

Lead Control Program

Police and Public Safety Institute

Firing Range

Safety & Security Services

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ALGONQUIN
COLLEGE

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Glossary

CSA	Canadian Standards Association
Control Measure	A measure used to control employee exposure to a lead dust or fume hazard. Control measures include the use of personal protective equipment such as respirators, local exhaust ventilation, wet cleaning methods, and so forth.
Dust	Small solid particles created by the destruction of larger particles through grinding, drilling, or explosion. Particle sizes vary.
Encapsulation	The application of a sealant over the surface to prevent migration of lead particles to the surface. Encapsulation is not recommended as a method of control of lead hazards.
EPA	U.S. Environmental Protection Agency
Fume	Fine solid particles formed through condensation of vapours that are solid at normal temperatures. Particle size is extremely small, typically less than 1µm in diameter.
HEPA	High Efficiency Particulate Air (HEPA). HEPA filtered equipment must be capable of trapping and retaining 99.97% of all particles larger than 0.3 microns.
HVAC	Heating, Ventilation, and Air Conditioning.
JOHSC	Joint Occupational Health and Safety Committee.
Lead	Elemental lead, inorganic compounds of lead and organic compounds of lead.
LCM	Lead Containing Materials
MOE	Ontario Ministry of Environment
MOL	Ontario Ministry of Labour.
NIOSH	National Institute for Occupational Safety and Health

OPS	Ottawa Police Service
OSHA	U.S. Occupational Safety and Health Administration
PPE	Personal Protective Equipment – Any material or device worn to protect a worker from exposure to, or contact with, any harmful material or force. PPE should only be used when engineering or administrative controls are insufficient to protect against a hazard.
Respiratory Protection	A device worn to either purify the air, or that provides clean air to the wearer from another source. All respirators must conform to CSA Z94.4-02.
SOPs	Standard Operating Procedures
TWAEV	Time Weighted Average Exposure Value.

1.0 INTRODUCTION TO THE LEAD CONTROL PROGRAM

The indoor firing range at Algonquin College is located in Police & Public Safety Institute at the Woodroffe Campus in Ottawa, Ontario. While the firing range is located at, and maintained by, Algonquin College, it is operated and used by the Ottawa Police Service (OPS). With the exception of Algonquin College maintenance and operations staff, no member of the Algonquin College community is permitted access to the range. Use of the range for its intended purpose is currently restricted to members of the OPS, who supply their own range masters and instructors. Due to this unique arrangement, the OPS is responsible for maintaining a separate *Lead Control Program*, covering environmental health and safety issues for its members.

The principle objective of the Algonquin College Firing Range Lead Control Program is to minimise the exposure of maintenance and custodial personnel to lead by:

1. Periodic assessment of maintenance and custodial range activities to measure worker exposure to airborne lead.
2. Developing standard work practices and procedures that will allow maintenance to be performed safely without exposing employees and building occupants to airborne or surface lead hazards.
3. Training individuals who may encounter lead hazards during their normal work activities.

This program has been designed to comply with Ontario Regulation 843 *Designated Substances – Lead*, as amended by Ontario Regulations 519/92 and 389/00.

Background information on the health effects associated with exposure to lead is included in Section 5.0 or through the Health and Safety Department of Algonquin College.

1.1 Who Should Participate

The Algonquin College Firing Range Lead Control Program is administered by the Occupational Health & Safety section (OHS) of the College. OHS coordinates sampling of suspected lead contaminated materials, maintains exposure records, monitors activities likely to pose exposure risks for workers, and periodically assesses work procedures likely to disturb lead. Other key College participants can include:

- Building maintenance and supervisory personnel

- Custodial staff and supervisory personnel
- Safety coordinators and members of the JHSC
- Contractors

As stated in Section 1.0, the Algonquin College Firing Range Lead Control Program does *not* cover members of the OPS, firing range shooting activities, firing range employees (i.e., instructors, range master), authorised or unauthorised firing range guests, and/or activities and persons not expressly authorised by OHS for the purpose of maintenance and operation of the firing range. All contractors and third parties performing work for, or on behalf of, Algonquin College, are required to adhere to this control program.

2.0 MONITORING LEAD

Algonquin College will monitor and secure personal air samples for all lead-related activities performed by college personnel. These air samples will be used to validate that work practices and standard operating procedures (SOPs) do not expose workers to lead levels above the allowable limits¹ set forth in Section 4 of O. Reg. 843 *Designated Substances – Lead*.

Historic sampling data may be used in lieu of monitoring where previous samples were obtained during similar work conditions and work types and no exposures above the TWAEV set forth in Section 4 of O.Reg 843 were recorded.

