

# **Hearing Conservation Program**

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# 1 Introduction

Temporary and permanent hearing loss can result from exposure to hazardous noise levels. The University of Nebraska-Lincoln (UNL) Hearing Conservation Program (HCP) is designed to protect workers from developing occupational noise-induced hearing loss. This is accomplished by identifying employees who may be exposed to hazardous noise levels by monitoring noise levels, requiring noise controls when appropriate, requiring the use of hearing protection devices (HPDs) when necessary, audiometric testing, and employee training. Associated records are maintained to demonstrate implementation and facilitate review of the HCP.

## **1.1 Regulatory Authority**

The UNL Hearing Conservation Program was developed in accordance with regulations of the State of Nebraska Department of Labor, Title 230, Chapter 6 – Workplace Safety Consultation Program, which references federal Occupational Safety and Health Administration (OSHA) standards. For the purpose of hearing protection, the applicable OSHA General Industry Standard is 29 CFR 1910.95 – Occupational Noise Exposure.

## **1.2 Application**

The UNL HCP applies to all UNL employees who, in the course of their employment, are exposed to noise levels of 85 decibels or greater based on an eight (8) hour time weighted average (TWA) regardless of the number of days of exposure per year. While the OSHA General Industry standard does not apply to agriculture and construction workers, UNL requires all employees whose exposures exceed OSHA's action limit to fully participate in the HCP, regardless of assigned job duties. This is consistent with OSHA's General Duty Clause and recognition of noise exposure as an occupational hazard.

## **1.3 Program Overview**

Program elements, which are discussed in Section 2 of this program document, include:

- Assessing and monitoring of noise exposures
- Control of noise sources
- Personal Protective Equipment
- Postings
- Training
- Audiometric testing and evaluation (hearing tests)
- Recordkeeping and program evaluation

Roles and responsibilities of UNL employees with respect to the HCP are discussed in Section 3.

## **2 Program Elements**

### **2.1 Assessing and Monitoring of Noise Exposures**

The primary purposes for conducting noise assessments are as follows:

- Define areas where essentially any time spent in the area by an employee will likely result in noise exposures that exceed occupational exposure or action limits.
- Identify employees who are required to participate in the UNL HCP because their individual exposures exceed occupational or action limits.
- Select appropriate hearing protectors based on knowledge of the noise source/level/work environment and other pertinent considerations.

The EHS Department is responsible for conducting noise exposure assessments, which consists of an area noise survey, personal dosimetry survey, or both.

#### **2.1.1 Assessment Frequency**

A noise exposure assessment (or re-assessment) must be completed where there is potential for employees to be exposed to noise levels in excess of occupational exposure or action limits. While the list below is not exhaustive, the need for an exposure assessment (or re-assessment) may be triggered by any of the following:

- Employee or supervisor reported noise concerns, including reporting of such as an exposure factor in an employee's job description..
- Difficulty hearing conversations while at or near a noise source or ringing in the ears after removal from the source.
- Use of equipment or operations typically associated with hazardous noise levels such as or similar to those described in Appendix A, as reported by employees, supervisors, or detected through routine EHS work area safety surveys.
- An employee(s) already enrolled in the UNL Hearing Conservation Program experiences a confirmed occupationally-related standard threshold shift.
- Equipment or use conditions documented during a previous noise hazard assessment have changed (e.g., different or additional high noise producing equipment, an increased exposure duration or frequency, etc.).

Supervisors of employees who may be exposed to potentially hazardous noise levels must notify EHS to initiate noise monitoring. Supervisors who have previously arranged for noise monitoring must also notify EHS to initiate re-monitoring in the event of process, facility design, or equipment changes that may increase noise levels or exposures, or if the designated hearing protection device(s) is/are suspected of being inadequate. EHS may also initiate noise hazard assessments when a work area survey or other observation indicates that noise to which an employee may be exposed has the potential to exceed occupational or action limits.

#### **2.1.2 Area and Personal Noise Monitoring**

Two basic types of noise monitoring are used at UNL: area noise monitoring and personal noise dosimetry. Area monitoring may be used to define boundaries where

even short periods of exposure may result in dose in excess of occupational or action limits. Local/area monitoring is also used as the preferred method to estimate an employee's total dose, unless this method is not feasible for providing accurate data. When used to estimate an employee's total dose, noise levels from all contributing sources and the time of exposure for each are used to calculate a worst-case combined dose.

