North Dakota State University
Noise/Hearing Conservation

I. Introduction

A number of job functions at NDSU may require varying degrees of hearing protection against the effects of hazardous noise. When specific levels of noise are exceeded, we need to identify and acknowledge the degree of hazard and the required protection.

II. Purpose

To identify a policy, procedure and instructions regarding a Noise/Hearing Protection Program for NDSU employees.

III. Goal

To prevent occupationally related hearing loss that may result from exposure to hazardous noise.

IV. Definitions

1. **Administrative Control -** any procedure that limits noise exposure by control of work schedules.
2. **Audiogram** - a chart, graph, or table resulting from an audiometric test. It shows an individual's hearing threshold level as a function of frequency (Hz).
3. **Decibel** - a unit of measurement of sound pressure level. The decibel level of a sound is related to the logarithm of the ratio of sound pressure to a reference pressure. The dB has meaning only when the reference is known.
4. **Dosimeter** - instrument that stores sound level measurements and integrates these measurements over time, providing an average noise exposure reading for a given period of time, such as an 8-hour work day. It is worn by the employee, measuring noise levels in those locations in which the employee travels.
5. **Engineering Control** - any mechanical device, physical barrier, enclosure or other design procedure that reduces the sound level at the source of noise generation or along the path of propagation of the noise to the individual. This **does not include** protective equipment such as ear muffs, plugs, or administrative controls.
6. **Noise -** unwanted sound.
7. **Noise Dose** - a measure of cumulative noise exposure over a stated period which takes into account both the intensity of the sound and the duration of the exposure.
8. **Time-Weighted Average (TWA) Sound Level** - the sound level which, if constant over an 8-hour workday exposure, would result in the same noise dose as is measured.
9. **Sound Level Meter** - measures the intensity of sound at a given moment. It provides a measure of sound intensity at only one point in time, making it necessary to take a number of measurements at different times during the day to estimate noise exposure over a workday. If noise levels fluctuate, the amount of time noise remains at each of

the various measured levels must be determined.

V. Permissible Exposure Limits

Continuous Noise - Measured on the A-Scale of a standard sound level meter set at slow response

Impulse/Impact Noise - Peak sound pressure level

Duration (Hours)	Sound Level (dBA)	Sound Level (dBP)	Permitted Impacts/ Impulses per Day
8	85	140	100
4	90	130	1000
2	95	120	10000
1	100		
0.5	105		
0.25	110		
0.125 or less	115		

VI. Noise Monitoring

Noise monitoring/measuring must be conducted only when exposures are at or above 85dB. Where feasible, facilities and equipment will be procured, designed, operated and/or modified in such a manner as to prevent employee's exposure to continuous noise levels above 85 dBA TWA or impulse noise above 140 dBp. Any reduction in employee noise exposure, even if not reduced below 85 dBA, is beneficial.

When information indicates that any employee's exposure may equal or exceed an 8-hour time-weighted average of 85 decibels, the employer shall develop and implement a monitoring program.

1. This includes (but is not limited to) times when representative exposures need to be documented, when employees complain of excessive noise, or when it is difficult to understand a normal conversation if the speaker and the listener face each other at a distance of 2 feet.
2. Noise dosimetry and area monitoring will be repeated periodically or whenever any changes to the facilities, new equipment, operation, jobs or procedures increases the potential for creating hazardous noise or increased noise emissions. In limited situations, monitoring will also be performed prior to startup.
3. Areas determined to have noise levels at or above 85 dBA must be posted as noise hazard areas.
4. Employees and/or their representatives will be provided an opportunity to observe

noise dosimetry and area monitoring activities.

5. The employer shall notify employees exposed at or above an 8-hour time-weighted average of 85 decibels of the results of the monitoring and assist with the proper selection of hearing protectors.

VII. Noise Measurement/Methods

While using the sound level meter or the noise dosimeter, a sufficient number of reading/measurements at different locations and times during the day are needed to reflect noise exposure that accurately represents the actual exposure.

Before and after each use, dosimeters and sound level meters will be calibrated using acoustical calibrators to verify accuracy of the measuring equipment. Sound level meters or noise dosimeters which are not working properly, or are out of calibration, will not be used to determine an employee's noise exposure.

1. **Sound level meters** will meet the Type II requirements of ANSI S1.4 and will be capable of measuring sound in the range of 80-130 dBA.

