tests will include:

- a. Blood lead (inorganic lead exposure). To minimize inaccuracy of results:
  - i. Blood specimens must be carefully collected by competent personnel,
  - ii. Blood collection must be carried out following thorough cleaning of the skin,
  - iii. Appropriate methods and sampling equipment must be used, including lead-free, trace metal vacuum tubes,
  - iv. Blood specimens must be sent for analysis as soon as reasonably possible following collection and kept at an appropriate temperature during storage and transportation
  - v. Blood specimens must be transported in a container specifically designed for this purpose, and
  - vi. Analysis of blood samples may be made using any method that will produce results that meet the accuracy requirements of a reliable laboratory;
- b. Blood count; and
- c. Urinalysis (including microscopic).

If warranted in the opinion of supervising health care professional, additional test may include:

- a. Blood Urea Nitrogen (BUN)
- b. Creatinine
- c. Uric Acid
- d. Pulmonary function
- e. Zinc Protoporphyrin (ZPP)
- f. Chest X-ray
- g. PBGS--Porphobilinogen synthase (ALA-D).

### Termination Examination

All employees must be examined at the termination of their employment.

The termination examination must include all items required in a pre-placement examination.

## APPENDIX B

### Required Frequency of Periodic Examinations A Guide to Working with Inorganic Lead

**Note:** This procedure applies only to employees who may be exposed to lead for more than 30 days in a year.

TABLE 1. BLL Worker Monitoring and Medical Removal Criteria for Worker with Significant Lead Exposure, defined as an Airborne or Surface Lead Content Known or Reasonably Anticipated to Cause Elevated BLL	
Category of Exposure	Recommendations
All workers with significant lead exposure*: medical examination frequency	<ul style="list-style-type: none"> <li>• Baseline or preplacement medical history and physical examination, a baseline BLL, complete blood count, and serum creatinine before the worker is placed in a job with anticipated significant lead exposure.</li> <li>• Additional medical examinations may also be recommended periodically in specific workers based on the findings or prior medical examinations and clinical test results</li> </ul>
All lead workers: frequency of blood lead levels (BLLs)	<ul style="list-style-type: none"> <li>• BLL (measured in µg/L or µmol/L) every 2 months for first 6 months of placement, or upon change to tasks resulting in higher exposure, then BLL every 6 months; goal should be &lt; 50 µg/L, (&lt; 0.24 µmol/L) for all pregnant workers.</li> <li>• More frequent BLL monitoring may be needed for pregnant workers or those who are trying to or may become pregnant</li> </ul>
Recommendations if BLL 50 to < 100 µg/L (0.24 to <0.48 µmol/L)	<ul style="list-style-type: none"> <li>• BLL increases ≥ 50 µg/L, (≥ 0.24 µmol/L) evaluate workplace exposure and protective measures.</li> <li>• Increase monitoring if indicated. For women of childbearing age, levels between 50 and 90 µg/L, (0.24 and 0.43 µmol/L)</li> <li>• indicate possible risks for spontaneous abortion and possible risk for postnatal developmental delay; discuss health risks</li> </ul>

	<p>and reduce lead exposure for women who are or may become pregnant.</p> <ul style="list-style-type: none"> <li>• It is inadvisable to allow pregnant workers or those who are trying to or may become pregnant continued exposure if BLL is &gt; 50 µg/L, (&gt; 0.24 µmol/L), and medical removal is recommended; pregnant workers may return to work when two repeat BLLs are &lt; 50 µg/L, (&lt; 0.24 µmol/L)</li> </ul>
<p>Recommendations if BLL 100 to &lt; 200 µg/L <b>(0.48 to &lt;0.97 µmol/L)</b></p>	<ul style="list-style-type: none"> <li>• BLL every 2 months; evaluate exposure, engineering controls, and work practices; revert to BLL every 6 months after two or three BLLs &lt; 100 µg/L (0.48 µmol/L).</li> <li>• Mandatory medical removal for pregnant women or those who are trying to become pregnant if BLL is &gt; 100 µg/L (&gt; 0.48 µmol/L); return to work when two repeat BLLs are &lt; 50 µg/L, (&lt; 0.24 µmol/L)</li> </ul>
<p>Recommendations if BLL greater than 200 µg/L <b>(&gt;0.97 µmol/L)</b></p>	<ul style="list-style-type: none"> <li>• Evaluate exposure, engineering controls, and work practices, and remove from exposure if repeat BLL measured in 4 weeks remains ≥ 200 µg/L (≥ 0.97 µmol/L), or if the first or any single BLL ≥ 300 µg/L (≥ 1.45 µmol/L).</li> <li>• Monthly BLL testing needed, and consider return to lead work after two BLLs &lt; 150 µg/L (&lt; 0.72 µmol/L) 1 month apart, then monitor as above</li> </ul>
<p>Recommendations if BLL &gt; 300 µg/L <b>(&gt;1.45 µmol/L)</b></p>	<ul style="list-style-type: none"> <li>• Remove from exposure immediately. Evaluate exposure, engineering controls, and work practices.</li> <li>• In addition, monthly BLL testing needed.</li> <li>• Consider return to lead work after two BLLs &lt; 150 µg/L (&lt; 0.72 µmol/L) 1 month apart, then monitor as above</li> </ul>

\* Lead-exposed means handling or disturbing materials with a significant lead content in a manner that could reasonably be expected to cause potentially harmful exposure through inhalation or ingestion.

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