Personal noise dosimetry is reserved for those cases where area/local monitoring is ineffective in estimating an employee's dose because it is difficult to obtain accurate readings over an entire work shift due to the sensitivity of the instrument to bumps and wind that can greatly skew the data. Regardless of the type of monitoring (area/local or personal) all continuous, intermittent, and impulse sound levels from 80 to 140 dB are integrated during sound pressure measurements.

Following noise monitoring, EHS will notify monitored employees and any employees that might be similarly exposed of the monitoring results, recommendations relating to inclusion in the hearing conservation program, and controls.

## **2.2 Control of Noise Sources**

Whenever feasible, engineering (source) and administrative controls must be implemented to reduce noise exposures. Personal Protective Equipment (PPE) is used only as a supplement to feasible engineering and administrative controls. Engineering controls include, but are not limited to: maintenance, modification, or substitution of equipment; isolation of noisy equipment from surrounding areas; and utilization of acoustic materials. Administrative controls include, but are not limited to: segregation of work processes and noisy areas; job rotation/scheduling; and equipment design/purchase policies regarding maximum noise levels.

PPE, as an additional control, must be used when engineering and administrative controls are not feasible or completely effective in reducing an employee's exposure to less than an action level of 85 dB expressed as an 8-hour TWA. PPE is not a substitute for feasible engineering and administrative controls.

## **2.3 Personal Protective Equipment (PPE)**

When feasible engineering and administrative controls do not reduce an employee's exposure to less than the action limit, hearing protectors must be used. Selection of a specific and appropriate hearing protection device should consider the operation, employee preference, and attenuation required. EHS is responsible for evaluating suitability of various hearing protector options; supervisors/departments are responsible for costs associated with providing hearing protectors to affected employees. Employees are responsible for proper use of hearing protectors, including keeping them clean and maintained to ensure maximum effectiveness.

## **2.4 Posting**

While not required by regulation, EHS strongly encourages the posting of caution signs to warn employees of areas characterized by noise levels in excess of 115 decibels

(since at this level even very short duration exposures, e.g., 15 minutes or less) can result in exposures in excess of occupational action or exposure limits. This may be accomplished with the EHS door posting program or standard placards. The “potentially hazardous noise area” may encompass a whole room or, as in many cases, an area in front of or near noise producing equipment. In cases where hazardous noise areas do not encompass a whole room, the affected area should be clearly demarcated.

## **2.5 Training**

Employees who are exposed to noise levels in excess of the OSHA action limit must be enrolled in the HCP and participate in initial and annual training. Training is administered by EHS and includes instruction regarding the effects of noise; the purpose, advantages, and disadvantages of various types of hearing protectors; proper selection, fit, and care of personal hearing protectors; purpose and procedures of audiometric testing; and information specific to the employee’s exposure scenario, as applicable (i.e., engineering and administrative controls, requests for replacement hearing protection devices, reporting of suspected or known failures of hearing protectors, etc.). At a department’s discretion, EHS web-based training may be used to fulfill annual re-training requirements.

## **2.6 Audiometric Testing and Evaluation**

Audiograms measure hearing thresholds at speech frequencies, and are capable of detecting hearing losses before they become apparent to the subject. UNL employees who are required to participate in the HCP must receive an initial audiogram within six months of hire or assignment to job functions with exposures of 85 dBA 8-hr TWA or greater. The time period for the initial audiogram can be extended to one-year, if using a mobile test van. Audiometric testing and evaluation is not required for temporary employees who are appointed to a single term of six months or less (or one year, if using a mobile test van) provided that the employee fully participates in all other elements of the HCP (e.g., training, PPE use).

At their discretion, supervisors may allow employees who are not occupationally exposed to noise in excess of the OSHA action or exposure limits to participate in the annual audiogram program. However, by so doing, the supervisor agrees to all follow-up actions as described in UNL’s Hearing Conservation Program if an employee who is participating on a voluntary basis demonstrates a suspected or confirmed STS, including but not limited to follow-up audiograms.

Audiograms must be conducted by a licensed or certified Audiologist, or by a technician who is certified by the Council of Accreditation in Occupational Hearing Conservation, or who has satisfactorily demonstrated competence in administering audiometric examinations, obtaining valid audiograms, and properly using, maintaining, and checking calibration and proper functioning of the audiometers being used. At UNL, the audiograms are generally scheduled in consultation with the Occupational Medicine Provider (Company Care, as of the date of this document) or the Barkley Center. Prior to the audiogram, employees must be instructed/reminded to avoid noise exposure for fourteen (14) hours preceding the test. Supervisors should make every

effort not to assign employees to potentially hazardous noise levels in the 14 hours prior to the scheduled test. If scheduling is not feasible, hearing protectors must be used to avoid excessive noise exposures prior to the audiogram.

