Environmental Health and Safety
Hearing Conservation Program

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Purpose and application

Arizona State University's Hearing Conservation Program is designed to protect employees from noise exposure, conserve their hearing and prevent occupational-related hearing loss. The program is pursuant to 29 CFR § 1910.95.

The purpose of this program is educational and preventative and fulfills the written control plan required by the Occupational Safety and Health Administration, Title 29 of the Code of Federal Regulations, section 1910.95:

- Feasible engineering controls must be identified and provided to reduce the noise exposure to 90 decibels, dBA, or less if the eight-hour time-weighted average exposure exceeds the permissible exposure limit, PEL, of 90 dBA, A-weighting.
- Hearing protective devices must be provided and used by employees if the eight-hour time-weighted average exposure exceeds the action level of 85 dBA. Additionally, employees must be included in a hearing loss prevention program administered and enforced by ASU.

This program applies to all ASU employees whose noise exposures equal or exceed an eight-hour time-weighted average sound level of 85 decibels, otherwise known as the action level while performing their work activities. These employees must be enrolled in the hearing conservation program.

The program shall also apply to employees exposed to noise over the OSHA PEL, outlined in the table below. Proper hearing protection devices must be used when feasible engineering and administrative controls do not reduce the noise level to or below these PELs.

Table one — 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

EHS is responsible for the following:

- Administering training on noise and hearing loss prevention and complying with regulations.
- Conducting noise exposure monitoring and notifying the department and affected employees of their noise exposures.
- Developing, auditing and revising the ASU Hearing Conservation Program as appropriate.
- Indicating when the noise levels exceed permissible standards established by OSHA and when employees must be included in the hearing loss prevention program.
- Maintaining records of noise measurements and employee training.
- Providing recommendations concerning noise-control measures, including engineering controls, administrative controls and hearing protection.
- Reviewing and selecting appropriate hearing protective devices for use and training employees on their appropriate use.

Departments

Each department is responsible for the following:

- Administering and maintaining this program in the department.
- Documenting activities, including noise monitoring, equipment evaluations and selection, and results in audiometric testing and training.
- Downloading and posting warning signs in work areas designated as “high” noise exposure and establish procedures to reduce noise exposure.
- Educating employees on audiogram results.
- Enforce appropriate hearing protection requirements.
- Ensuring exposed employees are included in the audiometric testing program, and employees participate in and receive baseline audiometric tests within six months of the employee’s first exposure at or above 85 dBA and annual tests thereafter. More timely audiometric testing may be needed for an exposure of concern or possible work-related hearing loss.
- Identifying and reporting new and existing potential noise exposure sources to EHS and having them evaluated if there is a possibility of excessive noise exposure.
- Notifying employees of the need to avoid high levels of nonoccupational noise exposure during the 14 hours immediately preceding the audiometric examination.
- Providing a variety of hearing protection devices appropriate for the noise level for use by exposed workers at no cost to the employees.
- Reducing the noise level from sources using engineering controls or the purchase of quieter equipment. Maintain equipment to minimize noise production.
- Requesting assistance from EHS for a noise level assessment.
- Training employees on noise exposure hazards at and away from work, signs of hearing loss and proper use of hearing protective devices, with assistance from EHS.

Employees

Each employee is responsible for the following:

- Attend Hearing Conservation training.

- Following department safety procedures that address hearing loss prevention and use required hearing protection.
- 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.

EHS must be informed of standard threshold shifts for the OSHA 300 log.

Noise monitoring

The department will conduct a hazard assessment, identify work areas where suspected excessive noise exposures are present and request assistance from EHS to determine the 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.

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

Noise measurement data will be evaluated to identify employees and groups of employees who:

- Have noise exposures that equal or exceed 85 dBA TWA.
- Participate in the audiometric testing program and will be included in the Hearing Conservation Program.
- Perform similar job tasks.

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

Supervisors and affected employees will receive a report summarizing the noise monitoring results in their work area.

Noise controls

Feasible engineering and administrative controls will be implemented to reduce or eliminate employee exposure to excessive noise when monitoring identifies noise exposure levels that equal or exceed 90 dBA TWA.

Engineering controls

Engineering controls are installed to eliminate noise at the source or establish a permanent noise barrier.

Examples of eliminating noise include:

- Dampening noisy equipment and parts.
- Installing noise-absorptive enclosures.
- Replacing noisy equipment with quieter equipment.
- Use of silencers and mufflers.

Administrative controls

Administrative controls and work practices may be effective at reducing noise exposure. 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 below 85 dBA, then the hearing loss prevention requirements, including audiometric testing, use of hearing protection and training, are no longer required when noise reduction efforts effectively reduce the exposures below 85 dBA. However, the worker has the option of utilizing hearing protection.

The employees must wear hearing protection to reduce exposure to noise. If feasible, engineering and administrative controls are considered, and noise levels are not successfully reduced, so they remain below 90 dBA. Hearing protectors must attenuate employee exposure to an eight-hour time-weighted average of 85 decibels or below for employees who have experienced a standard threshold shift.

Audiometric testing program

All university employees 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 the department administrators, managers and supervisors to enroll their employees in the ASU Hearing Conservation Program and the Audiometric Testing Program.

Department administrators, managers and supervisors shall contact a professionally licensed health care provider, PLHCP, — either a qualified physician, otolaryngologist, audiologist or certified technician, such as the ASU Speech and Hearing Clinic — 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 PLHCPs.

