Arizona State University

# Environmental Health and Safety

# Hearing Conservation Program Pursuant to 29 CFR § 1910.95

Revised May 2023

480-965-1823
asuehs@asu.edu

## Table of Contents

Purpose and application ..... 3

Roles and responsibilities ..... 4

Noise monitoring ..... 5

Noise controls ..... 5

Audiometric testing program ..... 6

Hearing protection ..... 8

Training ..... 9

Program evaluation ..... 10

Record keeping ..... 10

Appendix: definitions

## Purpose and application

The primary purpose of Arizona State University's Hearing Conservation Program is to protect employees from noise exposure; conserve hearing ability; and prevent occupational hearing loss.

The intent of this program is educational, preventive, and to fulfill the requirements for a written control plan required by the Occupational Safety and Health Act, or OSHA, Title 29 of the Code of Federal Regulations, section 1910.95.

1. If the 8-hour time weighted average or TWA exposure exceeds the Permissible Exposure Limit or PEL of 90 dBA or decibels A-weighting, feasible engineering controls must be identified and provided to reduce the exposures to 90 dBA or less.
2. If the 8 hour time-weighted average exposure exceeds the Action Level of 85 dBA, hearing protective devices must be provided and used by employees. Additionally, employees must be included in a hearing loss prevention program that is administered and enforced by ASU.

This program shall apply to all ASU employees whose noise exposures equals or exceeds an 8-hour time weighted average TWA sound level of 85 decibels, otherwise known as the action level, while performing their work activities. These employees must be enrolled into the hearing conservation program.

The program shall also apply to those employees who are exposed to noise in excess of the OSHA permissible exposure limits, or PEL, outlined in the table below. When feasible engineering and/or administrative controls do not reduce the noise level to or below these PEL's, proper hearing protection devices must be used.

### Table 1 – Permissible noise exposure limit

| Duration per day in hours | Sound level dBA slow response |
|---|---|
| 8 | 90 |
| 6 | 92 |
| 4 | 95 |
| 3 | 97 |
| 2 | 100 |
| 1 ½ | 102 |
| 1 | 105 |
| ½ | 110 |
| ¼ or less | 115 |

## Roles and responsibilities

### Environmental Health and Safety

- Conduct noise exposure monitoring and notify the department and affected employees of their exposures.
- Develop the ASU Hearing Conservation Program and revise as appropriate.
- Indicate when the noise levels exceed permissible standards established by OSHA and when employees must be included in the hearing loss prevention program.
- Maintain records of noise measurement and employee training.
- Periodically audit the ASU Hearing Conservation Program.
- Provide recommendations concerning noise control measures including engineering controls, administrative controls, and hearing protection.
- Provide training on noise and hearing loss prevention that complies with regulations.
- Review and select appropriate hearing protective devices for use and train employees on their appropriate use.

### Department

- Administer and maintain this program in the department.
- Assisted by EHS, train employees on the hazards of noise exposure at work and away from work, signs of hearing loss and proper use of hearing protective devices.
- Document activities including noise monitoring, equipment evaluations and selection, results in audiometric testing, and training.
- Ensure exposed employees are included in the audiometric testing program and that employees participate and receive baseline within 6 months of the employees' first exposure at or above 85 dBA and annual tests. For an exposure of concern, or possible work-related hearing loss, more timely audiometric testing may be indicated.
- Ensure workers use appropriate hearing protection when required.
- Identify and report to EHS, new and existing potential sources of noise exposure and have them evaluated if there is a possibility of excessive noise.
- Inform EHS of Standard Threshold Shifts, or STS, for the OSHA 300 log.
- Inform employees of audiogram results.
- Notify EHS for assistance to conduct a noise level assessment.
- Notify employees of the need to avoid high levels of non-occupational noise exposure during the 14-hour period immediately preceding the audiometric examination.
- Post work areas that are designated as "high" noise exposure work areas and establish procedures to reduce noise exposure.
- Provide a variety of hearing protective devices appropriate for the noise level for use by "exposed" employees at no cost to the employees.
- Reduce the level of noise from sources through the use of engineering controls or purchase of quieter equipment. Maintain equipment to minimize noise production.

