

 <p>Carnegie Mellon University Environmental Health & Safety FIRE LAB WORK</p>	<p>Environmental Health and Safety Hearing Conservation Program</p>
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1. Purpose

Carnegie Mellon University (CMU) has developed this program to address hearing conservation for noise-producing activities conducted on CMU's Pittsburgh campus.

It is the responsibility of CMU to protect its employees from the potential noise hazards resulting from noise-producing activities that may severely impact hearing. This hearing conservation program aims to ensure that employees exposed to elevated noise levels while engaged in work-related activities are properly trained and protected by one or a combination of the following controls: engineering, administrative, safe-work practices and/or personal protective equipment (PPE).

2. Scope

This Hearing Conservation Program has been developed in accordance with the United States Occupational Safety and Health Administration's (OSHA) regulation for occupational noise exposure (29 CFR 1910.95). In this section, OSHA requires employers to implement a Hearing Conservation Program to protect its employees from noise hazards in the workplace that may negatively impact hearing. Activities covered, include, but are not limited to, routine maintenance, lawn care services, and shops that have the potential to expose employees to elevated noise levels.

This program provides the necessary guidance for noise evaluation procedures, (including monitoring and sampling), employee notification, employee audiometric testing, noise overexposure and reporting procedures, hearing protection/personal protective equipment (PPE), employee training/awareness, record keeping, and program evaluation. Responsibilities of all involved parties, including CMU department heads, managers, supervisors, or other employees acting in a supervisory capacity, Environmental Health and Safety (EHS) Department, Facilities Management and Campus Services (FMCS) Department, and individuals wearing hearing protection are also included.

3. Responsible Parties

a. CMU Department Heads, Managers, and Supervisors

- i. Comply with the requirements of this Hearing Conservation Program;
- ii. Provide work environments that minimize noise exposure to the greatest extent reasonably possible, e.g., in the purchase of new equipment;
- iii. Identify and report to [EHS](#) all areas and/or tasks that may require noise monitoring;

- iv. Identify employees who work in areas, or are involved with tasks, that require hearing protection and notify [EHS](#);
- v. Ensure all persons accessing areas that require hearing protection and/or are completing tasks that require hearing protection, are properly trained in accordance with this program;
- vi. Purchase and maintain hearing protection that is appropriate for the area/task and provide it, at no cost to the employee; and
- vii. Post and maintain signage in areas where hearing protection is required (signage will be provided by EHS).

b. EHS Department

- i. Develop, implement, and maintain a Hearing Conservation Program.
- ii. Assist management in implementing aspects of the Hearing Conservation Program;
- iii. Maintain the hearing conservation training program, as well as training classes and annual refresher training records.
- iv. Conduct noise monitoring for areas/activities-of-concern and recommend controls and/or appropriate signage;
- v. Maintain data from noise monitoring surveys and distribute results to affected parties;
- vi. Assist in the selection and approval of hearing protection devices and advise on its proper care and use;
- vii. Develop, implement, and maintain an Audiometric Testing Program (contained within this Hearing Conservation Program);
- viii. Maintain audiometric testing data; and
- ix. Provide signage for areas requiring hearing protection and ensuring the signs are maintained by department heads, managers, and supervisors.

c. FMCS Department

- i. Ensure, as reasonably possible, that existing equipment and operations minimize noise exposure;
- ii. Ensure, as reasonably possible, that new equipment reduces noise exposure; and
- iii. Collaborate with EHS, department heads, managers, and supervisors in designing noise control measures/features for new and existing equipment/tasks.
- iv. Ensure employees that are enrolled in the Hearing Conservation Program participate in the program, including attending training and audiometric testing as required.

d. Individuals Wearing Hearing Protection

- i. Comply with the requirements set forth in this Hearing Conservation Program, including training and audiometric screenings, if required;
- ii. Ensure proper maintenance and use of hearing protection;
- iii. Report deficiencies or malfunction of hearing protection to managers. Escalate to the [EHS Department](#) if the issue is not resolved in a reasonable time; and
- iv. Report noise level and/or exposure concerns to manager and/or [EHS Department](#) as soon as possible.