2.1 Airborne Lead

Airborne monitoring measures the amount of lead dust and fumes in the breathing zone or work areas where workers may be exposed to airborne lead. While personal air monitoring is designed to measure the exposure level on individual workers to airborne lead, it is also used to establish the required level of respiratory protection and determine whether Algonquin College is in compliance with the stated requirements of O.Reg 843.

¹ The current TWAEV of a worker for exposure to airborne lead, except tetraethyl lead, is 0.05 milligrams lead per cubic metre of air, and in the case of exposure to tetraethyl lead is 0.10 milligrams lead per cubic metre of air.

Area samples are used to determine the concentrations of airborne lead dust and fumes within a limited area surrounding the sample location and are useful in determining how particular firing range tasks affect the levels of airborne lead.

Section 11 of O.Reg 843 states that “the procedures for monitoring, sampling, and determining the concentrations of airborne lead in the atmosphere of a workplace and a worker’s exposure to airborne lead shall be in accordance with standard methods for workplace air sampling and analysis”. In order to fulfil this requirement, Algonquin College, and any third party acting on behalf on Algonquin College, will follow one of the published methodologies of the National Institute for Occupational Safety and Health (NIOSH) for airborne lead sampling and analysis.

2.2 Lead Levels in Workers

As required under Section 13 of O.Reg 843, all college workers potentially exposed to lead from maintenance and cleaning operations of the indoor firing range at the college shall, at no expense to the worker, undertake medical examinations and clinical testing as described in the *Code for Medical Surveillance for Lead*, published by the Ontario Ministry of Labour (MOL).

The purpose of medical surveillance is to protect the health of workers by ensuring that their individual level of health is appropriate, that data exists to monitor and recognise problems when encountered, and to ensure that remedial action will follow if a problem is encountered. The *Code for Medical Surveillance for Lead* has set the following action levels:

Lead in Blood	0.60 mg/L	- Employer must make enquiries regarding work practices and personal hygiene
	> 0.70 mg/L ²	- Employee must be removed from all lead exposure if results confirmed by a second test.
Lead in Urine	> 0.15mg/L	- Worker is required to take a blood test when this level is reached.

As the MOL may alter these levels at some time in the future, any third party utilizing this control program must confirm these levels directly with either the MOL or by obtaining the latest edition of the *Code for Medical Surveillance for Lead*.

² For woman capable of bearing children, this level has been reduced to > 0.40 mg/L of lead in blood.

3.0 ENGINEERING CONTROLS, WORK PRACTICES, & HYGIENE

3.1 Engineering Controls

Engineering controls involve the installation and use of equipment, facilities, or modifications to work procedures to either protect workers from exposure or reduce exposure to industrial contaminants. Within the firing range, engineered controls take numerous forms:

Isolation – Certain aspects of the range are restricted to authorized personnel. For example, access to the maintenance area behind the range where the backstops are located is locked.

Process Modification – Involves changing the method by which an activity occurs. For example, HEPA vacuuming the range floor rather than sweeping to control lead dust.

Ventilation – The Firing Range is equipped with a dedicated HEPA filtered HVAC system designed to produce laminar airflow downrange to move contaminants away from shooters. Positive air pressure is maintained uprange while negative air pressure exists downrange.

As detailed in Section 2.0, Algonquin College will monitor and secure personal air samples for all lead-related activities performed by college personnel. Based upon the results of these samples, changes to the current engineering controls may occur periodically to ensure College personnel are fully protected from lead hazards.

3.2 Work Practices

All work practices must be performed in a manner designed to ensure the health and safety of workers and building occupants. Work that will disturb, or is likely to disturb, lead or LCMs, must be performed by trained personnel (Section 5.2) suitably attired in protective clothing (Section 6.0) following the work procedures outlined in Section 10.0.

3.3 Worker Hygiene & Housekeeping

Lead dust on work surfaces, the range floor, or on worker clothes can easily become airborne and can be inhaled or swallowed by hand-to-mouth contact with contaminated surfaces. Good housekeeping and hygiene practices are essential to protect both the worker and their families and co-workers.

Within the range area and all associated spaces, the following rules apply:

- Eating, drinking, smoking, chewing tobacco, applying cosmetics, lip balms, sunscreens, and repellents are all prohibited.
- All employees are required to wash their hands, forearms, and face thoroughly with warm, soapy water and to dry them with a clean towel before breaks, lunch, and whenever exiting the range area. Washing facilities are available within the range area.

These rules are in place to prevent workers from accidentally ingesting or inhaling lead and from spreading lead dust to other areas of the facility and worker vehicles. Under no circumstances are workers permitted to depart the range area after performing work that produced lead dust without removing their outer protective clothing and washing.

4.0 EMPLOYEE RECORDS

The retention of worker health records for any College workers required to undergo medical surveillance are defined under the *Code for Medical Surveillance for Lead*. The college will treat all records as confidential and personal. An employee has the right to access his or her personal medical records and be provided with a copy of all records concerning their lead exposure.

