Tennessee TECH

Environmental Health and Safety

HEARING CONSERVATION PROGRAM

I. Purpose

a. The purpose of this program is to prevent hearing loss for students, staff and employees while engaged in university-sponsored activities.

II. Scope

a. This program shall apply to all employees, students and visitors to the University who are expected to be exposed to noise great enough to cause hearing damage. As a reference, 85 decibels, A-scale, (dBA) for an average of 8-hours per day shall be used. If octave band analysis is used to determine noise exposure, table G-9 in 29 CFR 1910.95 can be used. The provisions for audiometric testing and associated record keeping and training shall not apply to students or visitors. This program shall not apply to individuals attending events on campus for entertainment purposes.

III. Abbreviations and Definitions

a. Abbreviations

ANSI – American National Standards Institute
EHS – Environmental Health and Safety
OSHA – Occupational Safety and Health Administration

b. Definitions

Action Level: An 8-hour time-weighted average of 85 decibels A-weighted (85 dbA 8-hr TWA) established by CAL/OSHA.
Administrative Controls: Methods that limit an employee's exposure time to noise. This includes assigning the employee to less noisy areas in the workplace for a certain length of time so the employee shall not exceed the action level.
Audiogram Testing: Exams that measure the sensitivity of a person's hearing threshold in decibels as a function of frequency.
Audiometer: An instrument for measuring the threshold or sensitivity of hearing.
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: An audiogram obtained after 14 hours of quiet. The audiogram against which future audiograms are compared.
Continuous Noise: Noise levels that vary with intervals of one second or less.
Decibels (dB): A measure of the sound level (loudness). The decibel scale is a logarithmic scale; as an example, a 90 dB noise is ten times louder than a 80 dB noise.
Decibels, A-Weighted (dBA): The A weighted is the scale used for most occupational noise measurements. The A weighting approximates the range of human hearing by reducing the effects of lower and higher frequency noises with respect to the medium frequencies.

Decibels, C-Weighted (dBC): The C weighted scale filters include both high and low frequency noise and are used for impact noise and in the selection of hearing protection.
Engineering Controls: May include purchasing quieter equipment using barriers, damping, isolating, muffling, installing noise adsorption material, mechanical isolation, variations in force, pressure or driving speed or any combination of methods to decrease noise levels.
Frequency: A sound's pitch measured in hertz (hz); high pitches are high frequency sounds.
Hearing Conservation Program (HCP): Program established when employees are exposed to noise exceeding the Action Level. Program must include noise surveys, audiometric testing, hearing protectors, training, and recordkeeping requirements.
Hearing Protection Devices (HPD's): Personal protective equipment that is designed to be worn in the ear canal or over the ear to reduce the sound level reaching the ear drum. Examples include ear muffs or plugs.
Hearing Threshold Level (HTL): The lowest threshold that the employee can hear the test tone during an audiometric test. The HTL's are recorded on the employee's audiogram.
Hertz (Hz): A unit of measurement of frequency, expressed as cycles per second.
Impact Noise: Impact or impulsive noise is defined as noise that reaches a maximum at an interval exceeding one second in duration. The maximum permit impact noise is 140 dBA. The following table shall be used to determine the permissible level of impact noise.
Noise: Unwanted sound.
Noise Dosimeter: An instrument worn by an individual that integrates the sound level exposure over a period of time.
Noise Reduction Rating (NRR): The Noise Reduction Rating of hearing protection devices (HPD) indicates the theoretical amount of reduction of noise levels that can be achieved if the HPD is worn correctly. This rating is shown on the HPD packaging.
Otolaryngologist: A physician specializing in diagnosis and treatment of disorders of the ear, nose and throat.
Permissible Exposure Limit (PEL): 90 dBA 8-hr TWA.
Pitch: Another term for sound frequency. Higher pitches are higher frequency sounds.
Representative Exposure: Measurements of an employee's noise dose or 8-hour time weighted average sound level that is representative of the exposures of other employees in the workplace.
Sound: A vibration or pressure oscillation that is detectable by the ear drum.
Sound Level Meter: An instrument used for the measurement of noise in sound level surveys.
Speech Interference Levels (SILs): The frequencies most associated with speech, which are the 500-4000 hz (frequency) range. Vowels (a, e, i, o, u) are low frequency sounds (below 2000 hz) and consonants (b, c, d, etc) are high frequency sounds. The low frequencies are the least affected by noise. If the high frequencies are affected, t's and p's or s's and f's may be easily confused.
Time-Weighted Average Sound Level (8-hr TWA): That sound level, which if constant over an 8- hour exposure, would result in the same noise dose measured in an environment where noise level varies.
Threshold of Pain: A noise level of 120 dB causes pain.