4. Definitions

- a. **Action level:** a concentration for a specific chemical, physical, or biological contaminant, calculated as an eight (8)-hour time-weighted average, which initiates certain required activities such as exposure monitoring and medical surveillance.
- b. **Audiogram:** a test of a person's ability to hear sounds in varying frequencies and intensity.
- c. **Decibel (dB):** a unit used to measure the intensity of a sound. A-weighted sound levels closely match the perception of loudness by the human ear (referred to as dBA).
- d. **Noise Reduction Rating (NRR):** system used to measure the amount a hearing protection device is capable of reducing sound exposure in decibels.
- e. **Permissible Exposure Limit (PEL):** the maximum concentration/level of a chemical, physical, or biological contaminant (e.g. noise) that an employee is permitted to be exposed to and calculated as an 8-hour time weighted average.
- f. **Time Weighted Average (TWA):** the employee's average airborne exposure in any 8-hour work shift of a 40-hour work week.

5. Hearing Conservation Program—Core Components

a. Limits for Inclusion

Most employees will not perform activities that will require full participation in the Hearing Conservation Program; however, when hearing protection is required employees will need to complete the proper training prior to performing activities associated with the noise hazard (see **Section 5g—Training**).

Although students are not covered under the Hearing Conservation Program, appropriate training, PPE, and signage shall be provided for areas, or with activities, that may produce increased noise levels.

b. OSHA Action Level

When noise levels equal or exceed the OSHA Action Level of 85 decibels on an A-weighted sound level (dBA) calculated over an 8-hour Time Weighted Average (TWA), the employee exposed to these levels must be enrolled into the Hearing Conservation Program and participate in hearing evaluations as described in **Section 5e—Audiometric Testing Program**.

Work shifts exceeding 8 hours have reduced Action Levels, as shown in the table below.

Shift Duration (hours)	OSHA Action Level (dBA, slow response)
8	85
10	84
12	83

At any time, if an individual experiences an increase in noise level exposure and/or an increase in duration of noise exposure, EHS should be notified as soon as possible to determine if the individual should be included in the Hearing Conservation Program.

If noise monitoring determines that the individual has been exposed to noise levels equal to or above the appropriate Action Level, they must, within 6 months of the exposure, undergo a baseline audiogram against which future audiograms can be compared. See **Section 5e—Audiometric Testing Program**, for complete requirements for employee exposure monitoring. Examples of when hearing protection may be required include, but are not limited to:

- i. The individual is involved in a task that generates a noise hazard, such as lawn maintenance, drilling, grinding, etc.;
- ii. There is posted signage in the area of work; or,
- iii. Hearing protection is part of the task’s standard operating procedures.

c. OSHA Permissible Exposure Limit (PEL)

When employees are exposed to noise levels exceeding PELs set by OSHA (shown in the table below), feasible engineering and administrative controls must be provided. If the controls cannot reduce noise exposure to acceptable limits, hearing protection must be provided. The noise exposure would need to remain below the PEL and below the Action Level, if possible.

Shift Duration (hours)	Sound Level (dBA, slow response)
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
0.5 or less	115

Utilization of engineering and administrative controls can reduce personnel exposure to hazardous noise, thusly limiting the number of employees in the Hearing Conservation program. Feasible engineering controls include, but are not limited to:

- i. Installation of sound-absorbing enclosures or panels;

- ii. Equipment substitution; and
- iii. Equipment modification.

Where engineering controls are not feasible due to the nature of the noise source or the operating environment, administrative controls should be implemented. Administrative controls include, but are not limited to:

- i. Increasing the distance between the noise source and affected individual;
- ii. Rotating individuals to reduce the time of exposure; and
- iii. Utilizing forms of hearing protection that is required in the specified areas during specified times.

d. Noise Evaluation and Monitoring

Requests for noise monitoring will be completed by CMU department heads, managers, and supervisors. Requests should be sent to [EHS](#). Noise monitoring will be initiated by EHS if it is discovered that there is a lack of data for an area, task, or individual, or if there is an indication that noise exposures exceed the Action Level. Noise monitoring shall be completed when:

- i. An area or task generates increased levels of noise (as a general rule-of-thumb, noise may be loud enough to damage hearing when you have to raise your voice over the noise in order to be heard by someone within arm's length);
- ii. An individual has exposure, short or prolonged, to increased levels of noise;
- iii. It is suspected that an employee's exposure may equal or exceed the Action Level; or,
- iv. There is a change in process or equipment (both for areas already monitored and not yet monitored). This is to determine if additional employees are exposed at or above the Action Level and if provided hearing protection is still adequate for the noise level.