Individual hearing test results will be communicated to the employee by the attending technician or physician. When review by a licensed or certified audiologist or physician indicates a standard threshold shift (STS), the employee should be retested within 30 days from the first audiogram. Supervisors must provide copies of the audiograms promptly to EHS. EHS is responsible to notify supervisors and employees when the audiogram indicates a possible STS. Supervisors are then responsible to ensure that the employee is re-tested.

If a STS is confirmed by the second test, and the physician determines that the hearing loss is occupationally-related, the employee must be fitted or refitted with adequate hearing protectors, re-trained, and required to use the proper hearing protectors. EHS is responsible for the selection and training related to hearing protectors. If the reviewing physician determines that the hearing loss is not thought to be work related, the employee will be notified and advised to seek medical attention.

Departments are responsible for all costs associated with testing, evaluation, and purchase of hearing protection devices. However, costs associated with non-work related hearing loss is not the responsibility of the University of Nebraska-Lincoln.

## ***2.7 Recordkeeping and Program Evaluation***

EHS will maintain the following records for the duration of an employee's employment with UNL: Noise Hazard Assessment forms; notifications to employees; and audiometric tests. EHS will periodically (at least every two years) review and evaluate the UNL Hearing Conservation Program and update/revise it as necessary.

# **3 Responsibilities**

## ***3.1 Department Heads/Chairs***

- Implement feasible engineering and/or administrative controls to reduce employee noise exposures to less than 85 dBA 8-hr TWA. Implement the UNL Hearing Conservation Program at the department level and ensure that all affected employees fully participate when engineering and/or administrative controls fail to reduce noise exposures below 85 8-hr dBA TWA.
- Enforce requirements of this program within the reporting unit.
- Implement planned financial support for the Hearing Conservation Program within the reporting unit (e.g., purchase of hearing protectors, audiograms, etc.).
- Consider noise levels when purchasing new equipment, designing new facilities, or modifying existing facilities.

### **3.2 Supervisors**

- Identify noisy operations/areas/equipment and affected employees that may fall within the purview of the UNL Hearing Conservation Program and report these findings to EHS for evaluation and monitoring. Notify EHS promptly of changes, particularly changes that may increase an employee's potential exposure and when it is suspected that the hearing protectors used are insufficient or ineffective.
- As advised by EHS, maintain placards and demarcation that identifies potentially hazardous noise areas.
- As advised by EHS, provide hearing protectors at no cost to the employee, and, to the extent reasonable, accommodate personal preferences in the selection of specific hearing protection devices.
- Ensure affected employees fully participate in the UNL Hearing Conservation program.
- Arrange/schedule initial, annual, and follow-up audiometric testing for affected employees and provide them with written notification of the test date, time, and location, as well as instruction to avoid hazardous noise for fourteen (14) hours preceding the test. To the extent feasible, avoid assigning employees to hazardous noise areas/tasks for fourteen (14) hours preceding audiometric testing. Forward copies of audiograms to EHS promptly.
- Enforce the proper use of appropriate hearing protection devices by employees who are required to participate in the UNL Hearing Conservation Program, and implement appropriate disciplinary procedures in accordance with UNL Human Resource Policies for employees who do not comply with the requirements of this program.

### **3.3 Employees**

- Fully participate in the UNL Hearing Conservation Program, as well as associated policies and/or procedures, administrative controls, etc.
- Use and maintain hearing protection devices in accordance with training and specific procedures established for the work site(s).
- Immediately report to the supervisor suspected or known deficiencies or malfunctions of hearing protection devices.
- Inform the supervisor of operations or areas that may pose a noise hazard unless the operation or area is known to have been previously evaluated by EHS and no changes have occurred since that evaluation that would substantially change the noise level or exposure.
- Complete audiograms and training at the required frequency.
- Notify supervisor of known or suspected hearing losses.

### **3.4 Environmental Health and Safety (EHS)**

- Administer the UNL Hearing Conservation Program.
- Provide technical support to management, supervisors, and employees.



- Evaluate equipment, areas, operations, etc. and measure noise levels and exposures when potentially hazardous noise levels are suspected.
- Provide written notification to employees of noise hazard assessments.
- Conduct routine program evaluations to determine the effectiveness of the program and revise the program as necessary.
- Review annual audiograms and implement follow-up actions.
- Maintain records described in Section 2.7.

