



THE UNIVERSITY OF WESTERN ONTARIO

Hearing Protection Program

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1.0 Purpose

The purpose of this Hearing Protection Program (HPP) is to ensure that the hearing of University of Western Ontario (UWO) employees is continuously protected. The program includes a strategy to identify noise hazard areas, and implement measures to protect all employees who have the potential to develop occupational noise-induced hearing loss.

2.0 Definitions/Abbreviations

Audiometry:

A method of hearing assessment which 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.

Decibel:

The decibel is a logarithmic and dimensionless unit for measuring sound pressure levels.

A-weighted decibel:

The A-weighted decibel or dBA, is a scale used because it closely represents the manner in which the human ear responds to noise.

Exchange Rate:

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 Noise Control and Hearing Protection Program uses the 3 dB exchanged rate since it is more conservative and provides better protection against noise-induced hearing loss.

Noise:

In general, noise is considered to be any unwanted sound. The University's Noise Control and Hearing Protection Program targets noise levels and noise exposures which 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.

Noise-exposed:

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.

Noise hazard area:

An area is considered a noise hazard if the sound levels regularly exceed 85 dBA.

Noise surveys:

Noise surveys provide 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.

Nuisance noise:

Nuisance noise is that 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 UWO's noise control and Hearing Protection Program. Given the subjective nature of nuisance noise, concerns of this type will be assessed separately, as required.

Time-weighted average:

The time-weighted average (TWA) represents the average (noise) exposure measured over a typical 8-hour workday.

ACGIH: American Conference of Governmental Industrial Hygienists

CSA: Canadian Standards Association

HCP: Hearing Conservation Program

IAPA: Industrial Accident Prevention Association

OHS: Occupational Health and Safety

CAN3-Z107.4-M86: Pure Tone Air Conduction Audiometers for Hearing Conservation and for Screening.

3.0 Application

This standard applies to all divisions, departments and facilities within UWO and its agents including any contractors within their employ, such that, all personnel within these groups dealing with noise hazards shall be informed of the contents of this program. A contractor's participation is coordinated through the UWO Project Coordinator who is responsible for the contractor.

3.1 Scope & Criteria

Noise hazards at UWO form the primary focus of this program. Position Hazard Communication Form (PHCF) will be used as a key source for identifying, evaluating and controlling noise hazards. Controls will include procedures, communication, training, and audiometric testing as required.

The HPP will ensure that noise hazards are identified assessed for risk and that controls are implemented and maintained on a continual basis. Accordingly, the core activities of the HPP are to:

- Identify and assess the risk associated with new noise sources, existing noise sources and noise associated with occupational tasks.
- Conduct personal and area noise assessments for normal and non-routine activities such as shutdowns and turnarounds.
- Eliminate or reduce noise sources where practical.

- Specify the purchasing standards for hearing protective equipment, ensure employees using hearing protection are trained in its proper use and ensure that appropriate levels of hearing protection are available when required.
- Coordinate medical surveillance through Workplace Health to ensure appropriate audiometric testing is conducted as identified through the Position Hazard Communication Form.
- Communicate and train employees on the HPP and associated procedures.
- Maintain appropriate records to monitor effective execution of the program.
- Monitor and report on the effectiveness of the program to the Director of OHS.
- Take corrective actions as necessary.

Any employee is considered noise-exposed if they have the potential to develop occupational noise-induced hearing loss. Regular exposure to sound levels greater than a time-weighted average of 90 dBA or an "equivalent" noise exposure (using a 5 dB exchange rate), as listed in Table 1 is associated with the development of noise-induced hearing loss.

It is important to recognize that some individuals are more susceptible to the effects of noise and may be at risk of developing noise-induced hearing loss when regularly exposed to sound levels lower than 90 dBA. For this reason, University employees entering locations with noise levels of 80 dBA or above will be required to wear hearing protection and/or follow instructions on posted signs; all employees who work in such situations should be informed and offered appropriate hearing protection.

In addition, any employee is considered to be “noise-exposed” if they are regularly exposed to impact noise at a level and frequency exceeding the values given in Table 2.

