

Northwestern
Hearing Conservation
Environmental Health and Safety

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I. Purpose

This program establishes procedures to reduce noise exposure through effective engineering and administrative controls. Hearing protection is required to be used when effective engineering and administrative controls are not feasible. This program establishes the procedures for noise reduction, noise monitoring, and audiometric testing to prevent hearing loss from occupational noise exposure. Refer to Northwestern's [Noise and Hearing Conservation Information Sheet](#) for more information.

II. Scope

This program applies to all Northwestern University employees who are exposed to noise levels at or above the Occupational Safety and Health Administration (OSHA) action level of a time-weighted average (TWA) of 85 dBA.

Students, faculty, staff, contractors, vendors, suppliers, and visitors with occasional or infrequent exposure to hazardous noise levels must wear hearing protection, as required. However, these will not be included in the hearing conservation program.

III. Responsibilities

A. Environmental Health and Safety (EHS)

- i. Adhere to the requirements of this program.
- ii. Conduct noise exposure monitoring and maintain noise monitoring equipment.
- iii. Maintain records of noise exposure measurements.
- iv. Provide results to all employees monitored for noise exposure.
- v. Coordinate audiometric testing and training with Northwestern University Center for Audiology Speech Language and Learning (NUCASLL), Northwestern Medicine Corporate Health, or other audiometric testing centers.
- vi. Review and revise this program, as necessary.

B. Audiometric Testing Provider

- i. Adhere to the requirements of this program.
- ii. Conduct audiometric tests and determine if employees experience a standard threshold shift (STS).
- iii. Provide EHS with a list of employees who have experienced an STS.
- iv. Retain audiometric test results for the duration of each employee's employment.
- v. Maintain and calibrate all audiometric testing equipment according to industry and OSHA standards.
- vi. Conduct in-person employee training, if applicable.

C. Departments and Units

- i. Adhere to the requirements of this program.
- ii. Contact EHS regarding potential noise exposures, including changes in the work environment and equipment that could increase noise exposure, and for noise monitoring requests.
- iii. Ensure employees exposed at or above a TWA of 85 dBA attend annual training and receive annual audiometric tests.
- iv. Provide funding for audiometric tests and training.
- v. Notify EHS of new employees who are subject to this program.

- vi. Ensure employees are not exposed to occupational noise, or properly wear hearing protectors, for 14 hours prior to baseline audiometric testing.
- vii. Ensure a variety of hearing protection is provided, including ear plugs and earmuffs, at no cost to employees.
- viii. Ensure employees wear hearing protection when required.
- ix. Ensure signage requiring hearing protection is posted, where applicable.
- x. Ensure that when replacing equipment, new equipment must have a lower noise exposure level than the existing equipment, if feasible.

D. Employees

- i. Adhere to the requirements of this program.
- ii. Participate in noise monitoring activities.
- iii. Attend and complete annual training and audiometric tests.
- iv. Wear hearing protection as required.
- v. Ensure hearing protection is maintained in good condition.
- vi. Notify supervisors of changes in the workplace that could change noise exposures or when hearing protection needs to be replaced.

IV. Noise Monitoring

When employee exposure to noise is suspected or known to equal or exceed a TWA of 85 dBA, noise monitoring will be coordinated by EHS. All exposure measurements of continuous, intermittent, and impulsive sources of noise must include all noise within the 80 to 130 dBA range; exposure to impact or impulsive noise must never exceed 140 dBA.

- A. Noise exposure monitoring will be conducted with area sound level measurements, personal dosimetry, or a combination of these techniques.
- B. Measurements will be made with calibrated equipment operated by EHS or a designate.
- C. Monitoring will be repeated whenever there is a change in production, process, equipment, or controls that results in increased noise exposure.
- D. Affected employees will have the opportunity to observe any noise measurements during collection and will have access to monitoring results.

V. Audiometric Testing

- A. All employees with known or suspected noise exposure at or above the action level (TWA of 85 dBA) are required to participate in audiometric testing. This exceedance can occur as infrequently as one day per year.
 - i. A baseline test will be conducted within 6 months of the employee's first exposure at or above the action level of a TWA of 85 dBA.
 - ii. Supervisors must ensure employees are not exposed to occupational noise, or properly wear hearing protectors, for 14 hours prior to baseline testing.
 - iii. Audiometric testing will be conducted annually.
 - iv. All employees will receive the results of audiometric testing in writing. If an STS has occurred, employees will receive written notification within 21 days.
 - v. If the results of annual audiometric testing indicate an STS, the employee has the option to receive a re-test within 30 days. The results of the re-test will be considered as the annual audiogram.
 - vi. When tests indicate an STS, the following must occur:
 - a. Employees not wearing hearing protection will be provided hearing protectors, trained in their use and care, and required to wear them.

- b. Employees already using hearing protectors will be refitted and retrained in the use of hearing protectors and provided with hearing protectors offering greater attenuation if necessary.
 - c. Hearing protection must reduce employee exposure to a TWA below 85 dBA. Refer to Northwestern's [Hearing Protection Sheet](#) for more information.
 - d. An audiologist will review test results and determine if further evaluation or retraining is needed.
 - vii. An annual audiogram may be substituted for the baseline audiogram (i.e., revised baseline) when, in the judgment of the audiologist, otolaryngologist, or physician who is evaluating the audiogram, determines that:
 - a. The STS revealed by the audiogram is persistent, or
 - b. The hearing threshold shown in the annual audiogram indicates significant improvement over the baseline audiogram.
- B. An employee subject to this program whose duties change, where they are no longer exposed to a TWA of 85 dBA, will be required to complete at least one additional annual audiogram, as regularly scheduled.
- C. Approved audiometric testing locations:
 - i. Northwestern University Center for Audiology, Speech, Language, and Learning (NUCASLL)
2315 Campus Drive, Evanston, Illinois 60208
Phone: (847) 491-3165, Fax: (847) 467-7141, Email: nucasll@northwestern.edu
 - ii. Northwestern Medicine Corporate Health
676 N. St. Clair Street, Suite 900, Chicago, Illinois 60611
Phone: (312) 926-8282, Fax: (312) 926-1787
- D. Audiometric testing must be performed in accordance with **Appendix 1** (Audiometric Testing Requirements).
- E. Audiometric testing will be provided at no cost to employees if required by this program.