5.0 LEAD HAZARD RECOGNITION

The lead hazards associated with indoor firing ranges have been well documented by such agencies and organisations as the United States Environmental Protection Agency (USEPA) and the U.S. Occupational Safety and Health Administration (OSHA). The main lead hazards at indoor firing ranges are as follows:

- Lead dust created as bullet slugs hit bullet traps, walls, floors, and ceilings;
- Exploding primers (in bullets) containing lead styphnate;
- Lead dust created by friction between the bullet slug and the barrel of a gun;
- Accumulation of lead in surface dusts due to inadequate ventilation or disruptions to laminar air flow; and
- Spent bullets and lead dust accumulating in the bullet traps.

Custodial and maintenance activities occurring in the firing range can expose workers to high levels of lead dust. The health risks associated with lead are not limited to workers; improper worker hygiene can lead to second-hand lead exposures for other building occupants, co-workers, and family. Dust which settles on workers clothing, boots, and body will leave the range with the worker if the precautions and SOPs outlined in this

Lead Control Program are not strictly adhered to. Children are particularly susceptible to the health risks associated with lead. Dust on workers clothing may be deposited elsewhere on campus, in vehicles, and at the workers home.

5.1 Hazards of Lead

The primary toxicological exposure routes (methods by which lead enters a body) are inhalation (breathing) and ingestion (direct entry through the mouth). Lead (except for some organic compounds not covered by this program) is not typically absorbed through the skin. Inhalation of lead is considered the primary source of occupational exposure. When lead is present in the air as either a dust or fume, it can be inhaled and absorbed through the lungs and upper respiratory tract. Lead can also enter the digestive system if it enters the mouth and is swallowed (i.e., by handling food or cigarettes with lead contaminated hands).

Once lead enters the body, the majority of the lead is stored in either the bones or tissues. Over time with lead exposure, the amount and concentration of lead within the body increases when the body becomes unable to excrete all of the lead absorbed, which can result in lead poisoning. The major effects of lead poisoning are summarised in **Table One** below:

Table One – Acute and Chronic Health Effects of Lead Exposure

<p>Acute (Short Term) Extremely rare</p>	<ul style="list-style-type: none"> • Seizures • Unconsciousness • Cardio-respiratory failure resulting in death
<p>Chronic (Long Term) Damage typically to the urinary, nervous, blood-forming, and reproductive systems.</p>	<ul style="list-style-type: none"> • Loss of appetite • Metallic taste in the mouth • Anxiety • Constipation • Nausea • Pallor • Insomnia • Headaches • Nervous Irritability • Muscle and/or joint pain • Tremors

5.2 Training

Employees who perform duties that involve the removal or disturbance of lead or LCMs or that are required to work in environments contaminated with lead dust shall be

provided training annually. At a minimum, the training shall include the following components:

- The requirements of O. Reg. 843 *Designated Substances – Lead*;
- Information about the potential for adverse health effects of lead exposure;
- Information about the early recognition of lead intoxication;
- The specific operations that could result in an exposure to lead above the TWAEV, and the work practices and procedures that they are to follow to limit their exposure;
- Discussion of the importance of personal hygiene practices in reducing lead exposure; and,
- Instruction about the use and care of appropriate protective equipment, including protective clothing and respiratory protection.

Employees that need to use respiratory protection during the course of their work, or that perform work where exposures above the TWAEV have been documented, must participate in the College's medical surveillance and respiratory protection programs. For more information, contact the Office of Safety and Security.

6.0 PERSONNEL PROTECTIVE EQUIPMENT (PPE)

When engineering controls and work practices are not effective in controlling exposure to lead and LCMs, College employees must wear suitable personnel protective equipment including approved respiratory protection. In addition, equipment appropriate to respond to emergencies such as spills or fires must be present and in good working condition. *(See Personal Protective Equipment Program)*

6.1 Respiratory Protection

If, and when, respiratory protection is required for College employees due to lead hazards associated with the indoor range, a respiratory protection program, including selection, fit, testing, training, maintenance, and inspection will be implemented in accordance with CSA Standard Z94.4-02 "Selection, Care, and Use of Respirators". *(See Respiratory Protection Program)*

In addition to compliance with Z94.4-02, all respiratory equipment "shall meet or exceed the requirements set out in the *Code for Respiratory Equipment for Lead*", issued by the Ontario Ministry of Labour (R.R.O. 1990, Reg. 843, s. 5 (2); O. Reg. 389/00, s. 2).

