



ILLINOIS STATE UNIVERSITY HEARING CONSERVATION PROGRAM



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1. PURPOSE AND SCOPE

In an effort to protect University employees from work-related, noise-induced hearing impairments, the Illinois State University Hearing Conservation Program (HCP) has been established to:

- Identify areas or operations on campus that produce noise levels at or above an eight hour time weighted average (TWA) at or above 85 decibels (dB);
- Administer engineering/administrative controls to reduce workplace noise levels;
- Provide protection against identified hazards, and;
- Provide audiometric evaluations to identify and prevent occupational hearing loss.

Environmental Health and Safety (EHS) will oversee the HCP. EHS will be responsible for conducting personal monitoring and area audiometric monitoring to identify areas and occupations to be included in the HCP. Protection against the effects of noise shall be provided when employees are subjected to sound levels at or above an eight hour TWA of 85 dB. Feasible engineering and administrative controls shall be utilized. If such controls fail to reduce sound levels or are impractical, personal protective equipment shall be provided and used to attenuate noise to acceptable levels.

Occupational groups identified in [Appendix B](#) are included in the HCP. Personal monitoring, work space monitoring, or task-specific monitoring has confirmed that their noise exposures have the potential to be at or above an eight hour TWA of 85 dB during the course of their normal work duties. Those occupations included in the HCP will obtain annual audiometric evaluations and training as required by the Occupational Safety and Health Administration Occupational Noise Exposure standard [29 CFR 1910.95](#).

The dual purpose of audiometric evaluations is to identify noise-induced hearing loss as well as evaluate the effectiveness of existing attenuation practices. Training and education will be provided at the Eckelmann-Taylor Speech and Hearing Clinic, however, departments included in the HCP are ultimately responsible for ensuring that employee education and training is provided and understood. Employee training shall include:

- Effects of noise on hearing, as well as the purpose of hearing protection;
- Advantages, disadvantages, and attenuation of various types of hearing protection devices;
- Instructions on selection, fitting, use, and care of hearing protection devices, and;
- Purpose of audiometric tests and an explanation of test procedures.

2. RESPONSIBILITIES

a. Employees

- Assist EHS staff performing exposure monitoring by sharing knowledge involving equipment, processes, and other relevant information as it pertains to noise exposure;
- Report for audiometric testing as scheduled and complete annual training;
- Notify supervisors of any changes in his/her work environment and activities that he/she believes may produce high noise levels;
- Assist the audiologist by disclosing relevant details of noise exposure history, as well as current ear conditions (ringing in the ear, etc.) or histories of ear disease ([Appendix C](#));
- Utilize hearing protection in high noise areas, and;
- Adhere to all requirements included in the Hearing Conservation Program and corresponding training.

b. Department Directors/Supervisors/Designees

- Evaluate the impact modifying equipment and processes will have on overall noise levels;
- Provide break and lunch areas which reduce workplace noise to levels as low as reasonably achievable;
- As required, provide employees time during their normal work shift to undergo audiometric evaluations;
- Inform employee's of the need to avoid high levels of both occupational and non-occupational noise exposure during the 14 hour period immediately preceding the audiometric evaluation;
- Provide employees a selection of hearing protectors and ensure they are worn when required;
- Promote the use of hearing protection, and;
- Schedule annual audiograms/training for employees in the Hearing Conservation Program.

c. Environmental Health and Safety

- Post signs to identify high noise areas at or above a TWA of 85 dBA;
- Advise on noise reduction through engineering or administrative controls;
- Recommend appropriate hearing protection devices;

- Inform supervisors of employees who have experienced a STS and actions the supervisors are to take as a result of the STS;
- Conduct area and personal noise sampling in order to analyze environmental noise levels and potential worker exposure levels;
- Retain noise exposure measurement records for 2 years;
- Maintain audiologist notification records for the duration of the affected employee's employment, and;
- Audit the Hearing Conservation Program annually to ensure compliance with [29 CFR 1910.95](#).

d. Eckelmann-Taylor Speech and Hearing Clinic

- Arrange audiology appointments with appropriate supervisors or administrative personnel;
- Administer baseline, annual, and follow-up audiograms for employees, as well as review hearing health histories;
- Ensure HCP employees are provided annual HCP training;
- Provide 3M E-A-Rfit Validation System hearing protector fit testing, if requested;
- Compare current and past audiograms to determine presence of standard threshold shifts;
- Conduct all requested follow-up testing and full diagnostic evaluations;
- Send audiologist notification form to EHS and EMPLOYEE within 14 days of determination for all audiogram evaluations, and;
- Retain audiometric evaluation records for the duration of the affected employee's employment.