**Personnel**

- Attend training classes.
- Follow Department safety procedures that address hearing loss prevention and use hearing protectors as required.
- Receive initial, annual, and termination audiometric tests as scheduled.
- Report work conditions that may result in high noise exposures so the hazard can be evaluated.
- Wear appropriate hearing protection as required.

## Noise monitoring

The Department will conduct a hazard assessment, identify work areas where suspect excessive noise exposures are present, and request assistance from EHS to determine exposure level. The Department will be responsible for notifying EHS of changes in work practices that could result in excess noise exposure.

EHS will develop a sampling strategy and evaluate noise exposures as required in OSHA 1910.95 1910.95.

Noise measurements will be representative of the employees who perform tasks that may result in noise exposures that equal to or exceed 85 dBA TWA. A screening survey will be conducted, followed by, as needed, comprehensive noise exposure monitoring to determine the employee's actual noise exposure.

If noise levels are below 80 dBA TWA in the area, no further noise monitoring will be required for that area.

Noise measurement data will be evaluated to identify employees, and groups of employees who perform similar job tasks, who have noise exposures that equal or exceed 85 dBA TWA who will be included in the Hearing Loss Prevention Program and participate in the audiometric testing program.

Exposure monitoring will be periodically repeated when there are changes in processes, job responsibilities, or equipment that may increase or decrease the exposure. Monitoring will also be repeated if an employee is identified with a STS or an employee is exposed to high levels of noise that require more than then usual level effective hearing protection, such as the use of double hearing protection.

Supervisors and affected employees will be provided with a report that summarizes the noise monitoring results in their work area.

## Noise controls

When monitoring identifies noise exposure levels that equal or exceed 90 dBA TWA, feasible engineering and/or administrative controls will be implemented to reduce or eliminate employee exposures to excessive noise. Once the noise exposures are controlled below 90 dBA TWA, no further reduction is required.

**Engineering controls**

Engineering controls are installed to eliminate noise at the source or establish a permanent barrier to noise. Examples include replacing noisy equipment with quieter equipment, use of silencers and mufflers, installation of noise absorptive enclosures, and dampening noisy equipment and parts.

**Administrative controls**

Administrative controls and work practices may be effective at reducing noise exposures. Examples include rotating employees between louder and quieter work environments, limiting the amount of time noise generating equipment is used, and rescheduling work.

**Personal protective equipment**

When noise reduction efforts effectively reduce the exposures so they are below 85 dBA, then the hearing loss prevention requirements including audiometric testing, use of hearing protection, and training are no longer required but hearing protection may be utilized at the option of the worker.

If feasible engineering and administrative controls are considered and noise levels are not successfully reduced so they remain below 85 dBA, then the employees must wear hearing protection to reduce the exposure to noise.

**Warning Signs**

Warning signs meeting ANSI Z535 current standard will be posted at the entrances or boundaries to areas where noise levels can exceed 85dBA TWA to notify employees and visitors that hearing protectors are advised.

## Audiometric testing program

All University employees who are exposed to noise levels that equal or exceed 85 dBA must participate in the University's Hearing Conservation Program and Audiometric Testing Program. It is the responsibility of Department Administrators, Managers, and Supervisors to enroll their employees in the ASU Hearing Conservation Audiometric Testing Program. Department Administrators, Managers, and Supervisors shall contact a Professionally Licensed Healthcare Provider or PLHCP, either a qualified physician, otolaryngologist, audiologist or certified technician, to enroll these employees in the ASU Hearing Conservation Medical Surveillance Program. EHS can provide the Program Administrator, Manager, or Supervisor with names of local PLHCP's.

Affected departments are responsible for costs associated with the ASU Hearing Conservation Audiometric Testing Program. Audiometric tests including any required travel or necessary additional examinations, or testing are provided at no cost to the exposed employees.