6.2 Protective Clothing

All range work that disturbs, or is likely to disturb, lead or LCMs, must be performed by personnel suitably attired in protective clothing. The minimum levels of protection are as follows:

- Disposable coveralls with booties and hood designed to provide an effective particulate barrier OR disposable coveralls and hood with CSA-approved rubber boots;
- Disposable gloves (nitrile, latex, or similar);
- CSA-approved eye and face protection; and,
- Respiratory protection as outlined in Section 6.1.

All disposable protective clothing must be removed immediately on exit from the firing range and placed in an appropriate receptacle with labels for Class 9 waste as defined under the Transportation of Dangerous Goods Regulation and Act.

Non-disposable protective clothing (i.e., eye and face protection, respirators, footwear) must be immediately decontaminated upon exit from the firing range or sealed in a suitable container and transported elsewhere for decontamination.

7.0 CONTRACTOR AWARENESS PROGRAM

Contractors performing work within the firing range or to equipment servicing the firing range are required to comply with all aspects of this control program and with all applicable provincial and federal regulations, specifically, but not limited to, Ontario Regulation 843 *Designated Substances – Lead*. It is the responsibility of the Contractor to ensure all Contractor employees and/or Sub-Contractors are aware of these requirements and comply with them at all times.

Prior to commencing any work within the firing range, the Contractor shall contact the manager responsible for the contract work being performed to receive a copy of the Firing Range Lead Control Program. Contractors are required to complete the Contractor Acknowledgement Form in **Appendix A**. In addition, the Contractor shall submit to the manager responsible for the contract work, for review and approval, a written work plan, including work practices, precautions, procedures, and engineering controls to be used during all work liable to disturb lead dust prior to commencement of this work. Work will not proceed until the proposed work plan has been approved by OHS.

Contractors are responsible for securing air samples for their own personnel as needed to meet the requirements of Ontario Regulation 843 *Designated Substances – Lead*, as amended by Ontario Regulations 519/92 and 389/00. A copy of all air monitoring performed on Algonquin College property must be provided to the Algonquin College Office of Safety and Security within five (5) days of receipt from the laboratory.

8.0 WORK AUTHORISATIONS & PERMITS

The purpose of the work authorisations is to allow Algonquin College an opportunity to review all proposed firing range work that is to be completed internally by College staff and/or by Contractors to insure that proposed work procedures adhere to the principles of the Algonquin College Lead Control Program. Workers and building occupants are to be protected from lead hazards at all times.

9.0 WORK PROCEDURE GUIDELINES

Work procedure guidelines for lead-related activities at the firing range outline minimum levels of protection and work practices to ensure the health and safety of building occupants and workers. Adherence to these guidelines is mandatory and will help to minimise the production of airborne lead, minimise the creation of surface lead dust hazards, and will assist in protecting the worker and building occupants.

9.1 Firing Range Cleaning

Range cleaning activities include vacuuming or mopping the range floor and other horizontal surfaces within the range area, including the range mechanical room.

For all cleaning activities, PPE must be worn including a NIOSH-approved HEPA-filtered respirator, disposable or range-specific clothing, and disposable booties or CSA-approved rubber boots. Cleaning activities are to be performed in a manner designed to minimise the potential for lead particles to become airborne. Examples of appropriate cleaning methods include wet cleaning (mopping) and HEPA vacuuming. Under no circumstances are any surfaces to be dry mopped or swept.

9.2 Bullet Trap Cleaning

The bullet traps at Algonquin College are cleaned from the rear of the range from within the service room. Workers are required to open the trap doors on the bottom of each trap and empty the contents into a wheelbarrow. Once in the wheelbarrow, the contents are separated with the use of a siphon-vacuum system that sucks the lighter rubber particles into the system and returns them to the trap from the top. The heavier metal

components are left behind in the wheelbarrow, where they are collected and removed for disposal as leachable toxic waste or metal recycling. The system only works as intended if the vacuum wand remains a minimum of 12 inches above the wheelbarrow contents. It is not possible to remove all lead and metal particles using this system.

During bullet trap cleaning, the minimum levels of protection for workers are disposable coveralls with booties or CSA-approved rubber boots, eye and face protection (due to the high velocity of rubber and metal particles moving through the siphon-vacuum system, a NIOSH-approved respirator with P100 HEPA filters, and disposable gloves.

9.3 HVAC Work

Work on the HVAC system serving the firing range can be divided into two categories: routine maintenance activities including replacement of HEPA filters and cleaning, and repair work.

For routine maintenance activities, workers are required to wear disposable coveralls and booties or CSA-approved rubber boots, a NIOSH-approved respirator with P100 HEPA filters, and disposable gloves, and eye and face protection. For any activities which includes utilizing chemicals in the HVAC system (i.e., cleaning and descaling), a two-stage “piggyback” respirator cartridge system must be used that provides both appropriate chemical protection and a P100 HEPA filter for airborne particulates.

