



UNIVERSITY OF
TORONTO

NOISE CONTROL AND HEARING CONSERVATION PROGRAM
University of Toronto

1.0 INTRODUCTION AND SCOPE

Introduction

In compliance with the Occupational Health and Safety Act of Ontario and the Ontario Regulation for Noise (O.Reg. 381/15), the University shall take all precautions reasonable to protect employees from hazardous noise exposure in the workplace.

The objective of the University's Noise Control and Hearing Conservation Program is the identification and control of noise hazard areas and the recognition and protection of all employees who have the potential to develop occupational noise-induced hearing loss.

Nuisance noise is the type of noise which may be irritating or annoying to some people but it is not loud enough to be hazardous or associated with noise-induced hearing loss. Nuisance noise is not covered by the University's Noise Control and Hearing Conservation Program. Given the subjective nature of nuisance noise, concerns of this type will be assessed separately, as required.

Scope

This program applies to all University employees who work in noise hazard areas or who have the potential to develop noise-induced hearing loss as a result of their occupation. It is the intent of the University that, whenever practical or feasible, efforts to reduce or eliminate excessive noise exposure in the workplace by means of engineering controls or proper work practices will precede a requirement for mandatory use of hearing protection.

2.0 DEFINITIONS

<u>Audiometry</u>	A method of hearing assessment that tests an individual's ability to hear sounds of different intensities and frequencies. Audiometry detects early, asymptomatic noise-induced hearing loss before the affected individual is even aware that it is happening.
<u>Decibel</u>	The decibel is a unit of measurement of sound pressure level that is a logarithmic and dimensionless.
<u>A-weighted decibel</u>	The A-weighted decibel or dBA, is a type of decibel measurement which closely represents the manner in which a human ear responds to noise.
<u>Exchange Rate</u>	The increase (decrease) in sound level for which permissible exposure time is halved (doubled). The two common exchange rates are 3 dB and 5 dB. The University's Noise Control and Hearing Conservation Program uses the 3dB exchange rate since it is more conservative and provides better protection against noise-induced hearing loss. See Table 1.
<u>Noise</u>	In general, noise is considered to be any unwanted sound. The University's Noise Control and Hearing Conservation Program targets noise levels and noise exposures that are associated with noise-induced hearing loss (refer to the definitions for "noise-exposed" and "noise hazard area" for clarification).

Noise dosimetry

This noise assessment technique measures an employee's personal noise exposure and is particularly useful and applicable when employees work in numerous noisy areas for short durations at a time or perform different noisy operations on any given day.

<u>Noise-exposed</u>	For the purpose of this program, a person is considered noise-exposed if the 8-hour time-weighted average (TWA) exceeds 85 dBA or an "equivalent" exposure (using a 3 dB exchange rate), as listed in Table 1.
<u>Noise hazard area</u>	An area is considered a noise hazard if the sound levels regularly exceed 85 dBA.
<u>Noise surveys</u>	Noise survey is another noise assessment technique that provides valuable information regarding sound levels in an area. The most common type is a general noise survey which measures sound levels in A-weighted decibels (dBA). Another important type of noise survey is octave band frequency analysis. This type of analysis assists in the selection of potential noise control measures.
<u>Time-weighted average</u>	The time-weighted average (TWA) represents the average (noise) exposure measured over a typical 8-hour workday.
<u>Worker</u>	In this program, "worker" includes faculty, staff, students, contractors, and visitors.

3.0 CRITERIA FOR NOISE EXPOSURE

3.1 Individual Exposure

An employee is considered noise-exposed if he/she has the potential to develop occupational noise-induced hearing loss, as a result of his/her work activities. Regular exposure to sound levels greater than a time-weighted average of 85 dBA or an "equivalent" noise exposure (using a 3 dB exchange rate), as listed in Table 1, is associated with the development of noise-induced hearing loss.

3.2 Area Noise Levels

An area or location is considered a noise hazard area if sound levels are regularly at, or above, 85 dBA.

4.0 RESPONSIBILITIES

4.1 Management

Principals, Deans, Directors, Chairs and Managers are responsible for ensuring that all components of the Noise Control and Hearing Conservation Program are implemented and enforced in noise hazard areas under their jurisdiction. These components are discussed in Section 5.0 of this document.