3.2 Area Noise Levels

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

TABLE 1: EQUIVALENT NOISE EXPOSURES

| Duration per 24 hour period (hours) | Maximum Permissible Exposure Durations for Noise without Hearing Protection (Continuous or Intermittent Noise) * (dBA) |
|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| 16 | 85 |
| 8 | 90 |
| 4 | 95 |
| 2 | 100 |
| 1 | 105 |
| 1/2 | 110 |
| 1/4 | 115 |
| None | Over 115 |

* Based on a 5 dB exchange rate

TABLE 2: IMPACT NOISE

| Sound Level (dB) | Maximum Number of Impacts/ 8 hour Day |
|-------------------------|----------------------------------------------|
| >140 | 0 |
| 140 | 100 |
| 130 | 1,000 |
| 120 | 10,000 |

4.0 Responsibilities

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

Supervisors, in conjunction with Occupational Health and Safety, are responsible for:

1. identifying noise hazard areas and workers who may be noise-exposed;
2. maintaining an up-to-date list of noise hazard areas/operations and noise-exposed workers;
3. ensuring that all noise-exposed employees attend the OHS Hearing Conservation training; schedule of training is posted on the OHS web page:

http://www.uwo.ca/humanresources/facultystaff/h_and_s/training/training_idx.htm

4. taking appropriate steps to minimize the risk of noise-induced hearing loss, including, but not limited to, implementation of noise control measures where feasible and the provision of appropriate hearing protection devices;
5. ensuring that noise-exposed employees participate in the audiometric testing program scheduled by Workplace Health;
6. ensuring that all new employees who may be exposed to hazardous noise levels undergo audiometric testing at Workplace Health within the first two weeks of employment; and
7. Ensuring that any noise-exposed employees who have terminated employment with the University undergo audiometric testing at Workplace Health prior to departure.

4.1 Supervisors

Supervisors must have an up-to-date listing of the noise hazard areas/operations and noise-exposed employees. If hearing protection is necessary, the Supervisor must enforce its use 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.).

4.2 Employees

Employees exposed to hazardous noise levels are responsible for:

1. attending Hearing Conservation Training as required;
2. participating in the audiometric screening program;
3. using and caring for hearing protective devices where these devices are required; and
4. Reporting noise concerns to the Supervisor.

4.3 Occupational Health and Safety

Occupational Health and Safety is responsible for:

1. defining the Noise Control and Hearing Protection Program;
2. conducting noise surveys and dosimetry;
3. providing technical services and advice regarding control measures and hearing protection;
4. providing appropriate hearing conservation training and education;
5. requesting audiometric screening and maintaining confidential personal records;
6. reporting noise-induced hearing loss cases to the WSIB Coordinator; and
7. Auditing the program.

5.0 Program Administration

- The effectiveness of the HPP will be assessed on a 12-month cycle by reviewing the collective results of the employees' annual audiograms.
- Audiograms will be conducted annually at which time individual counselling as specified in Appendix 1 will be conducted.
- Training as detailed in Appendix 1 will be conducted every two years for employees specified.

6.0 References

UWO Position Hazard Communication Form

IAPA's Integrated Management System™ (IMS)

IAPA's Noise Control: A guide for Employers and Employees

The current ACGIH Threshold Limit Values for Chemical Substances and Physical Agents

CSA Z107.56-94 Procedures for the Measurement of Occupational Noise Exposure

CSA Z94.2-02 Hearing Protection Devices - Performance, Selection, Care, and Use

Z107.0 Definitions of Common Acoustical Terms Used in CSA Standards

CAN/CSA-Z107.6 Pure Tone Air Conduction Threshold Audiometry for Hearing Conservation

Appendix 1

Hearing Conservation Education

The following groups of employees shall receive training related to Hearing Conservation:

- Those who routinely work in the Power Plant
- Others as identified by Occupational Health and Safety and Supervisors
- Employees who are required to enter high noise areas.

Training will be delivered through a standard education package offered by the OHS and when an employee is given the results of his or her annual audiogram.

The content of the training packages is as follows:

EDUCATION PACKAGE:

- Description of UWO HPP
- The hazards of noise
- How hearing loss occurs
- The purpose and limitations of audiometric testing
- The purpose and limitations of hearing protectors
- The proper way to wear hearing protectors
- Characteristics of noise in employee's specific working environment and how such noise could affect hearing

INDIVIDUAL COUNSELLING DURING COMMUNICATION OF AUDIOGRAM RESULTS:

- The importance of wearing hearing protectors
- How they should be worn.
- The results of the employee's audiogram and how that relates to the maintenance of the employee's hearing

Appendix 1: Hearing Conservation Education (continued).

Training requirements specified in this section applies to individuals performing specific functions within the program.

Noise measurement

Employees taking noise measurements shall be trained in the appropriate methods to assess noise source levels and noise exposures according to CSA Z107.56-94 Procedures for the Measurement of Occupational Noise Exposure.

Hearing Protection Use and Care

Employees monitoring hearing protection shall understand the appropriate requirements of CSA Z94.2-02 Hearing Protection Devices - Performance, Selection, Care, and Use.