VI. Hearing Protection

- A. A variety of hearing protection will be made available, at no cost, to all employees exposed to or likely to be exposed to noise levels at or above the OSHA action level of a TWA of 85 dBA.
- B. The following employees must wear hearing protection:
 - i. Employees exposed to a TWA of 90 dBA or more.
 - ii. Employees exposed to a TWA of 85 dBA or more who have not taken a baseline audiogram.
 - iii. Employees exposed to a TWA of 85 dBA or more who have experienced an STS.
- C. Hearing protection guidelines are as follows:
 - i. Training will be provided on the use and care of provided hearing protection. Refer to **Section VII**.
 - ii. Hearing protection will be replaced as necessary.
 - iii. Hearing protection must provide a noise reduction rating (NRR) sufficient to attenuate the noise below the 85 dBA action level.
- D. Refer to Northwestern's [Hearing Protection Sheet](#) for more information.

VII. Training

- A. Each employee with known or suspected exposure to noise at or above a TWA of 85 dBA must receive hearing conservation training upon hire and annually.
- B. Training must include:
 - i. The effects of noise on hearing.
 - ii. The purpose, advantages, and disadvantages of properly fitting hearing protectors for attenuating noise levels.
 - iii. Instructions on selection, fitting, use, and care of hearing protection.
 - iv. The purpose of audiometric testing and an explanation of test procedures.
- C. Training will be conducted by the following mechanisms:
 - i. [Online](#), or
 - ii. In-person with EHS or NUCASLL personnel.

VIII. Recordkeeping

- A. Northwestern Environmental Health and Safety (EHS) will maintain:
 - i. Noise monitoring data for thirty years.
 - ii. Training records for three years.
- B. Audiometric testing providers will maintain audiometric test records for the duration of affected employees' employment and must include:
 - i. Name and job classification of the employees
 - ii. Dates of the audiogram
 - iii. Examiner's name
 - iv. Date of latest audiometer calibration

IX. Regulatory Authority and Related Information

Northwestern, audiometric testing providers, and contractors will comply with the Occupational Safety and Health Administration's (OSHA) standards and any other applicable codes and standards, including:

[29 CFR 1910.95 – Occupational Noise Exposure](#)

[29 CFR 1904.10 – Recording Criteria for Cases Involving Occupational Hearing Loss](#)

[OSHA 29 CFR 1910.1020 – Access to Employee Exposure and Medical Records](#)

Northwestern's [Hearing Protection Sheet](#)

Northwestern's [Noise and Hearing Conservation Information Sheet](#)

X. Contact

For questions contact Environmental Health and Safety at ehs@northwestern.edu or (847) 467-6342.

Appendix 1 – Audiometric Testing Requirements

- A. Audiometric tests will be performed by:
 - i. A licensed or certified audiologist, otolaryngologist, or other physician, or
 - ii. 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. A technician who performs audiometric tests must be responsible to an audiologist, otolaryngologist, or physician.
- B. Audiometric tests will be pure tone, air conduction, hearing threshold examinations, with test frequencies including as a minimum 500, 1000, 2000, 3000, 4000, and 6000 Hz. Tests at each frequency will be taken separately for each ear.
- C. Rooms used for audiometric testing will not have background sound pressure levels exceeding those in Table 1.

Table 1: Maximum Allowable Octave-Band Sound Pressure Levels for Audiometric Test Rooms

Octave-band center frequency (Hz)	500	1000	2000	4000	8000
Sound pressure level (dB)	40	40	47	57	62

- D. Audiometric tests will be conducted with audiometers (including microprocessor audiometers) that meet the specifications of, and are maintained and used in accordance with, American National Standard Specification for Audiometers, S3.6-1969.
- E. Functional Operation:
 - i. The functional operation of the audiometer must be checked before each day's use by testing a person with known, stable hearing thresholds, and by listening to the audiometer's output to make sure that the output is free from distorted or unwanted sounds.
 - ii. Deviations of 10 decibels or greater require acoustic calibration.
- F. Acoustic Calibration:
 - i. Audiometer calibration will be checked acoustically at least annually.
 - ii. Test frequencies below 500 Hz and above 6000 Hz may be omitted from this check.
 - iii. Deviations of 15 decibels or greater require an exhaustive calibration.
- G. Exhaustive Calibration:
 - i. An exhaustive calibration will be performed at least every two years.
 - ii. Test frequencies below 500 Hz and above 6000 Hz may be omitted from this calibration.
- H. Revised baseline:

An annual audiogram may be substituted for the baseline audiogram when, in the judgment of the audiologist, otolaryngologist, or physician who is evaluating the audiogram:

 - i. The standard threshold shift revealed by the audiogram is persistent, or
 - ii. The hearing threshold shown in the annual audiogram indicates significant improvement over the baseline audiogram.