Line Managers and Supervisors, in conjunction with the Office of Environmental Health and Safety, are responsible for:

- 1) identifying noise hazard areas, equipment and situations where hearing protections are required and employees who may be noise-exposed. This generally means areas or tasks where workers may be exposed to noise levels above 85 dBA;
- 2) maintaining an up-to-date list of noise hazard areas/operations and noise-exposed employees and providing this information to the Office of Environmental Health and Safety and/or Health and Well-Being Programs and Services upon request;
- 3) ensuring that employees receive general noise awareness training (Office of Environmental Health and Safety) and are informed and receive specific training on the use, care, inspection, maintenance and if applicable, disinfection, of the types of hearing protectors used in their departments;
- 4) taking appropriate steps to minimize the risk of noise-induced hearing loss, including elimination/substitution, engineering and administrative controls and where these controls are not practicable, the use of hearing protective devices (e.g. earplugs and/or earmuffs);
- 5) Where hearing protective devices are used, the devices should be selected based on the sound levels workers may be exposed to, the attenuation level provided by the hearing protectors and the manufacturer's information on the use and limitation of the devices;
- 6) ensuring that noise-exposed employees are advised of and offered participation in the audiometric testing program conducted by the Occupational Health Nurse (Office of Environmental Health and Safety);
- 7) arranging audiometric testing appointments for staff within the first two weeks of employment and as required thereafter;
- 8) informing the Occupational Health Nurse of any new or temporary employees;
- 9) ensuring that any noise-exposed employees who have terminated employment with the University undergo audiometric testing prior to departure.
- 10) Ensure that workers wear appropriate hearing protection at all times in noise hazard areas or when performing tasks which generate potentially hazardous noise levels.

4.2 Supervisors

The front line Supervisor's role is vital to the Noise Control and Hearing Conservation Program. Supervisors are responsible for ensuring that all noise-exposed employees under their jurisdiction are trained, are aware of the noise hazards, and are provided with the means to protect his/her hearing.

If hearing protection devices are necessary, selection must be based on the information regarding the sound levels employees are exposed to, the attenuation level offered by the protectors and the manufacturer's information on the use and limitations of the devices. The Supervisor must enforce the use of it and be prepared to take appropriate disciplinary action in the event an employee does not comply with this requirement. Enforcing the proper use of hearing protection should be viewed in the same manner as the enforcement of other types of personal protective equipment (safety glasses, hard hat, safety shoes/boots, etc.).

4.3 Employees

Employees exposed to hazardous noise levels are responsible for:

- 1) reporting noise concerns to the Supervisor;
- 2) using and caring for hearing protective devices where these devices are required;
- 3) attending noise training workshops as required;
- 4) responding to requests for participation in the audiometric screening program; and
- 5) Do not modify hearing protection provided.

4.4 Joint Health and Safety Committee

The local Joint Health and Safety Committee's duties include the inspection and identification of hazards in the workplace. If noise hazards are detected or suspected, the JHSC shall inform line management and/or the Office of Environmental Health and Safety for further investigation and follow-up.

In accordance with Section 11 of the Occupational Health and Safety Act of Ontario, the Office of Environmental Health and Safety, shall inform the Joint Health and Safety Committee(s) when sound level measurements will be conducted in the workplace. A worker member of the committee is entitled to be present at the beginning of testing.

4.5 Office of Environmental Health and Safety

The Office of Environmental Health and Safety is responsible for:

- 1) defining the Noise Control and Hearing Conservation Program;
- 2) conducting noise surveys and personal dosimetry assessments;
- 3) providing technical services and advice regarding control measures and hearing protection;
- 4) providing appropriate general noise training and education;
- 5) conducting audiometric screening and maintaining confidential medical records; and,
- 6) providing confidential (individual) counselling and, where necessary, referral to an appropriate health care practitioner;

4.6 Health and Well-Being Programs and Services

Health and Well-Being Programs and Services is responsible for:

- 1) reporting noise-induced hearing loss cases to the Workplace Safety and Insurance Board; and,
- 2) reporting general summaries of the results (stripped of individual identities) to the pertinent supervisors and Joint Health and Safety Committees as appropriate.