IV. Responsibilities

a. Department Heads of Employees Who Are Covered by the Hearing Conservation Program
   i. Assure that the authorized individual(s) receive all necessary training to discharge their duties.
   ii. Assure that all equipment necessary to protect the health and safety of the workers are provided and maintained in a good state of repair.
   iii. Enforce the written control program.

b. Environmental Health and Safety
    i. Develop a written control plan and perform a periodic review to determine if revisions are necessary.
    ii. Monitor compliance of the respective departments' compliance with the Hearing Conservation Program.
    iii. Provide guidance and technical assistance to departments in the design and selection of appropriate engineering and administrative controls.
    iv. Provide guidance and technical assistance to departments in the selection of the most appropriate types and quantities of personal protective equipment.
    v. Provide consultation to the departments to assist them in fulfilling their training needs.
    vi. Promote campus compliance with the OSHA Standard.
    vii. Identify, evaluate, and make recommendations regarding those operations and locations requiring hearing protection.
c. Employees
    i. Participate willingly in all training programs offered by the University and learn as much as possible about the Hearing Conservation Program.
    ii. Abide by all rules and apply to the fullest extent possible the safety and health precautions specified by TTU.
    iii. Report any problems that are observed, which could compromise health and safety, to the University administration through their immediate supervisor.
    iv. Maintain his or her hearing protection equipment in a safe and sanitary condition.

V. Determination of Noise Hazards and Monitoring

a. EHS shall conduct periodic survey of the campus to identify equipment, processes and locations that generate substantial noise. Individuals exposed to noise levels exceeding an 8-hour, time-weighted average of 85 dBA shall be included in the Hearing Conservation Program. A sufficient number of measurements shall be taken to account for random fluctuations in employee noise exposure.
b. Sound level survey readings shall be taken to document the findings. In some cases, it may be necessary to use dosimetry to determine the individual's noise exposure. Noise levels shall be checked (monitored) periodically. The frequency of monitoring shall be determined by EHS. Any individual in the University community may request a sound level survey.

VI. Controls

a. Personal protective equipment is considered the last choice with respect to controlling an employee's exposure to a noise source. This fact is based on low employee acceptable and improper use of personal protective equipment. It may be necessary to use several control methods in combination to assure workers' health. Hearing protectors may be used to prevent noise exposure while engineering or administrative controls are being developed. The following controls are arranged in descending order, with the first being the preferred method of control.
b. Engineering controls are the best choice, when feasible, for dealing with an occupational hazard. The first control to consider regarding a noise sources is elimination of the source.

Other engineering controls include equipment that produces lower sound level pressure, shielding or enclosure of equipment.

c. The second control method is known as administrative controls, which are also known as work practices. Examples of this control method involves rotation of workers, providing greater distance between the worker and the noise source, using less power or pressure to accomplish the task.
d. The third control method is personal protective equipment which is also known as hearing protectors. Personal protective equipment can take the form of ear plugs, ear muffs, helmets or circumaural protectors. Some personal protective equipment uses active noise attenuation which is based on generation of a pressure wave that is 180 degrees out of phase with the noise source.