3. DEFINITIONS

Affected Employee: Individual that is included in the Hearing Conservation Program.

Audiogram: Graph of hearing threshold level as a function of frequency.

Decibel, A-weighted (dBA): Unit representing the sound level measured with the A-weighting network on a sound level meter.

Hearing Threshold Level (HTL): For a specified signal, amount in decibels by which the hearing threshold for a listener, for one or both ears, exceeds a specified reference equivalent threshold level.

High Noise Area: Any area in which an employee can be exposed to 85 dBA or more during a normal 8 hour work shift.

Impact: Single collision of one mass in motion with a second mass that may be in motion or at rest.

Impulse: Product of a force and the time during which the force is applied; more specifically, impulse is the time integral of force from an initial time, the force being time-dependent and equal to zero before the initial time and after the final time.

Intermittent Noise: Noise levels that are interrupted by intervals of relatively low sound levels.

Noise: (1) Undesired sound. By extension, noise is any unwarranted disturbance within a useful frequency band, such as undesired electric waves in a transmission channel or device. (2) Erratic, intermittent, or statistically random oscillation.

Noise Reduction Rating (NRR): The NRR, which indicates a hearing protector's noise reduction capability based upon laboratory estimates, is a single-number rating that is required by law to be shown on the label of each hearing protector sold in the United States.

Standard Threshold Shift (STS): A hearing level change, relative to the baseline audiogram, of an average of 10 dB or more at 2000, 3000, and 4000 Hz in either ear.

Similar Exposure Group (SEG): Group of workers having the same general exposure profile due to the similarity of performed tasks, materials and processes in which they work, and similar work environments.

Temporary Threshold Shift: Temporary increase in the threshold of audibility for an ear caused by exposure to high-intensity acoustic stimuli. Such a shift may be caused by other means such as use of aspirin or other drugs.

Time-Weighted Average (TWA): The averaging of different exposure levels during an exposure period typically over 8 hours.

4. EXPOSURE CONTROL

The identification of noise hazards will be coordinated between affected departments and EHS. Noise monitoring and work space evaluations will be conducted:

- Where it is believed noise exposures have the potential to be at or above 85 dB;
- When employees express a concern about the level of noise in their work area;
- When employees notify EHS of potential noise-induced hearing loss, and/or;
- When an audiogram indicates a standard threshold shift (STS) of 10dB or more.

Re-evaluations of noise exposure will be conducted when changes or additions to equipment, space or operations significantly alter noise exposure that could cause employee exposure at or above 85dBA or render hearing protection inadequate.

Noise hazard evaluations will be based on the results from area noise monitoring, personal dosimeter monitoring, and task-specific monitoring. Area surveys will measure environmental noise levels to identify areas where employee exposures are at or above 85 dB. In situations that involve high worker mobility during a workday, significant variations in sound level, or a significant source of impulse noise that makes area monitoring ineffective, individual sampling using personal dosimeters and task-specific sampling using sound level meters may be warranted. All continuous, intermittent, and impulse sound levels from 80 dB to 130 dB will be integrated into noise measurements. All instruments used to measure employee noise exposure shall be calibrated prior to sampling to ensure measurement accuracy.

Affected employees shall be notified whenever dosimeter monitoring results meet or exceed 85 dBA as an 8-hour TWA. All monitoring shall be performed to meet the standards set by [29 CFR 1910.95\(d\)](#) and compared to known time exposure standards listed in [Appendix A](#).

Employees shall be provided the opportunity to observe monitoring and to have the results of that monitoring explained to them. Requests for noise monitoring or observation of noise monitoring should be directed to EHS. If an employee does not wish to observe monitoring, he/she can choose a representative as a substitute in the observation of noise exposure monitoring. Employees will have access to all monitoring results.