Baseline audiometric tests are provided for employees pre-placement, upon first assignment or within 6 months of assignment to the noise designated work area, and annually thereafter.

Annual testing following these initial tests will be compared to the baseline test results for all employees who continue to work in high noise areas. When the baseline audiometric test reveals a pre-existing hearing loss, a full evaluation will be conducted to determine the type of hearing loss. Employees must not be exposed to workplace noise for at least 14 hours before having an audiogram. Employees should avoid high exposure levels from non- occupational noise sources (such as loud music, headphones, guns, power tools, motorcycles, etc.) during the 14-hour period immediately preceding the audiometric examination. Audiograms will be reviewed by a licensed or certified audiologist, otolaryngologist, or another qualified physician. Employees will be provided with results of their individual audiometric exams.

The department is responsible for scheduling employee audiometric testing with a PLHCP. Employees with exposure to TWA noise levels of 85 dBA or greater must have baseline audiometric testing performed within 6 months of initial noise exposure. The employee should not be exposed to workplace noise for at least 14 hours prior to the baseline audiogram.
Hearing protection may be worn as a substitute for this requirement. The supervisor should also notify the employee to avoid high levels of non-occupational noise during this period.

The PLHCP has the responsibility for administering the Audiometric Testing Program portion of the ASU Hearing Conservation Program. A qualified physician, otolaryngologist, audiologist or certified technician will perform the audiogram examination. The testing must conform to OSHA's requirements on audiometric testing, which are covered in Appendices C through F in the Occupational Noise Exposure Standard. The object of the audiometric testing program is to identify workers beginning to experience hearing loss to allow intervention before the hearing loss progresses. Audiometric testing will be provided to all employees with exposure to TWA noise levels of 85 dBA or greater. Annual retesting will be performed for all personnel enrolled in the ASU Hearing Conservation Medical Surveillance Program until separation from employment or upon transfer to duties with noise exposures below 85 dBA.

Audiometric testing not only monitors the sharpness or acuity of an employee's hearing over time, but also provides an opportunity for employers to educate employees about their hearing and the need to protect it. The important elements of the audiometric testing program include baseline audiograms, annual audiograms, training, and follow-up procedures. Audiometric testing must be made available at no cost to employees exposed to TWA noise levels of 85 dBA or greater. Annual audiograms must be conducted within 1 year of the baseline. Annual audiograms must be routinely compared to baseline audiograms to determine if the employee has lost hearing ability, i.e., if a standard threshold shift or STS has occurred. STS is defined as an average hearing loss in either ear of 10 dB or more at frequencies of 2000, 3000, and 4000 hertz.

If the annual audiogram shows that an employee has experienced a STS, the PLHCP will arrange for the employee to retest within 30 days, and the results of the retest will be used as the annual audiogram. If a STS is indicated, the employee shall be informed of this fact in writing within 21 days of the determination. If a PLHCP determines the STS may be work- related or aggravated by occupational noise exposure, the employee will be referred for a follow-up clinical audiological evaluation. The employee's supervisor will also be notified of the STS and shall ensure that the employee has appropriate hearing protection, is trained in their use and care, and required to use them. Employees already using hearing protection shall be refitted, if necessary and retrained in the use of hearing protection and provided hearing protection offering greater attenuation if necessary.

## Hearing protection

The primary means of reducing or eliminating personnel exposure to hazardous noise is through the application of engineering controls. Engineering controls are defined as any modification or replacement of equipment, or related physical change at the noise source or along the transmission path that reduces the noise level at the employee's ear. Engineering controls such as mufflers on heavy equipment exhausts or on air release valves are required where possible.

Administrative controls are defined as changes in the work schedule or operations which reduce noise exposure. If engineering solutions cannot reduce the noise, administrative controls such as increasing the distance between the noise source and the worker or rotation of jobs between workers in the high noise area should be used if possible.