VII. Selection of Hearing Protectors

a. The type(s) of hearing protection used by the employee shall reduce the sound level pressure to an 8-hour, time-weighted average of 85 dbA or less. All hearing protection has a noise reduction rating (NRR) which is expressed in decibels. These ratings were developed under laboratory conditions and do not represent actual use. The measurement of the effectiveness of the hearing protector varies based on whether dBA or dBC is used and whether dosimetry or area exposures are measured. Consult EHS with regards to the field or adjusted NRR.
b. Employees shall be offered several different types of hearing protectors (e.g. plugs, muffs) that meet the necessary sound level attenuation.

VIII. Care, Maintenance and Storage of Hearing Protectors

a. Employee exposed to excessive noise shall be furnished with hearing protection. The University shall provide all necessary hearing protection at no cost to employees. Hearing protectors shall be inspected by the employee before each use for damaged, worn, or missing parts. Hearing protection devices shall be kept in good repair or replaced if unserviceable.

IX. Audiometric Testing

a. Each employee exposed to noise levels in excess of 85 dBA (8-hour average) shall be offered an audiometric test. Employees shall be tested within six months of the date of their initial exposure to a time weighted average of 85 dBA or higher. Tests shall be preceded by at least 14 hours without exposure to noise (work or non-work related). Retesting shall be offered annually.
b. All testing shall be offered the employee at no charge. The initial test shall serve as a baseline against which all subsequent tests are compared. The test shall be administered and reviewed by an individual(s) meeting the requirements set forth in 29 CFR 1910.95.
c. The effects of non-occupational noise exposure, age, disease, and drugs shall be considered during evaluation of the audiograms.

X. Employee Training

a. Employees shall be trained in hearing conservation. Refresher training shall be conducted on an annual basis. Training is available online via the EHS website. The following training requirements are taken from OSHA and ANSI and are be covered during training:

i. Noise hazards and the effects on hearing.
ii. Engineering and administrative controls being used and the need for hearing protectors.
iii. Reasons for selecting a particular type of control.
iv. The function, capabilities, and limitations of the selected hearing protector.
v. The proper fitting of the hearing protector.
vi. Maintenance, inspection, and storage or hearing protectors.
vii. The University's program for hearing conservation.
viii. The purpose of audiometric testing.

b. Acceptable sources of training include courses offered through Environmental Health and Safety, and other courses offered outside the University. Records shall be kept on employees who have been trained in the hearing conservation program.

XI. Recordkeeping

a. Listed below are various records that must be maintained under the hearing conservation program.

Record	Location	Retention Times
Medical Evaluations and Audiograms	Occupational Health Provider	As long as the employee is enrolled in the HCP
Medical Evaluation Results	Supervisor/Department and EHS	As long as the employee is enrolled in the HCP
Hearing Conservation Program manual	EHS and website	On-going
Noise surveys and employee noise monitoring	EHS and/or Supervisor/Department	At least 2 years
Training records	Supervisor/Department	At least 2 years

b. The medical opinion and audiometric testing are considered medical records and shall be kept secure by the employee's department and EHS.
c. Records may be kept in paper or electronic form.

XII. Employee Notification

a. Employees shall be notified, either verbally or in writing, when their noise exposure exceeds a time-weighted average of 85 dBA.
b. Each employee who has experienced a standard threshold shift shall be notified in writing within 21 days of the date of determination. A standard threshold shift shall be defined as an average hearing loss of 10 dBA at 2,000, 3,000, and 4,000 Hz.

XIII. Off-site Noise Hazards

a. Members of the university community shall be covered by this plan when noise hazards are encountered off site. It shall be the responsibility of the dean, director, department head or immediate supervisor to identify employees and students, under their supervision, who may be exposed to high noise levels. EHS is available to assist departments manage off-site hearing conservation programs.
b. Examples of such locations include hand gun certification for University police officers and graduate students' field practice in various industries.

XIV. Standards

OSHA General Industry - 29 CFR 1910.95
ANSI S12.6