5. ENGINEERING AND ADMINISTRATIVE CONTROLS

No individual may be exposed to a continuous noise level above 115 dB at any time. When employees are exposed to sound levels at or above an 8-hour TWA of 85dB, or if an impact or impulse noise exceeds 140 dB peak sound pressure level [\[\(1910.95\(b\)\(2\) Table G-16\]](#), administrative or engineering controls shall be utilized. The use of engineering/administrative controls will reduce noise exposure to the point where the hazard to hearing is eliminated or at least more manageable. Noise levels will be considered continuous if maximum noise levels occur at intervals of one second or less.

a. Engineering Controls

Engineering controls involve modifying or replacing equipment, or making related physical changes at the noise source or along the transmission path to reduce noise levels at the workers ear. Engineering controls shall be used, whenever possible, to reduce noise exposure by:

- Reducing noise at the source;
- Interrupting the noise path;

- Reducing reverberation, or;
- Reducing structure-borne vibration.

The design of engineered noise controls shall be such as to not interfere with work posture (bending, standing, sitting etc.) or environmental conditions (light, temperature, etc.). Examples of engineering controls include low noise tools and machinery, maintained and lubricated equipment, noise barriers between noise source and employee, and the enclosure or isolation of the noise source.

b. Administrative Controls

Administrative controls are changes in the workplace that reduce or eliminate worker exposure to noise. Examples of administrative controls include limiting the amount of time an individual spends near a noise source, operating noisy equipment when fewer people are exposed, and distancing the worker from the noise source.

Illinois State University has identified multiple groups, including craft trades and that are (by the nature of their work) considered to be susceptible to noise levels equal to or above a time-weighted average of 85dBA. (These groups have been included, carte blanche, into the Hearing Conservation Program and are listed in [Appendix B](#)).

Consequently, all employees in these groups are required to receive annual audiograms and training.

Further, any employee who is exposed to a TWA of 85 dBA or more is required to wear hearing protection. Applicable signage depicted in [Appendix D](#) will be appropriately posted in areas that entail noise levels on campus that are equal to or exceed a TWA of 85 dBA. Employees who are not participating in the Hearing Conservation Program may only work in these areas for the time limit noted on the sign. If additional work is required, it can be accomplished by a different employee or on a different day.

6. AUDIOMETRIC EVALUATIONS

The University shall provide audiometric testing, at no cost to the employee, whose noise exposure is equal to or exceeds 85 dBA as an 8-hour TWA. Audiometric tests will be administered by Eckelmann-Taylor Speech and Hearing Clinic. The audiologist will be responsible for all technicians who perform audiometric tests. Audiometric measuring instruments used for audiometric evaluations shall meet the requirements of [29 CFR 1910.95 Appendix E](#).

Audiometric evaluations will be performed for:

- All employees in groups who are included in the Hearing Conservation Program ([Reference Appendix B](#)).

Audiograms shall be provided to employees noted above:

- Prior to initial assignment in high noise areas;
- Annually, and;
- Upon termination of employment.

a. Baseline Audiograms

Baseline audiograms shall be obtained within six months for new hires in occupational groups identified in [Appendix B](#) and prior to working in high noise areas. Baseline audiogram results shall be compared to future annual audiograms to identify hearing loss which may be work-related.

Employees being tested for baseline audiograms shall not to be exposed to high workplace noise for at least fourteen hours prior to the audiogram. Employees shall also be informed that they should avoid non-occupational high noise exposure fourteen hours prior to the audiogram. If the avoidance of high noise levels cannot be assured, then adequate hearing protection devices can be used to substitute for the fourteen hour noise exposure requirement.

b. Annual Audiograms

Annual and follow-up audiograms will be performed after a valid baseline has been established for those who have been included in the HCP.

c. Audiogram Evaluations

Baseline audiograms shall be compared to annual and follow-up audiograms to identify employees who may be experiencing noise-aggravated Standard Threshold Shifts (STS). Both the individual employee and EHS will be provided written results of the audiogram. If no STS is identified, the Speech and Hearing Clinic will send an audiologist's notification to the employee and EHS. EHS will keep the information on file in order to track affected employees' audiogram conformance. If a STS has been identified by the audiologist, the following protocol is to be followed:

- Speech and Hearing Clinic shall send an Audiologist's Notification form to the individual employee and EHS within 14 days of the determination;
- EHS shall contact the employee's supervisor and advise him that the employee's audiogram has indicated a STS and recommend a re-test within 30 days of the determination, and;
- If accepted by the individual employee, the supervisor shall ensure that the affected employee is rescheduled with the Speech and Hearing Clinic.