The following parameters will be adhered to for noise monitoring, which includes sound-level surveys and personal noise dosimetry:

- i. Sampling will be completed by a qualified member of EHS;
- ii. Proper industrial hygiene practices will be followed throughout the monitoring process, which typically includes monitoring for the duration of a standard work shift;
- iii. The sampling strategy will be designed to identify individuals for inclusion in the Hearing Conservation Program, to identify hazardous noise areas/tasks, and to enable the proper selection of hearing protection;
- iv. Sound levels from at least 80-130 dB will be measured;
- v. Noise monitoring equipment will be properly calibrated according to the manufacturer's instruction to ensure measurement accuracy;
- vi. Individual(s) shall be notified of the results of the monitoring if it is determined that they have been exposed at or above the Action Level; and
- vii. Affected individual(s) shall be provided the opportunity to observe any noise measurements.

e. Audiometric Testing Program

The Audiometric Testing Program is implemented and maintained by EHS. Employees whose exposure equals or exceeds the Action Level must be enrolled into the Audiometric Testing

Program. The services of this program will be provided to affected individuals at no cost. Associated costs will be the responsibility of the department of the affected individual(s).

i. **Audiometric Testing Procedures**

The following parameters will be adhered to for employee audiometric testing:

1. Audiometric tests shall be performed by a licensed or certified audiologist or other physician in accordance with 29 CFR 1910.95(g)(3) and in accordance with 29 CFR 1910.95(h) and appendices B, C, and D of 29 CFR 1910 for measuring instruments, test rooms, and calibration procedures. Employees may receive testing;
2. A baseline audiogram shall be completed within 6 months of an individual's first exposure at or above the Action Level;
3. Testing shall be preceded by at least 14 hours without exposure to workplace noise (individuals will be notified of this by EHS and/or their manager/supervisor prior to the audiogram);
4. It shall be communicated to the individual the need to avoid high levels of non-work-related noise exposure during the 14-hour window preceding the audiogram; and
5. An annual audiogram shall be conducted after completion of the baseline audiogram for all individuals exposed at or above the Action Level.

ii. **Audiogram Evaluation Procedures**

The following parameters will be adhered to for audiogram evaluation:

1. Each individual's annual audiogram will be compared to the baseline audiogram to determine if a standard threshold shift has occurred. The standard threshold shift is a change in the hearing threshold of an average of 10 dB or more at 2000, 3000, and 4000 Hertz in either ear.
 - o If a standard threshold shift has occurred, a retest may be conducted within 30 days and the retest results may be considered as the annual audiogram.
 - o Allowance may be made for the contribution of aging to the change in hearing level in accordance with Appendix F of 29 CFR 1910.
2. The audiogram evaluator shall review problem audiograms and determine if there is a need for further evaluation. EHS shall provide the evaluator with:
 - o A copy of the requirements for this Audiometric Testing Program and
 - o The individual's baseline audiogram and most recent audiogram.

iii. **Audiogram Follow-up Procedures**

The following parameters will be adhered to for audiogram follow up:

1. The individual will be notified in writing if their audiometric evaluation has indicated a standard threshold shift;
2. When a standard threshold shift determination has been made (except in those cases where it has been determined that the shift is not work related) EHS and/or the individual's manager/supervisor shall ensure:
 - o Individuals not wearing hearing protection are fitted with hearing protection and properly trained (see Section 4.7—Training);

- Individuals already wearing hearing protection are refitted, retrained, and provided with hearing protection offering greater noise reduction, if necessary;
 - The individual shall be referred for clinical evaluation if additional testing is necessary or if it is suspected that medical pathology of the ear is caused and/or aggravated by the wearing of hearing protection; and
 - The individual shall be notified of the need for a clinical evaluation if it is suspected that medical pathology of the ear is unrelated to the use of hearing protection.
3. If subsequent audiometric testing of an individual whose exposure is less than an 8-hour TWA of 90 dB indicates that the standard threshold shift is not persistent, then the individual shall be notified of this new interpretation and use of hearing protection for that individual may be discontinued.

f. Hearing Protection Provisions and Specifications

Hearing protection will be provided at no cost to employees exposed at or above the Action Level and/or PEL. While hearing protection is recommended and encouraged for employees exposed at or above the Action Level, employees exposed at or above the PEL are required to wear hearing protection. Affected individuals will have the opportunity to select an appropriate hearing protector from a variety of approved types. Types of hearing protection that may be provided include:

- i. Expandable foam plugs;
- ii. Pre-molded, reusable plugs;
- iii. Canal caps; and/or
- iv. Earmuffs.

