

Laboratory Inspection Guide



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Laboratory Inspection Guide

The purpose of this guide is to assist a knowledgeable Occupational Health and Safety Officer in conducting a proper inspection of a laboratory.

The guide is prepared for those Officers who specialize in Part II of the *Canada Labour Code*, and who are required to inspect laboratories, either on a routine basis, or in response to specific complaints, including work refusals.

The *Canada Labour Code*, Part II and its Regulations make reference to codes and standards and other technical documents that are most relevant to the specific topic. However, prior to obtaining an AVC or issuing a direction, all references must be verified for accuracy and appropriate application.

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1. General and Administration

1.1 General duties of employer

- (1) Is Part II of the *Canada Labour Code* posted?
[CLC: 125.(1)(d)(i)]
- (2) Are the *Canada Occupational Health and Safety Regulations* available? [CLC: 125.(1)(e)]
- (3) Is the health and safety policy posted? [CLC: 125.(1)(d)(ii)]
- (4) Does the employer have the hazard prevention program?
[COHS: 19]
- (5) Is there a record of all hazardous substances in the laboratory and is it kept up to date? [COHSR: 10.3]
- (6) Has a laboratory training/education program been developed and implemented? [COHSR: 10.14(1)]
- (7) Does the program address the following issues?
[COHSR: 10.14(2)]
 - (a) the safety policy and procedures;
 - (b) every known or foreseeable safety or health hazard in the area where employees work;
 - (c) labelling and material safety data sheets;
 - (d) protective measures required;
 - (e) sources of assistance and information.
- (8) Is there a safety manual?
- (9) Does the manual contain policies/procedures for the administration of the training/education program?
- (10) Have all laboratory employees been informed about the risks involved in the work place and trained in safe work procedures? [COHSR: 10.14(2)]

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- (11) Does the laboratory have a preventive maintenance program for equipment in place?
 - (12) Is the employee education/training program reviewed by the employer? [COHSR: 10.14(3)]
 - (13) Is a written record of the instruction and training kept by the employer? [COHSR: 10.15]
 - (14) Are laboratory supervisors/managers adequately trained in health and safety and informed of their responsibilities under Part II of the *Canada Labour Code*? [CLC: 125.(1)(z)]

1.2 Emergency plan/procedures

- (1) If more than 50 employees work in the building, is there a written plan for use in an emergency prepared? [COHSR: 17.4]
- (2) Are there emergency procedures prepared? [COHSR: 17.5]
- (3) Has every employee been instructed and trained in the procedures and use of equipment? [COHSR: 17.6(1)]
- (4) Is a list of emergency telephone numbers posted near the telephone? [COHSR: 16.6(1)(d)]

1.3 Committees and Representatives

- (1) Is there a health and safety committee/representative at the work place?
 - (2) Are the names, work place telephone numbers and work locations of the health and safety committee members/representative posted? [CLC: 125.(1)(z.17)]
 - (3) Does the committee/representative inspect the laboratory? [CLC: 125.(1)(z.12); 135.(7)(k); 136.(5)(j)]
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1.4 Accidents

- (1) Are all hazardous occurrences investigated? [COHSR: 15.4(1)]
- (2) Are minor injury records kept? [COHSR: 15.7]
- (3) Are specified accidents, occupational diseases, and other hazardous occurrences reported to a health and safety officer within 24 hours? [COHSR: 15.5]
- (4) Are written reports on hazardous occurrences sent to the health and safety committee or representative and a health and safety officer without delay? [COHSR: 15.8]

1.5 First aid

- (1) Are written first-aid instructions provided? [COHSR: 16.2]
- (2) Is there a first aid attendant? [COHSR: 16.3]
- (3) Is the information regarding first aid posted? [COHSR: 16.6(1)]
- (4) Is an adequate first-aid kit provided? [COHSR: 16.7]
- (5) Is a first-aid record kept? [COHSR: 16.13(1)]

1.6 Non-smoking policy

- (1) Is smoking prohibited?
- (2) Are "NO SMOKING" signs posted? [*Non-smokers' Health Act*]

2. Safety Equipment

2.1 Ventilation [COHSR: 2.20; 10.17(1); 10.17(2)]

- (1) Is every ventilation system used in the laboratory properly designed, constructed, operated and maintained?
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- (2) For perchloric acid fume hoods, is every hood identified with a large warning sign?
 - (3) Is every perchloric acid fume hood used in the laboratory designed, constructed, operated and maintained in accordance with the standards set out in the publication of the ACGIH entitled *Industrial Ventilation*, 20th edition, dated 1988, as amended from time to time? [COHSR: 10.17(1)(b)(ii)]

NOTE: Other referenced standards may apply as well
[COHSR: 10.17(1)(b)(i)(iii)]

- (4) Do all fume hoods, including perchloric acid fume hoods, operate at an average face velocity in the range of 0.40 - 0.50 m/s (80-100 fpm) with a usual sash opening that is normally, but not invariably, 30 cm (12")?
- (5) Is each fume hood regularly tested for adequate face velocity?