If the re-test confirms a STS, the following protocol is to be followed:

- Speech and Hearing Clinic shall send an Audiologist's Notification form to the individual and EHS within 14 working days of the determination;

- The employee will be requested to visit the Speech and Hearing Clinic for a full diagnostic evaluation to determine if the STS is possibly work-related;
- The employee's supervisor must complete an on-line [Accident Report](#);
- EHS will instruct the supervisor to perform an investigation of potential work-related causes for the STS and propose resolutions for each. The supervisor's investigation should include a review of employee compliance with posted High Noise Areas and designated activities requiring hearing protection. It should also pursue the possibility of new equipment or work practices that may be contributing to the employee's hearing loss, and;
- Within 10 days of a confirmed STS, EHS shall re-train the employee on the ISU Hearing Conservation Program and suggest methods of reducing noise exposure.

Audiograms that suggest a persistent STS or indicate that the annual audiogram threshold has improved over the baseline can be revised as a new baseline. Baseline revisions shall be under the discretion of the supervising audiologist.

7. HEARING PROTECTION

University departments are responsible for providing hearing protection to employees required (or requesting) to wear it in posted areas or during activities where noise levels meet or exceed an 8-hour TWA of 85 dBA. Department supervisors will be responsible for ensuring that hearing protection is worn by employees when required. The use of hearing protection will be mandatory when:

- Noise exposure meets or exceeds an 8-hour TWA of 85 dBA or greater;
- An employee in the HCP group is without a baseline audiogram within the first six months of employment and is assigned to work in a high noise area or perform high noise tasks, or;
- An employee has experienced a STS.

Evaluations for the determination of hearing protection and its corresponding attenuation will be in accordance with [29 CFR 1910.95 Appendix B](#). Hearing protectors must attenuate noise to at least 85 dB. If a STS has been identified, the hearing protectors used must be effective enough to attenuate sound levels to 80 dB.

a. Hearing Protector Fit Testing

Employees have the opportunity to select hearing protectors that will provide them with the proper attenuation (below 8-hour TWA of 85 dBA). The University offers a selection of 3M ear plugs in which fit and attenuation can be evaluated with a 3M E-A-Rfit Validation System at Eckelmann-Taylor Speech and Hearing Clinic. Selection of hearing protection is based upon individual fit and manufacturer's quality testing

indicating the likely protection that they will provide to the properly trained wearer. Hearing protector attenuation is evaluated using the manufacturer Noise Reduction Rating (NRR) and hearing attenuation validation system.

When using NRRs to assess hearing protector adequacy, one of the following methods must be used:

- Dosimeter
 - Convert A-weighted dose to TWA, subtract 7 dB from NRR, and subtract remainder from A-weighted TWA to obtain estimated A-weighted TWA under the ear protector.
- Sound Level Meter
 - Obtain employee's A-weighted TWA, subtract 7 dB from NRR, and subtract remainder from A-weighted TWA to obtain estimated A-weighted TWA under the ear protector.
- Area Monitoring Procedures with Sound Level Meter
 - Obtain representative sound level for area in question, subtract 7 db from NRR, and subtract remainder from A-weighted sound level for that area.

8. EDUCATION AND TRAINING

Employees will participate in annual training and education as related to the HCP. Eckelmann-Taylor will provide annual education and training for HCP employees during annual audiogram appointments. Any modifications in work processes or in equipment that could increase the risk of high noise exposure should be communicated to affected employees. Training will include:

- The effects of noise on hearing;
- The purpose, advantages, disadvantages, and attenuation of various types of hearing protectors;
- Instructions on the use, fitting, and care of hearing protectors, and;
- An explanation of procedures in audiometric testing and the purpose of the testing as it relates to the identification of noise-induced hearing loss.

9. RECORDKEEPING

Noise exposure measurement records shall be retained for two years by EHS. These records will be provided, by request, to the Eckelmann-Taylor Speech and Hearing Clinic so an accurate noise exposure evaluation can be completed for each affected employee. Audiometric evaluation records shall be retained by the Speech and Hearing Clinic for the duration of the affected employee's employment. In the event that an employee finds employment outside of the University, his/her records will be made available to the successor employer. Furthermore, all records shall be made available upon request for former

employees, current employees, or representatives appointed by employees within 2 working days.