During investigation and/or repair operations to the mechanical systems serving the range, workers must take appropriate precautions to protect both themselves and others. This includes the use of disposable coveralls and booties or CSA-approved rubber boots, a NIOSH-approved respirator with P100 HEPA filters, and disposable gloves, and eye and face protection. Work should be performed in a manner designed to minimise the creation or release of lead dust and particles.

9.4 Miscellaneous Range Work

All maintenance work on or within the firing range not specifically covered in Sections 9.1 to 9.3 must take appropriate precautions to protect both themselves and others. This includes the use of disposable coveralls and booties or CSA-approved rubber boots, a NIOSH-approved respirator with P100 HEPA filters, and disposable gloves, and eye and face protection. Work should be performed in a manner designed to minimise the creation or release of lead dust and particles.

10.0 RANGE WASTE

In the province of Ontario, waste from industrial and commercial sources is governed by Ontario Regulation 347 *General Waste Management*. All waste generated at Algonquin College through activities associated with the firing range must adhere to the registration, handling, and disposal requirements of this regulation. In addition, the federal Transportation of Dangerous Goods Act and Regulations imposes requirements on the College, and Contractors working on behalf of the College, regarding waste storage, labelling, handling, and transportation.

Unless proven otherwise by laboratory sample results from an accredited laboratory, all waste removed from the indoor range and associated areas is to be consider a Class 9, leachable toxic waste and handled accordingly. This includes the HEPA filters in the HVAC system, all disposable protective equipment worn by workers, lead and metal from the bullet traps, the contents of the HEPA vacuum used for cleaning the range, and any equipment removed from the range.

The Transportation of Dangerous Goods Act (SOR/DORS/2001-286) requires that all persons handling dangerous goods be properly trained and hold a valid training certificate which details which types or classes of goods the worker is entitled to handle.

The removal of hazardous waste shall be conducted in accordance with the Hazardous Waste Program.

APPENDIX A

CONTRACTOR ACKNOWLEDEMENT FORM

ALGONQUIN COLLEGE LEAD CONTROL PROGRAM

Police & Public Safety Institute – Firing Range

CONTRACTOR ACKNOWLEDGEMENT

All contractors (including contractor employees and sub-contractors) performing work at or on the Algonquin College Firing Range are required to read and comply with the Algonquin College Firing Range Lead Control Program and all applicable federal and/or provincial regulations.

I, _____, representing _____ have been made aware of Algonquin College's Firing Range Lead Control Program on this _____ day of _____ (month), _____ (year). Furthermore, I agree to follow all Algonquin College practices, precautions, procedures, and engineering controls related to the Firing Range and lead control.

I also agree to submit, for review prior to work commencing, a task specific written work plan, including work practices, precautions, procedures, and engineering controls to be used during all work liable to disturb lead dust.

Contractors are responsible for securing air samples for their own personnel, as needed, to meet the requirements of Ontario Regulation 843 *Designated Substances – Lead*, as amended by Ontario Regulations 519/92 and 389/00. A copy of all air monitoring performed on Algonquin College property must be provided to the College Occupational Health & Safety section within five (5) days of receipt from the laboratory.

In the event that either myself, the organisation I represent, my employees or my sub-contractors are determined to have caused an incident whereby accidental exposure to airborne lead has occurred, I agree to contact the Algonquin College Occupational Health & Safety section immediately upon notification of said incident.

Contractor Signature: _____

Date: _____

Algonquin College: _____

(Name & Position)

It is the responsibility of each Contractor to ensure that all Staff, Employees, and Sub-Contractors are fully aware of the Algonquin College Firing Range Lead Control Program.

APPENDIX B

R.R.O. 1990, REGULATION 843, *Amended to O. Reg. 389/00*

DESIGNATED SUBSTANCE - LEAD

Occupational Health and Safety Act

REGULATION 843
Amended to O. Reg. 389/00

DESIGNATED SUBSTANCE — LEAD

This is the English version of a bilingual regulation.

1. In this Regulation,

“joint health and safety committee” includes a joint health and safety committee established under section 9 of the Act, a committee of like nature and the workers or their representatives who participate in an arrangement, program or system conforming to subsection 9 (4) of the Act; (“comité mixte sur la santé et la sécurité”)

“lead” means elemental lead, inorganic compounds of lead and organic compounds of lead. (“plomb”) R.R.O. 1990, Reg. 843, s. 1.
2. Lead is prescribed as a designated substance. R.R.O. 1990, Reg. 843, s. 2.
3. (1) This Regulation applies to every employer and worker at a workplace where lead is present, produced, processed, used, handled or stored and at which the worker is likely to inhale, ingest or absorb lead. R.R.O. 1990, Reg. 843, s. 3 (1).