NOTE: Tests should be performed upon installation, and annually or more frequently as required.

- (6) Are the usual sash opening and correct face velocity displayed on the fume hood?
- (7) Are the fume hoods free of unnecessary apparatus?
- (8) Are the fume hoods free of unnecessary chemicals?

NOTE: The quantity of a hazardous substance to be stored in the fume hood should be limited to the quantity required for one work day. Chemical storage beneath the fume hood should only be permitted if designed for this use.

- (9) Are the fume hoods blocked?
 - (10) Is there a fresh air make-up system?
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2.2 Fire protection

- (1) Are appropriate fire detection, suppression and alarm systems and equipment installed?
This includes the following:
 - (a) detectors;
 - (b) alarm systems;
 - (c) sprinkler systems;
 - (d) fixed extinguishing systems;
 - (e) portable fire extinguishers.
- (2) Are these systems and equipment properly inspected and maintained? [COHSR: 17.3]
- (3) Are extinguishers provided for every type of fire that can occur in the laboratory? [COHSR: 17.3(1)]
- (4) Are fire blankets available to laboratory staff?
- (5) Are employees trained in the use of emergency equipment and are records kept? Review records. [COHSR: 17.6(1)(b)]
- (6) Are inspections carried out at least once every 6 months? Review records. [COHSR: 17.9]
- (7) Is emergency lighting provided? [COHSR: 2.2; 6.10]

2.3 Safety showers, eyewash stations, and other safety equipment

- (1) Where there is a hazard of skin or eye injury from hazardous substances, are safety showers and eyewash stations provided for immediate use by employees? Is this equipment properly installed and maintained? [COHSR: 16.8(1)]
- (2) Are special materials/equipment for neutralizing, absorbing, and cleaning up spills available? [COHSR: 17.5(1)(b); 10.5; 10.14(c)(ii)]

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- (3) Is all safety equipment inspected and maintained regularly?

2.4 Personal protective equipment (PPE)

- (1) Is appropriate PPE used? [COHSR: 12.1]

This includes the following:

- (a) eye and face protection: safety glasses with side shields or goggles, full face shields [COHSR: 12.6];
- (b) skin protection: several types of gloves for special applications, lab coats and aprons, biosafety suits, etc. [COHSR: 12.9];
- (c) respiratory protection: chemical cartridges, self-contained breathing apparatus [COHSR: 12.7];
- (d) special applications: safety boots, hearing protectors, etc. [COHSR: 12.5; 7.7]

3. Laboratory Operational Safety

3.1 Layout and design

- (1) Do the design and construction of the laboratory meet the requirements of the *National Building Code*? [COHSR: 2.2]
- (2) Is the office area separated from the laboratory? [COHSR: 10.9; 2.2]
- (3) Are shelves strong enough for their load and securely fastened? [COHSR: 14.50(1)]
- (4) Are shelves that can be loaded from either side provided with barriers/ partitions? [COHSR: 14.50(3)]
- (5) Are cabinets stable? [COHSR: 14.50(3)]
- (6) Are the drawers equipped with stops so they cannot be pulled out or drop out of guides?

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- (7) Are there any splinters, sharp edges on furniture or equipment?
 - (8) Is sufficient lighting provided? [COHSR: 6.5]
 - (9) Are floors equipped with floor drains?

NOTE: If a spill of a hazardous substance is likely to cause environmental damage, drains with built in containment devices or floors with dikes at walls, counters and doors may be required. The employer should be referred to the appropriate environmental regulator for specific requirements.

- (10) Are sinks and drains resistant to chemicals used?
- (11) Are sinks equipped with glass traps?

NOTE: Glass is not suitable if hydrofluoric acid is used.

