Respiratory Protection Program Procedure

Approved by: Associate Vice President, Human Resources

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Applicable Legislation:

Occupational Health and Safety Act R.S.O. 1990

O.Reg 851, R.R.O. 1990, Industrial Establishments

O.Reg 833/90 Control of Exposure to Biological or Chemical Agents

Relevant Standards

Canadian Standards Association (CSA)

Z94.4-18 Selection, use and care of respirators

Related Policy/Procedures

Health and Safety Policy

Basic Safety Orientation Procedure

Designated Substance Policy

Hazardous Reporting Procedures

Joint Health and Safety Committee Procedure

Laboratory Safety Operating Procedures

WHMIS Procedure

Definitions:

ACGIH – American Conference of Governmental Industrial Hygienists

Aerosols – airborne solid or liquid particles

Air-purifying respirator – removes contaminants from workplace air by passing it through a filter, cartridge or a combination of both, to provide protection from particulates, vapours and/or gases.

APF – assigned protection factor – the level of respiratory protection that would be provided by a properly functioning respirator worn by a properly fitted and trained individual. A multiplier of the permissible exposure limit of a contaminant that defines the highest airborne concentration of a workplace atmosphere where use of a specified respirator is permitted.

Chemical cartridge – removes specific gases or vapours. High concentrations of contaminants, high humidity and high breathing rates shorten breakthrough times and usefulness of chemical cartridges.

Dusts – solid, mechanically produced particles or fibres; airborne solid particles caused by abrasive procedures such as cutting or grinding.

Filter facepiece respirator – a respirator worn to protect the wearer from airborne contaminants

Fit testing – Exercises conducted by a trained person to ensure individuals have a good seal between the respirator facepiece and the face

Fumes – occur when metal is heated and suddenly cooled e.g. welding, brazing

Gases – substances that are in a gaseous state at ambient temperature and pressure

IDLH – immediately dangerous to health or life; a condition or space where a hazardous atmosphere exists to such an extent that without appropriate respiratory protection a person could be fatally injured

Mists – tiny liquid droplets caused by spraying or blowing operations, considered as a particulate airborne hazard

MOL – Ontario Ministry of Labour

NIOSH – National Institute for Occupational Safety and Health which sets safety performance standards that are world recognized

Olfactory fatigue – diminishing sense of smell which occurs with continued exposure to an airborne contaminant

Particulate filters – removes particulates (dust, mists, fumes) from air

Respirator – a device designed to protect the wearer from inhaling hazardous atmospheric contaminants

Smoke – atmospheric contaminants that result from incomplete combustion

Sorbent – active ingredient in a chemical cartridge that removes a contaminant until it's capacity is exhausted or it's catalyst is poisoned

Supplied-air breathing apparatus – an air-line breathing apparatus that supplies breathing air to the wearer

Vapours – substances that evaporate from a liquid or solid at ambient temperature and pressure

Standard:

1. The Office of Human Resources - Health and Safety (Health & Safety) shall oversee a Respiratory Protection Program for all University spaces.
2. Supervisors shall assess the need for respiratory protection in the workplace and shall provide Health & Safety with the names of personnel to be enrolled in the Respiratory Protection Program.
3. All persons required to wear air-purifying respiratory protection shall participate in the Respiratory Protection Program.
4. Health & Safety shall provide advice and assistance to employees and supervisors concerning respiratory protection.
5. Fit testing shall be provided to personnel by competent persons (i.e. University employees or consultants) who are trained and qualified in fit testing procedures.
6. Air-purifying respirators provided for University personnel shall be NIOSH-approved.
7. No person shall rely upon a respirator without being enrolled in the Respiratory Protection Program and without receiving the training required by that Program.
8. The Respiratory Protection Program shall be reviewed annually by the workplace Joint Health and Safety Committee. The names of employees requiring air-purifying or supplied-air respirators shall be up-dated and provided to Health & Safety by supervisors.
9. Personnel shall report any change in status that may compromise respirator use to their supervisor and/or to Health & Safety and undergo medical evaluation if required.
10. At this time, only non-powered air purifying respirators are in use at Lakehead University and covered by the Respiratory Protection Program. Should another type of respirator be required, a full review will be conducted by the Joint Health and Safety Committee.

Guidelines:

Respiratory hazards in the workplace must first be evaluated, assessed and controlled by engineered methods before relying on the use of air-purifying respirators. Atmospheric contaminant concentrations are usually expressed in mg/m^3 for solids or particulates, and parts per million (ppm) for gases. The anticipated concentrations must be compared with MOL or ACGIH occupational exposure limits to determine potential for respiratory risk. Airborne contaminants can expose workers via inhalation, ingestion, and skin absorption. Accordingly, the need for personal protective clothing must also be assessed.

Persons who require air-purifying respirators should be medically fit for the stresses associated with respirator use. Persons will be required to self-screen for any conditions that may affect their safety using respiratory protection and seek medical clearance from a Health Care Professional when required. In order to provide adequate protection, a respirator must be suited to the hazard, properly fitted, worn correctly, and properly stored and maintained.