(2) A person who is an employer to whom this Regulation applies and at whose workplace construction is being carried out shall comply with sections 4 and 5 with respect to every worker who is not an employee of the employer and who,

 - (a) works on the construction, even if the work is performed under a contract with another person; or
 - (b) is authorized or permitted to be in the workplace. R.R.O. 1990, Reg. 843, s. 3 (2).

(3) Subject to subsection (2), this Regulation does not apply to a constructor or to an employer on a construction project in respect of those workers who work at or on the project. R.R.O. 1990, Reg. 843, s. 3 (3).
4. (1) Every employer shall take all necessary measures and procedures by means of engineering controls, work practices and hygiene practices and facilities to ensure that the time-weighted average exposure of a worker to airborne lead, except tetraethyl lead, shall not exceed 0.05 milligrams lead per cubic metre of air, and in the case of exposure to tetraethyl lead 0.10 milligrams lead per cubic metre of air. R.R.O. 1990, Reg. 843, s. 4 (1); O. Reg. 389/00, s. 1 (1).

(2) In complying with subsection (1), the employer shall ensure that the maximum concentration of exposure to airborne tetraethyl lead shall not exceed 0.30 milligrams lead per cubic metre of air and the exposure of a worker to such maximum concentration,

 - (a) shall not exceed fifteen minutes at any one time;
 - (b) shall not occur more than four times in a work day; and
 - (c) shall not occur until at least sixty minutes have elapsed from the time of the last previous exposure to such concentration. R.R.O. 1990, Reg. 843, s. 4 (2); O. Reg. 389/00, s. 1 (2).

(3) Subject to section 5, every employer shall comply with subsections (1) and (2) without requiring a worker to wear and use respiratory equipment. R.R.O. 1990, Reg. 843, s. 4 (3).

(4) The time-weighted average exposure of a worker to airborne lead shall be calculated in accordance with the Schedule and the result of the calculation of the exposure may be certified by an inspector. R.R.O. 1990, Reg. 843, s. 4 (4).

(5) Every worker shall work in compliance with the work practices and hygiene practices in accordance with the provisions of the lead control program. R.R.O. 1990, Reg. 843, s. 4 (5).

(6) On a prosecution for a failure to comply with subsection (1), it shall be a defence for an employer to prove that the employer has complied with subsection (1) and that a breach of subsection (1) occurred solely because a worker failed to work in compliance with the work practices and hygiene practices in accordance with the provisions of the lead control program and the employer has taken every precaution reasonable in the circumstances to require the worker to do so. R.R.O. 1990, Reg. 843, s. 4 (6).
5. (1) Where the strict duty imposed by subsection 4 (1) cannot be complied with because,
 - (a) an emergency exists; or
 - (b) the measures and procedures necessary to control the exposure of a worker to airborne lead,
 - (i) do not exist or are unavailable,

REGULATION 843 – Designated Substances - Lead

- (ii) are not reasonable or practical for the length of time or frequency of exposure or the nature of the process, operation or work, or
- (iii) are not effective because of a temporary breakdown of equipment,

the employer shall provide a worker with respiratory equipment which shall be used by the worker. R.R.O. 1990, Reg. 843, s. 5 (1).

(2) Where respiratory equipment is provided by an employer and used by a worker, the respiratory equipment shall be appropriate in the circumstances for the type and the concentration of airborne lead and shall meet or exceed the requirements set out in the *Code for Respiratory Equipment for Lead* dated June 30, 2000, and issued by the Ministry. R.R.O. 1990, Reg. 843, s. 5 (2); O. Reg. 389/00, s. 2.

(3) The employer shall provide training and instruction to a worker in the proper care and use of respiratory equipment provided by the employer. R.R.O. 1990, Reg. 843, s. 5 (3).

6. (1) Every employer to whom this Regulation applies shall cause an assessment to be made in writing of the exposure or likelihood of exposure in a workplace of a worker to the inhalation, ingestion or absorption of lead. R.R.O. 1990, Reg. 843, s. 6 (1).

(2) In causing the assessment to be made, the employer shall consider and take into account such matters as,

- (a) the methods and procedures used or to be used in the processing, use, handling or storage of lead;
- (b) the extent and potential extent of the exposure of a worker to the inhalation, ingestion or absorption of lead; and
- (c) the measures and procedures necessary to control such exposure by means of engineering controls, work practices and hygiene practices and facilities. R.R.O. 1990, Reg. 843, s. 6 (2).

(3) In causing the assessment to be made, the employer shall consult thereon with the joint health and safety committee and the committee may make recommendations with respect to the assessment. R.R.O. 1990, Reg. 843, s. 6 (3).

(4) A copy of the assessment made by an employer shall be given by the employer to each member of the joint health and safety committee. R.R.O. 1990, Reg. 843, s. 6 (4).