**The use of engineering and administrative controls should reduce noise exposure to the point where the hazard to hearing is eliminated or at least more manageable.**

Hearing protective devices – ear plugs, muffs, etc. – shall be the permanent solution only when engineering or administrative controls are considered to be infeasible or cost prohibitive.
Hearing protective devices are defined as any device that can be worn to reduce the level of sound entering the ear. Departments shall make hearing protection available at no cost to their employees who are exposed to TWA noise levels of 85 dBA or greater. Employees with routine periodic noise exposures over 85 dBA will also be provided hearing protection.

### Pre-molded

Pre-molded earplugs are pliable devices of fixed proportions. Two standard styles, single flange and triple flange, come in various sizes, and will fit most people. Personnel responsible for fitting and dispensing earplugs will train users on proper insertion, wear, and care. While pre-molded earplugs are reusable, they may deteriorate

### Formable

Formable earplugs come in just one size. Some are made of material which, after being compressed and inserted, expands to form a seal in the ear canal. When properly inserted, they provide noise attenuation values that are similar to those from correctly fitted pre-molded earplugs. Each earplug must be held in place while it expands enough to remain firmly seated. A set of earplugs with a cord attached is available. These earplugs may be washed and therefore are reusable but will have to be replaced after two or three weeks or when they no longer form an airtight seal when properly inserted.

### Custom molded

A small percentage of the population cannot be fitted with standard pre molded or formable earplugs. Custom earplugs can be made to fit the exact size and shape of the individual's ear canal. Individuals needing custom earplugs will be referred to an audiologist

**Earmuffs**

Earmuffs are devices worn around the ear to reduce the level of noise that reaches the ear. Their effectiveness depends on an airtight seal between the cushion and the head. Hearing protection shall be replaced as necessary.

Employees shall be given an opportunity to select their hearing protection from a variety of suitable devices. The Program Administrator shall provide training in the use and care of all hearing protection devices provided to employees. The supervisor shall monitor the correct use of all hearing protection. Environmental Health and Safety shall determine hearing protection attenuation necessary for the specific noise environments in which the hearing protection will be used. Only hearing protection with a suitable noise reduction ratio (NRR) will be used. The NRR used for calculating attenuated noise exposure levels will be calculated in the following manner, using a safety factor of 50%:

**Reduction (dB) = (NRR - 7) ÷ 2**

For example: If the NRR on a pair of earplugs is 21, subtract 7 from that number and divide that by 2, (21 – 7) ÷ 2 = 14 ÷ 2 = 7. Therefore, this pair of earplugs will reduce the TWA 7 decibels and the supervisor must determine if this will be enough protection for the employee.

Hearing protection must attenuate lower employee exposure at the ear to no more than a TWA noise level of 85 dBA. The adequacy of hearing protection shall be reevaluated whenever employee noise exposures increase to the extent that the hearing protection may no longer provide adequate attenuation.

Employees whose 8-hour TWA noise exposures do not meet or exceed 85 dBA will be provided hearing protection if their duties require entry into noise hazard areas or use of loud equipment where sound levels measure over 85 dBA. These areas or pieces of equipment should be placarded with signs advising employees that hearing protection should be worn.

Any personnel experiencing difficulty in wearing assigned hearing protection For example, irritation of the canals, pain, will be advised during training to immediately report this to their supervisor to schedule an appointment with the PLHCP for evaluation as soon as possible.

**Training**

**Before using earplugs/and or earmuffs, each employee who is exposed to noise levels at or above an eight-hour TWA of 85 dBA must receive training. This will be provided to employees upon initial work assignment to areas that are identified as excessively noisy, and annually thereafter or upon request.**

When workers understand the reasons for the ASU *Hearing Conservation Program* requirements and the need to protect their hearing, they will be better motivated to participate actively in the program and to cooperate by wearing their hearing protection and taking audiometric tests. Environmental Health and Safety or supervisory personnel knowledgeable of the requirements of the ASU Hearing Conservation Program may provide this training annually to employees exposed to 8-hour TWA noise exposures of 85 dB and above concerning:

1. The ASU **Hearing Conservation Program**,
2. The effects of noise on hearing,
3. The purpose, advantages, and disadvantages and attenuation of various types of hearing protection,
4. The selection, fit, use and care of hearing protection,
1. The purpose of audiometric testing and an explanation of the test process, and
2. Noise hazard areas.