### **3.5 Audiogram Provider**

- Provide audiogram testing in accordance with 29 CFR 1910.95 and the UNL Hearing Conservation Program.
- Communicate results of audiogram testing to the employee and their supervisor. The communication should include advice for re-testing and further medical evaluation to determine if the STS is work-related. Refer the employee to a personal physician if it is determined that the STS is not work-related.

## **4. Special Noise Exposures**

### **4.1 Headsets**

Noise overexposure in the workplace can occur where employees wear a communications headset as part of their employment. Clerical personnel, emergency personnel, reservation clerks, receptionists, and telephone operators are just a few examples of employees who may be exposed to hazardous noise levels via communications headsets. For a person wearing a sound-generating headset, the sound/noise exists predominantly between the ear drum and the headset. Because of the amplification properties of the human ear, the sound that exists inside the ear while wearing a headset is quite different from ambient levels.

Headsets can be categorized in two basic groups: those without any form of electronic limiting device and those with some form of limiting device built into the headset. Most modern telecommunication headsets use sophisticated limiting circuits, while headsets for special applications (for example, Walkman™ head-sets) do not. Headsets that contain acoustic limiting devices that are functioning as they were designed have been shown in both laboratory and field tests to provide sufficient protection to maintain employee noise exposures below OSHA permissible noise levels. However, headsets without limiting devices have, in some work environments, caused employee noise exposures to exceed safe levels. Therefore, at UNL headsets required for job functions must be equipped with limiting devices.

### **4.2 Ultrasonic Noise**

Sound frequencies outside of the typical audible range of humans (below 20 Hz or above 20 kHz) are beyond the scope of the UNL HCP.

## Appendix A

### ***Equipment and Operations Commonly Associated with Hazardous Sound Levels***

- Feed mill operations (i.e., augers, grinders and pallet mills)
- Operation of powered wood working equipment (i.e., table saws, circular saws, cordless saws, chop saws, panel saws, miter saws, radial saws, routers, belt sanders, pneumatic planers, joiners, grinders, pneumatic nail guns, etc.)
- Operation of sheet metal shop equipment (i.e., belt sanders, electric sheavers, pneumatic drills, etc.)
- Operation of key cutting equipment (i.e., grinders, cutters, etc.)
- Operation of electrical shop equipment (i.e., wheel or brush grinders, compressed air, etc.)
- Operation of refrigeration shop equipment (i.e., grinders, bead blasters, etc.)
- Operation of plumbing shop equipment (i.e., grinders, sand blasters, band saws, pipe threaders, air compressors, chop saws, etc.)
- Operation of vehicle maintenance shop equipment (i.e., impact wrenches, paint booth, etc.)
- Operation of powered lawn, garden, and/or farming equipment (i.e., lawn mowers, skid steer loaders, weed trimmers, chain saws, etc.)
- Operation of land-moving equipment (e.g., bulldozer, skid-steer loader, etc.)
- Operation of geoprobe
- Operation of garbage trucks
- Operation of enclosed swine facilities
- Operation of power washers
- Operation of fork lifts
- Utility plant boiler-related operations
- Rock processing operations (i.e., polishers, saws, grinders, etc.)
- Operation of press machines such as printing equipment and metal fabricator

## Glossary

**Attenuation:** A reduction in noise.

**Audiogram:** A chart, graph, or table resulting from an audiometric test showing an individual's hearing threshold levels as a function of frequency. Audiograms shall be pure tone, air conduction, hearing threshold examinations, with test frequencies including at a minimum 500, 1000, 2000, 3000, 4000, and 6000 Hz. Tests at each frequency shall be taken separately for each ear.

**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.

**Continuous or Intermittent Noise:** Sound of greater than one second or longer in duration.

**Decibel (dB):** Unit of measurement of sound level. When expressed as dBA, this is the measurement taken with weighting of the A-rating scale.

**Exchange Rate:** The relationship between an increase (or decrease) in sound level and the corresponding change in allowed exposure duration. UNL uses a 5 dB exchange rate (i.e., when the sound increases by 5 dB the allowable exposure time is halved).

**Impulse or Impact Noise:** Sound of one second or less in duration.

**Noise Dose:** Measured noise, expressed as a percentage, corresponding to the criterion sound level (90 dBA).

**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.

**Noise Reduction Rating (NRR):** An attenuation index that represents the overall average noise reduction in decibels provided by personal hearing protective devices.

**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, measured in decibels (dB) on the "slow" time response.

**Sound Level Meter:** An instrument for the measurement of sound level.

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

**Time-Weighted Average Sound Level:** That sound level, which if constant over an 8-hour exposure, would result in the same noise dose as is measured.