5.0 PROGRAM COMPONENTS

The components of the Noise Control and Hearing Conservation Program are:

- 5.1 Noise Hazard Assessment
- 5.2 Noise Control Measures
- 5.3 Hearing Protection Devices
- 5.4 Employee Education and Training
- 5.5 Audiometric Testing (including, as appropriate, Counselling and Referral)
- 5.6 Workplace Safety and Insurance Board Claims
- 5.7. Records and Reporting

5.1 Noise Hazard Assessment: Noise Surveys/Noise Dosimetry

Noise-exposed employees and/or noise hazard areas will be identified by the appropriate Department Manager or Supervisor in conjunction with the Office of Environmental Health and Safety. Where necessary an assessment will be carried out by means of workplace noise surveys and/or dosimetry. If conditions in the workplace change at any time (e.g. new equipment or process), the Department Manager or Supervisor is responsible for contacting the Office of Environmental Health and Safety to arrange for a re-assessment.

5.2 Noise Control Measures

The Department is responsible for ensuring that appropriate noise control measures are investigated and, if feasible, implemented.

5.2.1 Engineering Controls

In a noise hazard area, an investigation of the feasibility of applying engineering controls to reduce noise levels must be conducted and, where feasible or practical, noise levels are to be reduced through engineering controls. Depending on the circumstances, engineering controls may include barriers, vibration damping, source isolation and sound absorbing enclosures.

When new equipment is to be purchased, consideration must be given to the noise levels generated and the potential exposure of employees working with or near the equipment. Before equipment is purchased, the noise specifications should be checked and consideration given to the long-term implications of equipment which produces noise levels in excess of 85 dBA in the workplace.

5.2.2 Administrative Controls

In instances where engineering controls are not practical or feasible, administrative controls such as changes in work procedures, rescheduling of the noisy activity or decreasing the duration of exposure must be considered.

Clearly visible warning signs must be posted at the approaches to an area where sound levels regularly exceed 85 dBA. These warning signs must clearly indicate that the use of hearing protection is mandatory for entry. In situations where a piece of equipment or machinery presents a noise hazard, a sign must be affixed to the machine, in a clearly visible location, indicating that the operator must wear appropriate hearing protection.

Regular equipment maintenance is an important noise control measure since well maintained equipment, in addition to being more reliable, also tends to be quieter.

5.3 Hearing Protection Devices

Appropriate hearing protection must protect against the level of noise hazard, provide a comfortable fit, and comply with CSA Standard Z94.2-14 "Hearing Protection Devices – performance, selection, care, and use".

Engineering and/or administrative controls are the preferred methods for reducing noise exposure. If this is not feasible or practical, hearing protection devices must be used where sound levels regularly exceed 85 dBA or where an individual's personal exposure may exceed the limits set in Table 1.

Department managers and supervisors are responsible for selecting appropriate hearing protection devices. Hearing protection devices should be selected based on the information regarding the sound levels

employees are exposed to, the attenuation level offered by the protectors and the manufacturer's information on the use and limitations of the devices.

The use of recreational earphones (i.e. music earphones) are **not** a replacement for properly fitted and appropriate hearing protection. In fact, studies indicate that, even in areas where noise levels are not hazardous, unless a user maintains the volume at a conservative (low) level, these earphone devices can contribute to non-occupational noise-induced hearing loss.

There are several types of protectors (plugs, muffs, etc.) and many variations within each type. The selection of the appropriate hearing protection devices should be based on a hazard or risk assessment, the conditions of the workplace and on compatibility with other personal protection equipment. Appendix A outlines the recommended hearing protection to be worn when exposed to different levels of noise hazards. The following section outline the two general categories of hearing protection devices:

Examples of hearing protection devices are:

1. Earmuffs – a hearing protector usually consisting of a headband and earcups with a soft outer ring or cushion intended to fit snugly against the pinna (supra-aural) or the side of the head around the pinna (circumaural).
2. Earplugs: a hearing protector worn within the external ear canal (in the case of an insert or aural earplug) or in the concha against the entrance to the external ear canal (in the case of a semi-insert or semi-aural earplug).

For more information regarding hearing protection devices, please refer to Z94.2-14 Hearing protection devices – Performance, selection, care, and use or contact EHS.

For regular noise exposures between 80-85 dBA, hearing protection is optional but should be provided on request. Hearing protection devices should not be modified and headphones should not be worn in conjunction with a hearing protection device. For additional information regarding the selection of hearing protection devices, refer to the University of Toronto Hearing Protection Standard or contact the Office of Environmental Health and Safety.

5.4 Employee Education and Training

All noise-exposed employees who are required to wear hearing protection must attend the general noise awareness training from Office of Environmental Health and Safety. This seminar will include:

- 1) what noise is;
- 2) how we hear;
- 3) health effects of noise;
- 4) assessment and control measures; and
- 5) legislation and the U of T Noise Control and Hearing Conservation Program.