The responsibilities associated with recordkeeping are as follows:

Record	Location	Retention Time
Baseline and Serial Audiograms	Speech and Hearing Clinic	Duration of employee's employment
Case History	Speech and Hearing Clinic	Duration of employee's employment
Audiologist's Notification	Environmental Health and Safety; Speech and Hearing Clinic	Duration of employee's employment
Hearing Conservation Program	Environmental Health and Safety	On-going
Noise Surveys and Employee/Task Noise Monitoring	Environmental Health and Safety	At least 2 years
Audiometric Test Room Sound Pressure Level Certifications	Speech and Hearing Clinic	Annually

Audiometric evaluation records retained by Environmental Health and Safety will include:

- Name and job classification of employee;
- Date of the audiogram;
- Date the audiometer was last calibrated;
- The employee's most recent noise exposure assessment (case history), and;
- The examiner's name;
- Audiogram results, and;
- Audiologist's notification.

a. Injury Reporting

According to [1904.10 "Recording criteria for cases involving hearing loss"](#), if an employee's hearing test reveals that the employee has experienced a work-related STS of hearing in one or both ear(s) AND the employee's total hearing level is 25 dB or more above audiometric zero (averaged at 2000, 3000, and 4000 Hz) in the same ear(s) as the STS, the case must be recorded on the OSHA 300 log. The employee's supervisor will be notified by EHS and he/she will enter the injury as an [Accident Report](#) on the on-line accident reporting system as an OSHA recordable injury. If an employee experiences a confirmed STS in one or both ears that is not OSHA recordable, EHS will notify the supervisor that a non-OSHA recordable injury report must be submitted.

Appendix A: Maximum Daily Noise Exposure Durations for HCP Employees

A-weighted sound level, L (dB) Reference
Duration T, (hour)

80	16
81	13.9
82	12.1
83	10.5
84	9.1
85	8
86	6.9
87	6
88	5.2
89	4.5
90	4
91	3
92	3
93	2.6
94	2.2
95	2
96	1.7
97	1.5
98	1.3
99	1.1
100	1
101	0.8
102	0.75
103	0.65
104	0.57
105	0.5
110	0.25
115	0.125
120	0.063
125	0.031
130	0.015

In the above table, the reference duration (T) is computed by: $T=8/2^{(L-85)/5}$, where L is the measured A-weighted sound level.

Appendix B: Occupational Groups Included in Hearing Conservation Program

- Heating Plant
 - Assistant Chief Engineers
 - Automation Technicians
 - Pipefitters
 - Refrigeration Mechanics
 - Stationary Engineers
 - Stationary Firemen
 - Stationary Firemen Helpers
 - Water Operators
- Grounds
- Carpenters
- Electricians
- Machinist/Welder
- Painters
- Plumbers
- Printing Services
- Recycling

Appendix C: Hearing Health History Form

ECKELMANN-TAYLOR SPEECH & HEARING CLINIC Hearing Conservation Program Hearing Health History

Employee Name: _____ Current Date: _____

Date of Birth: _____ Department: _____ Campus Box _____

UID: _____

Do you use Hearing Protection Devices (HPDs)? Yes No

Type of HPD: _____

Time of Last Exposure: _____

Please answer the questions below:	Yes	No	Comments
Do you have or have you ever had draining ears?			
Have you had previous hearing tests?			
Do you have a known hearing loss?			
Have you ever had a head injury?			
Has anyone in your family had hearing loss before the age of 50?			
Do you have ringing in your ears?			
Have you had exposure to firearms?			
Have you had noise exposure at a previous job?			
Are you taking any medications known to be ototoxic?			
Do you have sinus, allergy or cold problems today? Chronic?			
Do you hear better in one ear than the other? If so, which ear?			
Do you have any dizziness? Is this a recent occurrence?			
Circle any of the following noisy hobbies that you have: loud music, farming, aircraft, stock cars, power tools, chain saws, snowmobiles or powerboats.			
Do you have fullness in your ears or numbness in your face?			
Circle any of the following that you have had: mumps, measles, scarlet fever, chicken pox, or meningitis.			
Is there any other aspect of your hearing health history that we should be aware of?			

***DO NOT SEND THIS FORM TO ENVIRONMENTAL HEALTH AND SAFETY**

Appendix D: High Noise Area Signage

HIGH NOISE AREA

Noise levels in this area approach __ decibels.
Only personnel who are wearing hearing protection
AND included in the Hearing Conservation Program may
work in this area for more than __ hours per 8-hour
shift.

ISU Environmental Health and Safety

HIGH NOISE AREA

Noise levels within __ feet of this equipment approach
__ decibels.
Only personnel who are wearing hearing protection
AND included in the Hearing Conservation Program may
work in this area for more than __ hours per 8-hour
shift.

ISU Environmental Health and Safety