3.2 Housekeeping and maintenance

- (1) Is the laboratory kept in a neat, orderly arrangement?
[COHSR: 10.14(2)(c)]
- (2) Are benches, floors, shelves, and hoods kept free of reagents and equipment not in use? [COHSR: 10.14(2)(c)]
- (3) Do all laboratory employees clean their working areas regularly? [COHSR: 10.14(2)(c)]
- (4) Are storerooms kept clean? [COHSR: 10.14(2)(c)]
- (5) Are the following turned off when not in use?
[COHSR: 10.14(2)(c)]
 - (a) gas lines and vacuum sources;
 - (b) water spigots;
 - (c) gas burners;
 - (d) electrical equipment (where possible).
- (6) Is an emergency gas shut-off valve available?
[COHSR: 10.24]

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- (7) Is there any broken or chipped glass?
 - (8) Is broken or chipped glass disposed of safely?
 - (9) Are floor conditions poor? Are there any spills?
[COHSR: 10.14(3)]
 - (10) Are floor mats defective?
 - (11) Is there any tripping hazard? [COHSR: 10.14(3)]
 - (12) Are materials stored on the top of cabinets?
[COHSR: 14.50(3); 10.14(2)(c)]
 - (13) Are materials piled insecurely? [COHSR: 14.50(3);
10.14(2)(c)]
 - (14) Is there glassware stored on shelves above an average person's
eye level? [COHSR: 14.50(3); 10.14(2)(c)]
 - (15) Are shelves too crowded? [COHSR: 14.50(3); 10.14(2)(c)]
 - (16) Are there open drawers? [COHSR: 14.50(3); 10.14(2)(c)]
 - (17) Is working space crowded? [COHSR: 14.50(3); 10.14(2)(c)]
 - (18) Are aisles obstructed? [COHSR: 14.50(3); 10.14(2)(c); 17.9]
 - (19) Are exits blocked? [COHSR: 14.50(3); 10.14(2)(c); 17.9]
 - (20) Are there any unguarded moving parts? [COHSR: 13.13]
 - (21) Is lifting equipment in good condition? [COHSR: 14.20]
 - (22) Are there any defective tools in use? [COHSR: 13.9; 13.10]
 - (23) Are equipment supports in good condition?

3.3 Electrical safety

- (1) Do the design, construction and installation of all electrical
equipment in the laboratory meet the standards set out in the
Canadian Electrical Code? [COHSR: 8.3]
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NOTE: The word "laboratory" is **not** included in the vocabulary of the *Canadian Electrical Code*. Laboratory work areas, laboratory units, laboratory hood interiors shall be considered as unclassified electrically with respect to Article 500 of NFPA 70, *National Electrical Code* [NFPA 45: 3.6.2]. There are exceptions to this rule as identified in NFPA 45.

- (2) Are electrical panels, cables, fixtures, and fittings maintained in safe operating condition?
- (3) Are electrical receptacles, switches and controls located in such places so that they are not subject to liquid spills? [NFPA 45]
- (4) Are there any electrical receptacles, switches, and controls in fume hoods?

NOTE I: In installations where electrical receptacles, switches, and controls are within the fume hood, additional electrical disconnects shall be located within 15 m of the hood and shall be accessible and clearly marked. [NFPA 45: 6.8.4]

NOTE II: If electrical receptacles are located external to the hood, no additional electrical disconnect shall be required.

- (5) Are portable electric tools grounded or otherwise properly protected? [COHSR: 13.4]
- (6) Is all electrical equipment grounded or otherwise properly protected?
- (7) Are ground fault circuit interrupter (GFCI) type of receptacles installed where needed (e.g., within 3 m of a sink, washbasin, bathtub or shower stall)?

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- (8) Are the disconnecting means required for motors, appliances or branch circuits such as circuit breakers legibly marked to indicate their purpose?
 - (9) Is the electrical equipment marked with the manufacturer's name, trademark or other descriptive markings providing voltage, current, wattage or other ratings as necessary?
 - (10) Is there clear access to switches, control devices or meters? [COHSR: 8.23]
 - (11) Is there an emergency lighting system? [COHSR: 6.10(1)]
 - (12) Is there emergency power for all emergency equipment? [COHSR: 2.2; 6.10; 17.3]
 - (13) Is there a lockout procedure for machinery and equipment? [COHSR: 8; 13.16]