Individual departments are responsible for providing training to employees on work-site specific control measures used to reduce noise and tracking this training (i.e. attendance sheet). Where hearing protection devices are provided, department-specific training must include:

- 1) care and use;
- 2) limitations;
- 3) proper fit;
- 4) inspection and maintenance; and,
- 5) if applicable, cleaning and disinfection

5.5 Audiometric Testing

Noise-induced hearing loss (NIHL) is gradual in onset and usually goes unrecognized until communication and comprehension are affected. Once noise damage has occurred, hearing loss is permanent and irreversible. However, NIHL is completely preventable through noise control and hearing conservation measures.

Regular audiometric testing allows the early detection of NIHL. Changes in an employee's audiometric results may indicate that noise conditions in the workplace have changed or that hearing protection is not being used correctly. It should be emphasized that audiometry does not in any way prevent hearing loss but rather it is a measure of the effectiveness of the program.

All University employees at risk of developing noise-induced hearing loss shall be offered confidential audiometric testing for hearing loss, conducted by the Occupational Health Nurse. During the visit, employees will be counselled as to their test results and any implications of changes which may have occurred. Follow-up evaluations will be scheduled as determined by Occupational Health Services.

All new employees who begin to work in areas with recognized noise hazards at the University should have a confidential baseline audiometric within the first two weeks of starting work. The employee's Department is responsible for arranging this audiometric test.

Similarly, any noise-exposed employee who is terminating employment at the University should undergo a final audiometric test. The employee's Department shall contact Health and Well-Being Programs and Services to arrange this.

5.6 Workplace Safety and Insurance Board (WSIB) Claims

Noise-induced hearing loss arising from occupational noise exposure is a compensable occupational disease in Ontario. Health and Well-Being Programs and Services will report suspected cases of noise-induced hearing loss to the WSIB once written consent to release audiometric information has been obtained from the employee.

5.7 Follow-up

Where applicable, after group audiometric results (stripped of individual identifiers) for an area are available, representatives from the Office of Environmental Health and Safety shall meet with the appropriate Line Management and/or Joint Health and Safety Committee to discuss the results and identify any emerging noise problems or trends. Potential corrective action and program responsibilities will also be reviewed.

5.8 Reporting

The Office of Environmental Health and Safety will forward a copy of noise surveys and/or personal dosimetry reports to:

- 1) the Department Supervisor or Manager;
- 2) the appropriate Joint Health and Safety Committee; and
- 3) the Employee (personal dosimetry results).

Occupational Health Services will provide a summary of group audiometric results (stripped of individual identifiers) to the appropriate Joint Health and Safety Committee and Department Manager if requested.

5.9 Records

Records of current noise levels and noise control/hearing conservation measures will be kept by the Department as well as the Office of Environmental Health and Safety.

Department management is responsible for maintaining a list of hazardous noise areas, noise-exposed employees and training records (general noise awareness training and any department-specific training including hearing protective devices).

Health and Well-Being Programs and Services will maintain records of all audiometric tests. These shall be maintained in a manner consistent with the principle of medical confidentiality.

TABLE 1: EQUIVALENT NOISE EXPOSURES

Duration per Day (hours)	Maximum Permissible Exposure Durations for Noise without Hearing Protection (Continuous or Intermittent Noise) - based on 3 dB exchange rate -
16	82
8	85
4	88
2	91
1	94
1/2 (30 minutes)	97
1/4 (15 minutes)	100
1/8 (7.5 minutes)	103
1/16 (3.75 minutes)	106
1/32 (1.88 minutes)	109

Appendix A

Selection of Hearing Protection

A worker is **noise-exposed** if he/she experiences regular exposure to sound levels greater than an 8 hour time-weighted average of 85 A-weighted decibels (dBA) or an “equivalent” noise exposure (using a 3 decibel exchange rate).

CSA standard Z94.2-14 provides a classification for HPDs (A/AL, B/BL or C). Based on this classification, dual hearing protection (ear muffs + ear plugs) are recommended for noise exposure ($L_{ex,8h}$ (dBA)) greater than 105 dBA.

A more common method used to rate HPDs is the NRR (Noise Reduction Rating). For the purpose of evaluating the effectiveness of HPDs, the method outlined by the provincial ministry of labour ([Appendix C: Selection of hearing protection devices and de-rating schemes](#)) shall be used. This method is based on the CSA standard Z94.2-14.