Noise Elimination/Reduction

Employees/engineers participating in noise engineering solutions shall receive appropriate training on basic noise control engineering principles (reference documents include IAPA's Noise Control: A guide for Employers and Employees; Current edition of the ACGIH Noise and Hearing Conservation Manual).

Purchasing

Persons purchasing materials, equipment and services involving potential for noise; as well as purchasing protective devices or consulting services shall be made aware of the requirements of the HPP standard and relevant engineering standards.

Appendix 2

Audiometry

Classification of Audiograms:

Each baseline audiogram will be classified into one of three categories. These categories are:

1. Normal (N)
2. Early Loss Index (ELI)
3. Abnormal (AB)

A brief explanation of each of these categories is given below.

1. Normal (N):

Where threshold data does not exceed 25 dBA hearing threshold level (HTL).

2. Early Loss Index (ELI):

The presence of a 15 dBA notch at 3000, 4000, and/or 6000 Hz when comparing the threshold to neighbouring frequencies. The deepest part of the notch should display a threshold of 30 dBA HTL or greater.

3. Abnormal (AB):

- a. Where thresholds exceed 25 dBA at 500, 1000, or 2000 Hz.
- b. The difference between better and poorer ear exceeds an average of 15 dBA at 500, 1000, 2000 Hz or exceeds an average of 30 dBA at 3000, 4000, and 6000 Hz.
- c. A loss of at least 30 dBA when compared to the preceding frequency. The loss can be any frequency above 2000 Hz.
- d. 30 dBA HTL or greater bilaterally from 3000 to 8000 Hz with no evidence of a notch.

Appendix 2: Audiometry (continued)

Classification of Threshold Shifts:

The results of periodic audiometric tests will be used according to a specified protocol for the purpose of detecting changes in hearing (threshold shifts).

Once a baseline audiogram has been done, subsequent audiograms will be compared to this "baseline audiogram". The purpose of this comparison is to determine whether a shift in hearing has occurred.

Each time comparisons are made to the baseline; the comparisons will be classified as either:

- NO SHIFT (NS)
- ABNORMAL SHIFT (ABS):

Where two consecutive frequencies from 1000 Hz to 6000 Hz shift 15 dBA or more when compared to the baseline test (or the new reporting baseline).

Once the classifications have been done, the baseline will be adjusted as appropriate:

- Where there is a confirmed ABS, the first of the two shifts will become the new reporting baseline.
- When an audiogram shows an average improvement of at least 10 dBA in 500, 1000, and 2000 Hz, or an average improvement of at least 10 dBA at 300, 4000, and 6000 Hz, in either ear, when compared to the existing baseline on at least two successive tests, then the best audiogram (or the first periodic test showing the improvement) will become the new Baseline.

Question: What happens if someone appears to be suffering from hearing loss?

Appendix 3
Purchasing Requirements

Purchasing Requirements for Hearing Protective Devices

As per CSA Z94.2-02, manufactures need to provide the required information as detailed in the first section of this appendix and preference shall be given to manufactures that can provide additional information as detailed in the latter section of this appendix.

Required Information

The smallest unit in which the hearing protector is sold or dispensed shall include, either on the package or as an insert, the following information:

- (a) the attenuation Grade and/or Class of the hearing protection device (see Table 2);
- (b) a warning that full attenuation will not be achieved unless the hearing protection device is properly fitted; and
- (c) contact details such as telephone number or an Internet Web address for additional information.

Recommended Additional Information

The following information regarding the construction, performance, and use of the hearing protectors shall be provided by the manufacturer as part of the hearing protection device packaging where practicable, or shall be readily available upon request by the user:

- (a) instructions on the selection care and use of the hearing protector.
- (b) mean sound attenuation in dBA at one-third octave bands centered at 125, 250, 500, 1000, 2000, 4000 and 8000 Hz (for each subject, attenuation shall be computed at each frequency by averaging the subject's trials and the mean for the panel of subjects is the average of each of the individual subject's multi-trial averages);
- (c) standard deviation in dBA at each of the frequencies specified in item (b);
- (d) for earmuffs, a measurement of the force exerted against the side of the head
- (e) physical performance test requirements that the hearing protection device satisfies
- (f) the identity of the test laboratory where each of the performance characteristics were determined;
- (g) the model(s) of hardhat(s) tested in combination with earmuffs
- (h) a warning for devices containing metallic components that such devices may increase electrical hazards;
- (i) a warning that users of hardhats combined with earmuffs must refer to CSA Standard Z94.1; and
- (j) details of any maintenance requirements and a list of the replacement spare parts that are available.