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 employee preplacement upon first assignment or within six months of assignment to the noise-designated work area and annually thereafter.
Annual tests following these initial tests will be compared to the baseline test results for all employees who continue to work in high-noise areas. A full evaluation will be conducted to determine the type of hearing loss when the baseline audiometric test reveals a pre-existing 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 hours immediately preceding the audiometric examination. Hearing protection may be worn as a substitute for this requirement. The supervisor should also notify the employee to avoid high levels of nonoccupational noise during this period. Audiograms will be reviewed by a licensed or certified audiologist, otolaryngologist or another qualified physician. Employees will be provided with their audiometric exam results.

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 six months of initial noise exposure.

The PLHCP is responsible 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 audiometric testing program objective is to identify workers beginning to experience hearing loss and allow intervention before the hearing loss progresses. Audiometric testing will be provided to all employees exposed 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 one year of the baseline exam. Annual audiograms must be routinely compared to baseline audiograms to determine if the employee has lost hearing ability, for example, if a standard threshold shift, 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.

The PLHCP will arrange for the employee to retest within 30 days if the annual audiogram shows that an employee has experienced an STS, and the retest results will be used as the annual audiogram. The employee shall be informed of this fact in writing within 21 days of the determination if an STS is indicated. The employee will be referred for a follow-up clinical audiological evaluation if a PLHCP determines the STS may be work-related or aggravated by occupational noise exposure.

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 is required to use them. Employees already using hearing protection shall be refitted 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 engineering control applications. Engineering controls are defined as any equipment modification, replacement or physical change to the noise source or transmission path that reduces the noise level at the employee's ear. Engineering controls such as mufflers on heavy equipment exhausts or air release valves are required where possible.

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

Using engineering and administrative controls should reduce noise exposure to reduce the time-weighted average to 90 dBA. Hearing protectors must attenuate employee exposure to an eight-hour time-weighted average of 85 decibels or below for employees who have experienced a standard threshold shift.

Hearing protective devices — ear plugs, muffs, etc. — shall be the permanent solution only when engineering or administrative controls are considered infeasible or cost-prohibitive.

Hearing protective devices are any device that can be worn to reduce the sound level entering the ear. Departments should make hearing protection available at no cost to employees exposed to TWA noise levels of 85 dBA or greater. Hearing protection will also be provided to employees with routine periodic noise exposures over 85 dBA.

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 that, after being compressed and inserted, expands to form a seal in the ear canal. When properly inserted, they provide noise reduction like 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 noise level that reaches the ear. Their effectiveness depends on an airtight seal between the cushion and the head. Hearing protection should be replaced as necessary.

Employees shall be allowed to select their hearing protection from various 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.

EHS should determine the 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 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 by seven decibels, and the supervisor must determine if this will be enough protection for the employee.

Hearing protection must attenuate lower employee exposure to no more than a TWA noise level of 85 dBA. The adequacy of hearing protection shall be reevaluated whenever employee noise exposure increases 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 having trouble with wearing assigned hearing protection, like irritation of the ear canals or 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 or earmuffs, each employee exposed to noise levels at or above an eight-hour TWA of 85 dBA must receive training. This will be provided to the employees upon their initial work assignment to areas identified as excessively noisy and annually thereafter or upon request.

Workers will be better motivated to participate actively in the program and to cooperate by wearing their hearing protection and taking audiometric tests when they understand the reasons for the ASU Hearing Conservation Program requirements and the need to protect their hearing.

EHS or supervisory personnel knowledgeable of the requirements of the ASU Hearing Conservation Program may provide Hearing Conservation training annually to employees exposed to eight-hour TWA noise exposures of 85 dB and above concerning the:

- ASU Hearing Conservation Program.
- Effects of noise on hearing.
- Common noise hazards.
- Purpose, advantages and disadvantages and attenuation of various types of hearing protection.
- Purpose of audiometric testing and an explanation of the test process.
- Selection, fit, use and care of hearing protection.

A copy of the Occupational Noise Exposure Standard will be made available to employees.

Program evaluation

The program administrator will conduct periodic program evaluations to assess compliance with federal and state regulations and the ASU Hearing Conservation Program requirements. Both the monitoring and audiometric testing portions of the ASU Hearing Conservation Program will be reviewed annually to ensure its quality and effectiveness.

An evaluation of the program will be conducted at least annually, including:

- Field audits of hearing protection use.
- Maintenance of hearing protection devices.
- Record keeping.
- Training records and course content.

Problems identified will be noted in an inspection log and addressed by the program administrator. These findings will be reported to ASU EHS, and the report will list plans to correct deficiencies in the program and target dates for the correction implementation.

Record keeping

Audiometric test records must include:

- Date of test.
- Date of the last acoustic or exhaustive equipment calibration.
- Employee’s most recent noise exposure measurement.

- Employee’s name and job classification.
- Examiner’s name.
- Measurements of the background sound pressure levels in audiometric test rooms.

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 eight-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, 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 sound level measurement.

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

Hearing protective vice: Any device that can be worn to reduce the sound level 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 time period in such a manner that it directly indicates a noise dose.

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

Otolaryngologist: A physician specializing in the diagnosis and treatment of 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 eight-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 micro pascals. Unit: decibels. For use with this regulation, SLOW time response, per ANSI1.4-1971, is required.

Sound level meter: An instrument for sound level measurement.

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 sound level: The sound level, which, if constant over an eight-hour exposure, would result in the same noise dose as is measured.