   If a sound level meter is used to estimate an employee's dose, the noise survey will include a **time and motion study** to document the variations in the employee's noise exposure during the working shift. If an employee moves about or noise intensity fluctuates over time, noise exposure is more accurately estimated by personal dosimeter.

   When using a sound level meter, the microphone should be positioned not less than 2 inches, and no more than 2 feet from the employee's ear.

   Measurements will be made with the employee at his/her regular workstation.

2. **Noise dosimeters** will meet the Class 2A -90/80 -5 requirements of ANSI~S1.25 and will be capable of integrating sound levels of 80 dB and above.

   To determine an employee's noise exposure, the microphone will be attached to the employee in the area of the employee's shoulder while the employee is at his/her regular workstation.

   "Maps" of the sound levels within different areas of the workplace may be drawn. By using a sound level "map" and information on employee locations throughout the day, estimates of individual exposure levels can be developed.

VIII. Personal Hearing Protection

Engineering controls are the first line of defense against hazardous noise. If engineering controls fail to reduce sound levels to within the limits of Permissible Exposure Limits, hearing protective equipment and/or administrative methods of noise exposure protection must be used.

Personal protective equipment is to be used only temporarily or if engineering controls are not feasible or practical.

Where hearing protection is mandatory, employers shall ensure that hearing protection is worn by all affected (identified) employees.

If hearing protective equipment is not sufficient to decrease sound levels, administrative controls will be applied to limit the duration of time spent in the noise hazard area, so as not to exceed the exposure limit minimums.

Disposable earplugs and/or earmuffs will be available for employee use (if desired) if noise exposures are less than 85 dBA (for protection against nuisance noise.)
Ear muffs and/or plugs will be provided to employees assigned to work in areas where they will be exposed to continuous noise (without regard to duration of exposure) in excess of 85 dBA and to impulse noise in excess of 140 dBP.

Ear muffs will be provided for employees when analysis of noise environments shows that the protection provided by earplugs is not sufficient to reduce noise exposures below 85dBA. Ear muffs will be inspected by the user on a regular basis.

Both ear muffs and plugs are required where noise levels equal or exceed 110 dBA.
Earplugs will be for the exclusive use of each employee and will not be traded or shared.

If reusable earplugs are used, they will be permanently issued to the employee and fitted to the employee under medical supervision. During fitting, the employee will be instructed in the proper method of insertion, storage, and cleaning of the earplugs. Earplugs will be checked during annual medical examinations.

The employee shall be given the opportunity to select his/her hearing protection equipment from a variety of suitable hearing protectors provided by the employer.

IX. Medical Monitoring

Whenever an employee is routinely occupationally exposed to continuous noise at or above the action level of an 8-hour time-weighted average of 85 decibels, the employee must participate in a Medical Monitoring Program. For the purpose of program enrollment, employee noise exposure will be determined without regard to any sound changes provided by the use of hearing protection.

The program will be provided at no cost to the employee.

All testing, medical examinations and follow up care will be performed under the direction and supervision of the Designated Medical Provider selected by NDSU and will include, but is not limited to, the following:

1. Physical Examination with audiometric tests:

a. Medical examination to determine any pre-existing or previous medical pathology of the ear
b. Current work history to document noise exposures
c. History of other work or non-work exposures to noise
d. History of the use of personal protective equipment

2. Baseline audiogram and evaluation of the audiogram
3. Annual Audiogram
4. Follow up procedures/care
5. Recommendations pertaining to the optimal performance of their occupation/job

All employees who have participated in the Medical Monitoring Program will receive a final audiometric examination upon termination of employment, during job changes within the University which would alter noise exposure, prior transfer to another department, and upon retirement.

X. Training and Record Keeping

An employee who is exposed to noise at or above the 8-hour time-weighted average of 85 decibels shall participate in a training program regarding hearing protection. The training will be presented periodically to all affected employees and will include the following:

1. The effects of noise on hearing and noise control principles
2. The purpose of hearing protection, the advantages, and disadvantages
3. The attenuation of various types of hearing protection
4. The instruction on selection, fitting, use and care of hearing protection
5. The purpose of audiometric testing and an explanation of the test procedures

All training and educational materials, as well as the Noise/Hearing Protection Standard, shall be available to the employee or his/her representative upon request to the Occupational Safety and Environment Health Office, Loss Prevention Office.

Audiogram and noise exposure records will be maintained as a part of the employees permanent record in the Human Resource Department and shall be available to the employee or his/her representative.