Head phones, ear buds, or other similar audio-listening devices are not typically rated to reduce noise exposure and are not permitted to be used in lieu of approved hearing protection.

Training on the use and care of the selected type of hearing protection will be provided to the individual in addition to ensuring proper initial fit and correct use.

Approved hearing protection will be determined based on the hearing protection's Noise Reduction Rating (NRR), which must be shown on the hearing protector's packaging. The NRR will be used, along with the individual's level of noise exposure, to calculate an attenuation value and ultimately determine if the hearing protector is suitable for the noise level.

g. Training

Initial and annual training will be provided, at a minimum, to employees who are exposed to noise at or above the OSHA Action Level. Updates to the training program will be consistent with changes in provided PPE as well as work processes. Access to information contained within this Hearing Conservation Program and other materials utilized for training will be available to all affected employees. Additionally, a copy will be posted on the [EHS website](#) under the "Workplace and Construction Safety" heading.

Training will include at a minimum:

- i. Identification and overview of the OSHA standard for noise exposure and hearing conservation—29 CFR 1910.95.
- ii. The effects of noise on hearing;

- iii. The purpose of hearing protectors;
- iv. Advantages, disadvantages, and attenuation of various types of hearing protection;
- v. Instructions on selection, fitting, use, and care of various types of hearing protection;
- vi. The purpose and explanation of audiometric testing procedures, including when they are required;
- vii. Reviewing areas and tasks where hearing protection is required and the corresponding exposure levels; and
- viii. The contents of this Hearing Conservation Program.

h. Record Keeping

All records of audiometric testing (assisted by the testing provider) and training will be maintained by EHS or the employee's supervisor. Records of audiometric testing will include:

- i. Name and job classification of employee;
- ii. Date of the audiogram;
- iii. The examiner's name;
- iv. Date of the last calibration of the audiometer;
- v. Employee's most recent noise exposure assessment; and
- vi. Measurements of background sound pressure levels in audiometric test rooms.

Noise exposure measurement records will be retained by EHS for at least two years and audiometric test results will be retained for the duration of the affected individual's employment. All records will be made available upon request.

6. Signage for Hearing Protecting Areas

Signage is an important tool for communicating to employees, and students when applicable, the potential for noise exposure in a specified area and/or task. Signage must be posted in areas where noise monitoring equals or exceeds the Action Level or PEL to prevent entry by unprotected and/or untrained individuals. Signage may also be posted in areas that are considered potentially hazardous, i.e. areas exceeding 80dBA. Wording of the sign will depend on when and where hearing protection is recommended or required. Such wording may include:

- a. High Noise Area—Hearing Protection Required;
- b. Hearing Protection Required While Equipment is Operating;
- c. Hearing Protection Required Prior to Entering;
- d. Hearing Protection Recommended While Working in This Area; and
- e. Hearing Protection Required While Working in This Area.

7. Program Evaluation

Periodic review of the effectiveness of the Hearing Conservation Program is critical to its usefulness and compliance with the most up-to-date federal, state, and local regulations and guidelines. EHS will conduct periodic surveys, including work-site inspections, interviews with hearing protection wearers, noise monitoring, and review other records, as applicable. In the event that deficiencies are found, the corrective action(s) will be made as soon as reasonably possible. Updates to the

Hearing Conservation Plan will be documented no later than one month after the deficiency was identified and noted on the Hearing Conservation Plan Amendments form located in **Section 7**.

8. Revisions

Date	Documented Changes	Initials
3/11/2019		
3/15/2021	Updated Format and Accessibility Update	MAS
3/22/2021	Updated roles/responsibilities: Removed "ensure employees that are enrolled in the Hearing Conservation Program participate in the program, including attending training and audiometric testing as required" from EHS responsibility and moved to FMCS responsibility. Added "Section 4: Definitions" Added to section 5f prohibition of using headphones/earbuds without an NRR for hearing protection. Minor administrative changes and updates to text to make content more concise.	CG
11/3/2022	Reviewed – No updates needed	CB