4. Hazardous Substances

4.1 Labelling

- (1) Are all containers of hazardous substances, other than controlled products, labelled? [COHSR: 10.27]
 - (2) Are all containers of explosives, cosmetics, devices, drugs or food, pesticides, radioactive substances or consumer products received from a supplier and present in the laboratory, labelled? [COHSR: 10.27; 10.31(1)]
 - (3) Is a supplier label applied to each controlled product received from a supplier, and to each container received from a supplier in which the controlled product is contained? [COHSR: 10.35(1); 10.39(1)(c); 10.39(2); 10.39(3)]
 - (4) Is a sign posted or a work place label applied to the controlled product, other than a fugitive emission, that is not in a container? [COHSR: 10.36 (1)]
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- (5) Is a work place label applied to the container of a controlled product produced in the work place, that will not be used exclusively in the laboratory and that is not intended for export? [COHSR: 10.36 (2)(3)]
 - (6) Is a work place label applied to the container in which an imported controlled product is placed? [COHSR: 10.36 (2)(3)]
 - (7) Is a sign posted in a conspicuous place near an unlabelled controlled product intended for export or near the container of a controlled product offered for sale in Canada while in the process of being appropriately labelled? [COHSR: 10.36 (3)]
 - (8) Do the labels disclose all required information?
[COHSR: 10.39]
 - (9) Is the information disclosed on a sign and/or on a label clearly legible to employees? [COHSR: 10.40; 10.41]

4.2 Material safety data sheets (MSDSs)

- (1) Are MSDSs obtained for all hazardous substances?
[COHSR: 10.28; 10.32; 10.33]

NOTE: The laboratory is exempted from this requirement if the supplier of the controlled product is exempted by the *Controlled Products Regulations* from the requirement to provide a MSDS and if the controlled product meets the requirements specified in the *Canada Occupational Health and Safety Regulations* [COHSR: 10.32(4)]

- (2) Are MSDSs available for all hazardous substances in the laboratory? [COHSR: 10.34]
 - (3) If a MSDS has a trade secret claim, is the date on which the claim for exemption was either registered or granted and a registry number or statement to the effect an exemption was granted, provided? [COHSR: 10.42(1)]
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- (4) Where a controlled product in the laboratory is hazardous waste, does the employer disclose the generic name and hazard information? [COHSR: 10.43]

4.3 Storage and handling

4.3.1 General

- (1) Are chemical inventories kept up-to-date? [COHSR: 10.3]
- (2) Is each hazardous substance properly stored, handled, and used? [COHSR: 10.8]
- (3) Are all processes that generate airborne contaminants conducted under fume hoods? [COHSR: 10.9]
- (4) Are inter-reactive chemicals (e.g., corrosive materials, oxidizing materials, reactive flammable materials, poisonous and infectious materials) properly stored and handled? [COHSR: 10.46; 10.47; 10.48; 10.49]

4.3.2 Laboratory storage

- (1) Are reagents and solvents stored in small quantities? [COHSR: 10.11]
 - (2) When maximum permissible quantities are exceeded, are flammable and combustible liquids stored in proper cabinets or rooms? [NFCC 4.2.4.2]
 - (3) Is storage of flammable and combustible liquids in cabinets and rooms compatible and in permissible quantities? [NFCC 4.2.4.2]
 - (4) Is each refrigerator, freezer or cooler prominently marked to indicate whether or not it meets the requirements for safe storage of flammable liquids? [NFPA 45]
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4.3.3 Storerooms

- (1) Is the storeroom for equipment separated from the reagent storeroom? [COHSR: 10.8; 10.9]
- (2) Is the reagent storeroom identified by a sign? [COHSR: 10.13]
- (3) If applicable, is a separate storage facility available for flammable and explosive materials? [COHSR: 10.45]
- (4) Does the storage room have proper ventilation system?

4.3.4 Hazardous waste

- (1) Are there any outdated chemicals? [COHSR: 10.8; 10.9]
- (2) Is a waste management program in place?

It should include the following:

- (a) categories of waste materials and their associated hazards;
- (b) types of containers used for disposal/storage of various waste products;
- (c) labelling;
- (d) record keeping;
- (e) initial treatment (e.g., dilution or neutralization of chemicals, autoclaving or chemical inactivation of biohazardous materials);
- (f) on-site handling systems for waste. [COHSR: 10]

4.3.5 Compressed gases and cryogenic liquids [COHSR: 10.48(a)]

- (1) Are compressed gases properly stored and handled?
- (2) If applicable, are these stored in a fireproof, dry, well-ventilated area?
- (3) Are cylinders securely anchored?

