ENVIRONMENTAL HEALTH AND SAFETY
University of Nebraska-Lincoln

Safe Operating Procedure

(Revised 10/25)

HEARING CONSERVATION

Introduction

Exposure to hazardous levels of noise can result in temporary or permanent hearing loss. Employees can protect themselves from noise-induced hearing loss by following the guidance in this SOP.

Effects of Noise

Exposure to moderate to loud noise levels will inevitably cause hearing loss over time because of damage to nerves in the inner ear. The body can generally repair some damage, particularly when caused by short exposures to moderate sound pressures. However, permanent damage is more likely to occur with long-term exposure to hazardous noise levels, or short term exposure to very high noise levels.

The risk of hearing impairment is primarily related to the intensity of the noise (sound pressure, measured in decibels or dB); type of noise (frequency spectrum); period of exposure each day; and total work duration. The human ear is most sensitive to high frequency sounds as opposed to low frequency sounds, and can distinguish only a certain range of sound frequencies. To account for this discrimination and sensitivity, most sound meters are calibrated to the A-scale, which attenuates very low frequency sounds. Therefore, sound pressure measurements are usually expressed as dBA. The higher the decibel reading, the more intense the sound pressure.

Time of exposure is also a consideration. Short-duration exposure carries less risk of hearing impairment than long duration exposure to the same sound pressures. Therefore, the U.S. Occupational Safety and Health Administration (OSHA) occupational exposure and action limits are expressed as 8-hour Time Weighted Averages. OSHA requires employers to establish an effective Hearing Conservation Program (HCP) when an employee's exposure to noise exceeds an 8-hour Time Weighted Average (TWA) of 85 dBA (action limit).

To put this into perspective, normal conversation is generally about 60 dBA; a belt sander produces about 93 dBA of sound; and an ambulance siren is about 120 dBA. OSHA's TWA accounts for the fact that an employee may not be exposed to a constant level of sound for the entire work day. In general, the higher the sound level, the less time that an exposure can occur without increased risk of hearing damage. In general, for every 5 dBA increase in sound pressure, the exposure time is reduced in half (this is referred to as the exchange rate). For

example, OSHA's action level of 85 dBA is based on an 8-hour work day. If the sound pressure is raised to 90 dBA, an equivalent exposure time is 4-hours. At 110 dBA, an equivalent exposure time is 30 minutes.

Protecting Against Hearing Loss

As required by OSHA regulations, The University of Nebraska-Lincoln has established a Hearing Conservation Program (HCP), which is designed to protect employees from the hazards of exposure to noise in excess of occupational action and exposure limits. Major elements of the university HCP include the following:

- Evaluation and measurement (monitoring) of exposures
- Audiometric testing
- Training
- Controls

Each of these major program elements are summarized below. The full HCP document is available from EHS upon request and is also on the EHS website.

Regulatory

The Occupational Health and Safety Administration (OSHA) Hearing Conservation Program (HCP) regulations apply to employees regularly exposed and those occasionally exposed to noise in excess of the action limit, even if only one day a year. An employee who has not been exposed to noise in excess of the action limit can be removed from the University of Nebraska-Lincoln HCP after one year if not expected to be exposed to noise in the future. Should that situation change, the worker would then need to again be added to the university HCP.

Noise Monitoring

In general, noise monitoring should be conducted when it is suspected that an employee's exposure to noise exceeds occupational action or exposure limits. This is generally triggered by one of the following:

- Employee complaints related to sound levels.

- Difficulty in hearing conversations while at or near a noise source or ringing in the ears after removal from the source. In general, if two people who are three (3) feet apart must shout to be heard, the background noise is probably above occupational action limits.

- Presence of equipment or operations commonly associated with increased sound levels, such as grinders, table saws, circular saws, belt sanders, pneumatic hand tools, bead blasters, air compressors, tractors, mowers, chain saws, power washers, polishers, boilers, etc.

EHS conducts noise monitoring to measure actual sound levels and exposures. If monitoring indicates that an action level is exceeded, affected employees are enrolled in the UNL HCP. Existing noise monitoring and assessment information is periodically verified by EHS.

Audiometric Testing

Employees subject to the UNL Hearing Conservation Program must receive a baseline audiogram within six (6) months of assignment to tasks that mandate their participation in the UNL HCP. This timeframe can be extended to one (1) year if a mobile test van is used for audiograms. Employees enrolled in the program must receive an audiogram annually thereafter. Audiograms are provided at no cost to employees who are required to participate in UNL's HCP. Supervisors provide information to employees regarding scheduling of audiograms. Employees must refrain from exposure to hazardous noise levels for (14) hours preceding the test. If necessary, this can be accomplished by using hearing protection.

The importance of the audiogram cannot be overstated. It is a means of objectively measuring whether hearing loss is occurring. An audiogram can detect early stages of hearing loss, while steps can still be taken to prevent further deterioration. It can also be useful in detecting medical conditions of the ear unrelated to noise exposure. During the audiogram, the attending physician/technician will test the ability of an individual to detect sounds in each ear at various frequencies, while providing protection from background noises. The results are then compared to previous test results to determine if a hearing loss is indicated. For OSHA purposes, a significant change is referred to as a Standard Threshold Shift (STS), and is defined as 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. The results of the audiometric testing are communicated to each worker and their supervisor by the attending technician or physician and/or EHS.

Additional information regarding the audiogram and information it contains is available in the National Institute for Occupational Safety and Health (NIOSH) publication, **Inquiring Ears Want to Know: A Fact Sheet About Your Hearing Test**, available on the NIOSH web site.

If an STS is detected through the audiogram process, an employee will be scheduled for a second confirmatory test. They may also be referred to a physician if the impairment may be related to something other than noise exposure. The cost for visiting a personal physician for non-work related hearing loss is not the responsibility of the University or employing department.

EHS will reassess an employee's exposure, and if necessary, repeat noise level monitoring, in response to a confirmed occupational hearing loss to determine if the assigned hearing protectors are adequate. EHS will also provide for re-fitting of hearing protectors and re-training.

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 this SOP and 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.

Training

Employees included in the Hearing Conservation Program receive initial and annual training. Instruction is provided on the following: effects of exposure to noise; purpose, advantages and disadvantages of various types of hearing protection devices; selection, fit and care of hearing protection devices; purpose and procedures of audiometric testing; and work/exposure specific information (e.g., specifically assigned hearing protectors, noise sources and levels, noise controls, relevant changes since the last training, etc.).

Hearing Protectors

Hearing protection must be provided to and worn by workers exposed to noise levels in excess of the OSHA action limit (85 dBA- 8 hour TWA). The cost of hearing protectors is the responsibility of the employer. Based on exposure data, EHS will provide recommendations for hearing protectors that will provide sufficient attenuation. EHS will also instruct employees on proper use and care of assigned hearing protectors. For additional information related to hearing protectors, see the EHS SOP, **Personal Hearing Protection Devices**.

Additional Information

A copy of the OSHA regulations, 29 CFR 1910.95, **Occupational Noise Exposure** can be obtained from EHS upon request or from the OSHA web site. The OSHA website also provides helpful tools and other information related to hearing protection.

The NIOSH website also contains resources and information.