7. (1) Where the assessment discloses or would, if made in conformity with section 6, disclose that a worker is likely to inhale, ingest or absorb lead and that the health of the worker may be affected thereby, the employer shall develop, establish, put into effect and maintain measures and procedures to control the exposure of the worker to lead and shall incorporate the same into a lead control program. R.R.O. 1990, Reg. 843, s. 7 (1).

(2) The lead control program shall include provisions for,

- (a) engineering controls, work practices and hygiene practices and facilities to control the exposure of a worker to lead;
- (b) methods and procedures to monitor the concentrations of airborne lead in the workplace and the exposure of a worker thereto;
- (c) personal records of the exposure of a worker to lead at the workplace to be maintained by the employer;
- (d) medical examinations and clinical tests of a worker; and
- (e) records of medical examinations and clinical tests of a worker to be maintained by a physician who has examined the worker or under whose direction the clinical tests have been performed. R.R.O. 1990, Reg. 843, s. 7 (2).

(3) In developing the measures and procedures mentioned in subsection (1) and the lead control program, the employer shall consult with the joint health and safety committee and the committee may make recommendations with respect to the same. R.R.O. 1990, Reg. 843, s. 7 (3).

8. Where a change is made in a process involving lead, or in the methods and procedures in the use, handling or storage of lead and the change could result in a significant difference in the exposure of a worker to the inhalation, ingestion or absorption of lead, the employer shall cause a further assessment to be made forthwith and the provisions of sections 6 and 7 apply to the further assessment. R.R.O. 1990, Reg. 843, s. 8.

9. (1) Where disputes arise between an employer and a joint health and safety committee as to an assessment required under section 6 or 8 or as to the measures and procedures mentioned in subsection 7 (1) or the lead control program or its provisions required under section 7 or 8, the employer, a member of the joint health and safety committee or the committee may notify an inspector thereof who shall investigate and give a decision in writing to the employer, the member or committee. R.R.O. 1990, Reg. 843, s. 9 (1).

(2) Nothing in subsection (1) applies so as to affect the power of an inspector to issue an order for a contravention of this Regulation. R.R.O. 1990, Reg. 843, s. 9 (2).

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10. (1) A copy of the lead control program put into effect by the employer shall be given by the employer to each member of the joint health and safety committee and the employer shall acquaint every worker affected by the lead control program with its provisions. R.R.O. 1990, Reg. 843, s. 10 (1).

(2) A copy of the lead control program put into effect by the employer shall be made available by the employer in English and in the majority language of the workplace. R.R.O. 1990, Reg. 843, s. 10 (2).

11. The procedures for monitoring, sampling and determining the concentrations of airborne lead in the atmosphere of a workplace and a worker's exposure to airborne lead shall be in accordance with standard methods for workplace air sampling and analysis. O. Reg. 389/00, s. 3.

12. The results of monitoring the concentrations of airborne lead in the workplace and the exposure of a worker thereto as provided by the lead control program shall be,

- (a) posted forthwith by the employer as soon as the results are available in a conspicuous place or places at the workplace where they are most likely to come to the attention of the workers affected thereby for a period of at least fourteen days;
- (b) furnished to the joint health and safety committee; and
- (c) kept by the employer for a period of at least five years. R.R.O. 1990, Reg. 843, s. 12.

13. (1) A worker shall, at the expense of the employer, undergo the medical examinations and clinical tests required under the lead control program. R.R.O. 1990, Reg. 843, s. 13 (1).

(2) The medical examinations and clinical tests required under the lead control program shall make provisions for,

- (a) pre-employment and pre-placement medical examinations to include,
 - (i) a medical history,
 - (ii) a physical examination, and
 - (iii) clinical tests including analysis of blood or urine or both as required by the examining physician; and
- (b) periodic medical examinations and clinical tests consisting of the items prescribed by clause (a). R.R.O. 1990, Reg. 843, s. 13 (2).

(3) The concentration of lead in a worker's blood or urine shall be determined in accordance with standard methods for biological monitoring. O. Reg. 389/00, s. 4.

(4) The medical history, physical examination and clinical tests shall meet the provisions of the *Code for Medical Surveillance for Lead* dated the 28th day of May, 1981 and issued by the Ministry. R.R.O. 1990, Reg. 843, s. 13 (4).

14. (1) The records of the exposures of each worker to airborne lead at the workplace to be maintained as provided by the lead control program shall identify the worker, including the worker's date of birth, the worker's jobs or occupations at the workplace, the results of monitoring for exposure to airborne lead in the worker's work area and the use by the worker of respiratory equipment and its type. R.R.O. 1990, Reg. 843, s. 14 (1).