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- (4) Where the compressed gas storage area is considered a hazardous location, is it free of sources of ignition?
 - (5) Are gases that may react with one another stored separately?
 - (6) Are full cylinders separated from empty cylinders?
 - (7) Are all empty cylinders clearly marked EMPTY?
 - (8) Do all cylinders have caps on when not in use?
 - (9) Are cylinder carts available for transport?
 - (10) Do all cylinders have proper labels?
 - (11) Are proper regulators connected to the cylinders in use?
 - (12) Adaptors that permit mixing of incompatible gases are not allowed.
 - (13) Is every assembly of pipes used for transferring gas/vapour clearly identified? [COHSR: 10.24(a)]
 - (14) Is there clear access to each safety device/valve controlling the supply of gases/vapours?
 - (15) Are warning signs posted where cryogenic liquids are stored or being used?
 - (16) Are vessels containing cryogenic liquids
 - (a) listed/designed for that purpose?
 - (b) stored in a proper location?
 - (c) stored away from heat sources?

4.3.6 Radiation emitting devices

- (1) Are sources of exposure to ionizing/non-ionizing radiation identified? [COHSR: 10.4(1)]
 - (2) Are safety procedures for control of ionizing/non-ionizing radiation established? [COHSR: 10.5(1)]
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- (3) Are radiation emitting devices reported to the Consumer and Clinical Radiation Protection Bureau of the Department of Health Canada? [COHSR: 10.26(1)(a)]

NOTE: The purchase, possession, use, transportation, and disposal of radioactive material and radioisotopes are subject to the provisions of the *Nuclear Safety and Control Act* and the *Nuclear Substances and Radiation Devices Regulations*.

- (4) Is the applicable document implemented?
[COHSR: 10.26(1)(b); 10.26(2)]

4.3.7 Biohazardous infectious material

- (1) Are poisonous and infectious materials properly stored and handled? [COHSR: 10.48(c)]
- (2) Are sources of infections (e.g., needles and syringes, spills and sprays, broken glass or other sharp objects, aspiration through pipettes, bites or scratches of animals or ectoparasites) identified? [COHSR: 10.4(1)]
- (3) Are safety procedures and instructions for dealing with infectious materials established and available to laboratory employees? [COHSR: 10.5(b)]
- (4) Are effective disinfectants available at all times in the laboratory?
- (5) Are laboratory employees protected against potential infection by immunization where possible and do they show immunity?
- (6) Is access to the laboratory limited or restricted in accordance with the requirements for each level of containment?
- (7) Are appropriate biological safety cabinets provided?
- (8) Have the cabinets been tested and certified within the previous 12 months according to the accepted standards?
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- (9) Are autoclaves provided as appropriate and regularly tested after installation by the use of biological indicators?
 - (10) Are high-efficiency particulate air (HEPA) filters installed in accordance with the requirements for each level of containment?
 - (11) Are all HEPA filters tested to ensure that they meet the required specifications after installation?

NOTE: Safety practices related to biohazardous infectious materials should conform to the Laboratory Biosafety Guidelines published by the Medical Research Council of Canada and Health Canada.

5. Noise

- (1) Are there any obvious sources of sound to which the employees are likely to be exposed for a duration that may endanger their hearing? [COHSR: 7.3(1)]
- (2) If so, has an investigation of the degree of exposure been carried out in accordance with COSHR: 7.3(1)?

6. Other Safety Measures

- (1) Are loose clothing, long hair, dangling accessories, jewellery, or other similar items tied, covered, or otherwise secured to prevent a hazard? [COSHR: 12.12]
- (2) Is laboratory clothing restricted to the areas to which the garments are assigned?

NOTE: Laboratory coats should not be allowed in the eating areas.

- (3) Is suitable footwear with closed toes and heels worn in all laboratory areas?

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- (4) Is oral pipetting prohibited in the laboratory?
 - (5) Is eating and drinking prohibited in the laboratory?
[COSHR: 9.38]
 - (6) Is food prohibited from being stored in laboratory
refrigerators? [COSHR: 9.38]
 - (7) Is there any evidence of non-compliance with safety rules?

References

Canada Labour Code, Part II

Canada Occupational Health and Safety Regulations

National Building Code

National Fire Code

Canadian Electrical Code

Safety Guide for Laboratory Operations, Treasury Board Manual,
Personnel Management, Occupational Health and Safety

*Nuclear Safety and Control Act and Nuclear Substances and Radiation
Devices Regulations*

Laboratory Biosafety Guide, Health Canada and Medical Research
Council of Canada

*Industrial Ventilation, American Conference of Governmental Industrial
Hygienists (ACGIH).*

Notes

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