A copy of the Occupational Noise Exposure Standard will be made available to employees and posted in the workplace – a copy can be found in Appendix B.

Training will be documented on forms provided by Environmental Health and Safety at the time of training. Information in the annual training program will be updated to be consistent with any changes in protective devices and work processes.

## Program evaluation

The Program Administrator will conduct periodic program evaluations to assess compliance with federal and state regulations and ASU Hearing Conservation Program requirements. Both the monitoring and audiometric testing portions of the ASU Hearing Conservation Program will be reviewed annually to assure its quality and effectiveness. An evaluation of the program, including training records and course content, maintenance of hearing protection devices and field audits of hearing protection use and record keeping will be conducted at least annually.

Problems identified will be noted in an inspection log and addressed by the Program Administrator. These findings will be reported to ASU Environmental Health and Safety, and the report will list plans to correct deficiencies in the program and target dates for the implementation of those corrections.

## Record keeping

Audiometric test records must include the name and job classification of the employee, the date, the examiner's name, the date of the last acoustic or exhaustive calibration, measurements of the background sound pressure levels in audiometric test rooms, and the employee's most recent noise exposure measurement.

The Program Administrator shall maintain an accurate record of all employee exposure measurements. Noise exposure measurement records must be maintained for the duration of employment plus 30 years. Employee records shall be provided upon request by the employee, former employee or designated representative.

## Appendix

### Definitions

**Action level** - An 8-hour time-weighted average of 85 decibels measured on the A-scale, slow response, or equivalently, a dose of fifty percent.

**Attenuation** – Sound reduction.

**Audiogram** - A chart, graph, or table resulting from an audiometric test showing an individual's hearing threshold levels as a function of frequency.

**Audiologist** - A professional specializing in the study and rehabilitation of hearing who is certified by the American Speech-Language-Hearing Association or licensed by a state board of examiners.

**Baseline audiogram** - The audiogram against which future audiograms are compared.

**Decibel or dB** - Unit of measurement of sound level.

**Decibel A-weighted or dBA** - A unit used to express sound power at frequencies though to provide a rating that indicates the injurous effects on the human ear. This is the preferred unit of measure by OSHA.

**Hearing Protective Device** - Any device that can be worn to reduce the level of sound entering the ear

**Hertz or Hz** - Unit of frequency measurement, numerically equal to cycles per second.

**Noise dosimeter** - An instrument that integrates a function of sound pressure over a period of time in such a manner that it directly indicates a noise dose

**OSHA** - Occupational Safety and Health Administration is responsible for the promulgation, modification, and enforcement of occupational safety and health standards.

**Otolaryngologist** - A physician specializing in diagnosing and treating disorders of the ear, nose and throat.

**Noise Reduction Rating or NRR** – Developed by the U.S. Environmental Protection Agency to aid in determining the adequacy of hearing protection devices in a given environment.

**Permissible Exposure Limit or PEL** - Exposure limit published and enforced by OSHA as a legal standard.

**Representative exposure** - Measurements of an employee's noise dose or 8-hour time- weighted average sound level that the employers deem to be representative of the exposures of other employees in the workplace.

**Sound level** - Ten times the common logarithm of the ratio of the square of the measured A-weighted sound pressure to the square of the standard reference pressure of 20 micropascals. Unit: decibels(dB). For use with this regulation, SLOW time response, in accordance with ANSI S1.4-1971 (R1976), is required.

**Sound level meter** - An instrument for the measurement of sound level.

**Standard Threshold Shift or STS** – An average hearing loss in either ear of 10 dB or more at frequencies of 2000, 3000, and 4000 hertz.

**Time-weighted average, or TWA, sound level** - That sound level, which, if constant over an 8-hour exposure, would result in the same noise dose as is measured.

Questions? Contact ASU Environmental Health and Safety at 480-965-1823 or email asuehs@asu.edu.

Revision date 05/2023