(2) The employer shall provide a copy of the records of the exposures of the worker to airborne lead as provided by the lead control program to the physician who examines the worker and under whose supervision the clinical tests of the worker are performed. R.R.O. 1990, Reg. 843, s. 14 (2).

15. (1) The records of medical examinations and clinical tests of a worker obtained and made under this Regulation and of the exposures of the worker to airborne lead furnished by the employer under subsection 14 (2) shall be kept in a secure place by the physician who has conducted the examinations and tests or under whose supervision the examinations and tests have been made for the longer of,

- (a) the period of forty years from the time such records were first made;
- (b) the period of twenty years from the time the last of such records were made. R.R.O. 1990, Reg. 843, s. 15 (1).

(2) Where the physician is no longer able or willing to keep the records, the records shall be forwarded to the Provincial Physician, Ministry of Labour, or to a physician designated by the Provincial Physician and the provisions of subsection (1) shall, with necessary modifications, apply thereto. R.R.O. 1990, Reg. 843, s. 15 (2); O. Reg. 519/92, s. 1.

16. (1) The physician conducting the physical examination or clinical tests or under whose supervision the examination or tests are made shall advise the employer, who shall act thereon, and the worker whether the worker is fit or because of a condition resulting from the inhalation, ingestion or absorption of lead is fit with limitations or unfit, without giving or disclosing to the employer the records or results of the examination or tests, and in advising that the worker is fit with limitations or unfit, the physician shall be governed by the provisions of the *Code for Medical Surveillance for Lead* referred to in subsection 13 (4). R.R.O. 1990, Reg. 843, s. 16 (1).

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(2) Where a worker is removed from exposure to lead because a physical examination or clinical test discloses that the worker may have or has a condition resulting from the inhalation, ingestion or absorption of lead and suffers a loss of earnings occasioned thereby, the worker is entitled to compensation for the loss in the manner and to the extent provided by the *Workers' Compensation Act*. R.R.O. 1990, Reg. 843, s. 16 (2).

(3) Upon receiving the report of the analysis of a sample of blood or urine taken under the lead control program, the physician shall advise in writing upon a confidential basis the joint health and safety committee of the concentration of lead in the blood or urine of a worker and in giving such advice shall indicate his or her opinion as to the interpretation to be placed thereon. R.R.O. 1990, Reg. 843, s. 16 (3).

(4) Copies of the exposure records and the records and results of physical examinations and clinical tests of a worker shall be given by the physician conducting the examinations or tests,

(a) to the worker or the worker's physician upon the request in writing of the worker; and

(b) in the case of a deceased worker, to the nearest next of kin or personal representative of the worker, upon the request in writing of such next of kin or personal representative,

and any authorization of another person by the worker or the worker's nearest next of kin or personal representative is of no effect. R.R.O. 1990, Reg. 843, s. 16 (4).

(5) Where the physician advises the employer that a worker, because of a condition resulting from exposure to lead, is fit with limitations or is unfit, the physician shall forthwith communicate such advice to the Provincial Physician, Ministry of Labour. R.R.O. 1990, Reg. 843, s. 16 (5); O. Reg. 519/92, s. 2.

17. For the purposes of this Regulation, the methods and procedures that may be used or adopted may vary from the Codes issued by the Ministry if the protection afforded thereby or the factors of accuracy and precision used or adopted are equal to or exceed the protection or the factors of accuracy and precision in the Codes issued by the Ministry. R.R.O. 1990, Reg. 843, s. 17.

Schedule

The time-weighted average exposure of a worker to airborne lead shall be calculated for a forty-hour week and an eight-hour day as follows:

1. The average concentrations of lead to which a worker is exposed shall be determined from analyses of air samples representative of the exposure of the worker to lead during work operations in accordance with standard methods for workplace air sampling and analysis.
2. The results of the analyses are the concentrations expressed as elemental lead in milligrams per cubic metre of air.
3. The concentrations shall be multiplied by the time in hours to which the worker is taken to be exposed to such concentrations.
4. $C_1T_1 + C_2T_2 + \dots + C_nT_n$ = cumulative weekly exposure, where C_1 is the concentration found in an air sample and T_1 is the total time in hours to which the worker is taken to be exposed to concentration C_1 in a week.
5. The weekly time-weighted average exposure shall be calculated by dividing the cumulative weekly exposure by 40.
6. The daily exposure shall be calculated as follows:
 $C_1T_1 + C_2T_2 + \dots + C_nT_n$ = cumulative daily exposure, where C_1 is the concentration found in an air sample and T_1 is the total time in hours to which the worker is taken to be exposed to concentration C_1 in a day.
7. The daily time-weighted average exposure shall be calculated by dividing the cumulative daily exposure by 8.

R.R.O. 1990, Reg. 843, Sched; O. Reg. 389/00, s. 5.