Respirator Selection

Selection of the appropriate respirator depends on the nature of the workplace atmospheric hazard, physical characteristics of the workplace, the physical demands of the task, and the capabilities and limitations of the respirators available. The atmospheric hazard may be assessed by evaluating the potential for exposure or by air sampling when required. Care is required when selecting respirators for contaminants that exist as particles and vapours. Generalizations about the contaminant phase are based on the ACGIH TLV listings. Low vapour pressure contaminants with a TLV listed only as mg/m^3 are assumed to exist in the particle phase and would require a particle filter. Contaminants with TLV's listed in both ppm and mg/m^3 are generally found in the vapour phase, and would require a chemical cartridge. Mixtures of contaminants in workplace air suggest that filters with aerosol and vapour removing capabilities would be required. Professional advice and assistance is essential for proper respirator selection and for correct, confident use of the recommended respiratory protection. A manufacturer's respirator filter and cartridge recommendations should be consulted in this process.

Assigned Protection Factors (APF's)

When a specific respirator is selected, the APF must be greater than the expected air contaminant concentration (C_{air}) divided by its exposure limit (TLV):

$$APF > \frac{C_{AIR}}{TLV}$$

For example, if the expected air concentration is 60 ppm and the exposure limit is 2 ppm, a respirator with an APF >30 must be used.

The following table illustrates values of assigned protection factors for various types of respirators based on workplace performance information:

	Respirator Type	**APF**
Air-Purifying	half-facepiece	10
	full-facepiece	100

Canada's Respiratory Protection Standard, CSA Z94.4-93

Canada's respiratory protection standard, CSA Z94.4-93 (R1997) Selection Care and Use of Respirators is intended to promote the correct use of respiratory protection, not to specify performance criteria. In this regard, it defaults to NIOSH requirements. The NIOSH standards are important to respirator users because they help define selection criteria.

NIOSH Standard 42 CFR 84 (1995) for Non-Powered Particulate Filtering Respirators
After July 1998, all non-powered particulate filtering respirators used in Canada must comply with one of the nine classes of NIOSH-approved respirators. There are three basic series of filters: N, R, and P, and each series comes in three filtration efficiencies: 95%, 99%, and 99.97% at 0.3 microns where particle capture processes are least efficient. The respirator series are defined as follows:

N Series: Non-oil, for any dust, mist, or fume that is not an oil;

R Series: oil-Resistant, can be used for up to eight hours in an atmosphere containing a particulate oil or oil-based substance (e.g. lubricants, cutting fluids, glycerine);

P Series: oil-Proof, can be used indefinitely in an atmosphere containing oil-based contaminants.

The NIOSH respirator standard, 30 CFR 11 (1972), applies to respirators worn to protect against gases (e.g. ammonia) and vapours (e.g. from evaporated fuel or solvent).

For further information about NIOSH Standards, see the web site: www.cdc.gov/niosh
Tips for Selecting an Air-Purifying Respirator

- Seek professional advice about respiratory protection and respirator selection.
- Seek employee input regarding comfort and fit, difficulty in breathing, and interferences with vision, communication and with other headwear or eyewear.
- Consider the ease of respirator maintenance and repair.
- Always purchase a NIOSH-approved product.

A simple filtering facepiece respirator that has no replaceable parts should be discarded when it becomes damaged, when breathing resistance increases, or when it becomes dirty or shows dirt on the inside.

Elements of a Respiratory Protection Program
The following information will be documented for the Respiratory Protection Program co-ordinator in Health and Safety:

1. The names of all persons requiring air-purifying and nature of the workplace atmospheric hazards (e.g. dusts, fumes, mists, vapours, gases, oxygen deficiency);
2. The names of employees requiring/requesting annual medical reviews (i.e. cardiorespiratory performance evaluations to assess fitness for respiratory usage);
3. The NIOSH-approved respirators selected in accordance with the applicable CSA standard and the dates of formal fit testing initiatives. (Note: fit tests must

be conducted while all pieces of on-the-job head and face protection are worn to ensure that there are no interferences with the face-to-facepiece seal.)

4. Initial training and annual retraining for respirator users about:
   - workplace hazards;
   - the atmospheric concentrations of workplace contaminants;
   - MOL or ACGIH occupational exposure limits (e.g. TWAEV, STEV);
   - type of respiratory protection specific for the hazards;
   - limitations of the type and size of personal respiratory protection selected;
   - instructions concerning inspections of the respirator;
   - instructions concerning donning the respirator;
   - instructions about positive and negative fit testing by the user;
   - wearing the respirator, breathing resistance, and sensory indications;
   - instructions concerning removing the respirator and cleaning it;
   - procedures for maintenance, repair, and storage of personal respirators;
   - emergency instructions should respirators malfunction.
5. Precautions concerning personal factors that can influence the safe and confident use of air-purifying respirators (e.g. you change or begin wearing eyeglasses, you grow a beard or sideburns or shave them off);
6. The schedule for program evaluations by supervisors, affected employees and workplace joint health and safety committee personnel.