



Table of Contents

I. PURPOSE..... 2

II. REGULATIONS..... 2

III. INTRODUCTION..... 2

IV. SCOPE..... 2

V. DEFINITIONS..... 3

VI. RESPONSIBILITIES..... 4

 A. Environmental Health and Safety..... 4

 B. Supervisors and Managers..... 4

 C. Employees..... 5

VII. GENERAL REQUIREMENTS..... 5

 A. Identification of Affected Personnel..... 5

 B. Monitoring..... 5

 C. Audiometric Testing Program..... 6

VIII. NOISE CONTROL..... 6

IX. TRAINING..... 7

X. RECORD-KEEPING..... 7

XI. OSHA TABLE 1..... 8

XII. OSHA TABLE 2..... 9

Approved: 5/25/2022

Approved by: K. Long-Witter

NORTH CAROLINA CENTRAL UNIVERSITY • 1801 FAYETTEVILLE STREET • DURHAM, NC 27707
EMAIL ehs@nccu.edu • TELEPHONE 919-530-7125 • <https://nccu.edu/ehs>

NORTH CAROLINA CENTRAL UNIVERSITY IS A CONSTITUENT INSTITUTION OF THE UNIVERSITY OF NORTH CAROLINA



I. PURPOSE

Exposure to excessive noise in the workplace can cause permanent hearing loss. Although North Carolina Central University attempts to control noise exposures on campus, certain operations and workstations may expose faculty, staff, or students to significant noise levels. The NCCU Hearing Conservation Program has been established to help ensure that members of the campus community do not suffer health effects from exposure to excessive noise while at work.

II. REGULATIONS

[OSHA Occupational Noise Regulation 29 CFR 1910.95](#)

[Determination of Work-Relatedness OSHA 29 CFR 1904.5](#)

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

III. INTRODUCTION

Noise, or unwanted sound, is one of the most pervasive occupational health problems. It is a by-product of many industrial processes. Sound consists of pressure changes in a medium (usually air), caused by vibration or turbulence. These pressure changes produce waves emanating away from the turbulent or vibrating source. Exposure to high levels of noise causes hearing loss and may cause other harmful health effects as well. The extent of damage depends primarily on the intensity of the noise and the duration of the exposure.

Noise-induced hearing loss can be temporary or permanent. Temporary hearing loss results from short-term exposures to noise, with normal hearing returning after period of rest. Generally, prolonged exposure to high noise levels over a period of time gradually causes permanent damage.

IV. SCOPE

The provisions of the Hearing Conservation Program apply to all personnel at North Carolina Central campus and any auxiliary sites or operations.

This program shall apply to all operations either stationary or mobile where employees are expected to be exposed to noise levels of 85 dBA or above for 8 hours as a time weighted average.

Approved: 5/25/2022

Approved by: K. Long-Witter

NORTH CAROLINA CENTRAL UNIVERSITY • 1801 FAYETTEVILLE STREET • DURHAM, NC 27707
EMAIL ehs@ncsu.edu • TELEPHONE 919-530-7125 • <https://ncsu.edu/ehs>

NORTH CAROLINA CENTRAL UNIVERSITY IS A CONSTITUENT INSTITUTION OF THE UNIVERSITY OF NORTH CAROLINA



V. DEFINITIONS

5 dB exchange rate – reciprocal relationship wherein as the noise level increases by 5 dBA, the amount of time a person can be exposed to a certain noise level to receive the same dose is cut in half.

Action Level - An 8-hour time weighted average (TWA) of 85 decibels measured on the A-weighted scale, slow response, or equivalently a dose of 50%. This is the level of sound exposure at which employee participation in the NCCI Hearing Conservation Program is mandatory.

Weighted Sound Level (dBA) - The weighting of sound levels to closely match the perception of loudness by the human ear.

Audiometric Testing - The portion of the Hearing Conservation Program that consists of measuring an employee's hearing to establish a baseline for subsequent annual measurement and comparison.

Decibel (dB) - Unit of measurement of sound level.

Dose - Ratio of noise exposure relative to the noise criterion level of 90 decibels, expressed as a percentage. Ninety decibels represent a dose of 100% over an 8-hour work shift. Eighty-five decibels represent a dose of 50% over an 8-hour work shift. Dose is based on the OSHA 5 dB exchange rate. Dose may be determined from the equation given in [Table 1](#) for non-continuous noise or estimated from [Table 2](#) based on the TWA.

Hearing Conservation Program (HCP)- A written program that establishes procedures to ensure the protection of employees from high noise areas or operations in compliance with the OSHA Occupational Noise Regulation 29 CFR 1910.95.

Hearing Protection Attenuation - The estimated reduction in the noise level at the eardrum as a result of the use of hearing protection.

Noise Induced Hearing Loss (NIHL) - The OSHA recordable occupationally related hearing loss, as defined by 29 CFR 1904.10 and 29 CFR 1904.5, and includes a Standard Threshold Shift (STS) of 10 db, with age correction, averaged over the 2K, 3K, and 4K frequencies from baseline in either ear and a 25 db shift from audiometric zero, in the same ear as the 10 dB STS at the same frequencies.

Noise Reduction Rating (NRR) - The theoretical maximum amount of noise reduction that can be achieved using a hearing protection device. This is a manufacturers' calculated value and must be displayed with the hearing protection device.

Approved: 5/25/2022

Approved by: K. Long-Witter

NORTH CAROLINA CENTRAL UNIVERSITY • 1801 FAYETTEVILLE STREET • DURHAM, NC 27707
EMAIL ehs@ncu.edu • TELEPHONE 919-530-7125 • <https://ncu.edu/ehs>

NORTH CAROLINA CENTRAL UNIVERSITY IS A CONSTITUENT INSTITUTION OF THE UNIVERSITY OF NORTH CAROLINA



Monitoring - The sampling of noise levels using a sound level meter, octave band analyzer, or personal noise dosimeter.

Permissible Noise Exposure - The maximum daily noise exposure which may be experienced by employees not using hearing protectors from a continuous 8-hour exposure to a sound level of 90 dBA or equivalent dose of 100%.

Standard Threshold Shift (STS) - A change in hearing threshold, relative to the most recent audiogram for that employee, of an average of 10 decibels (dB) or more at 2000, 3000, and 4000 hertz in one or both ears and substantiated within 30 days with a follow-up audiogram.

Time Weighted Average (TWA) - The [equivalent] noise level, in dB, based on an 8-hour exposure time frame. If the noise is not constant over an 8-hour exposure, then a calculated 8-hour TWA must be made using the equation in [Table 1](#). The TWA may also be estimated from the dose or percent noise exposure, based on noise exposure continuous over 8-hours, as given in [Table 2](#).

VI. RESPONSIBILITIES

A. Environmental Health and Safety

1. Develop written Hearing Conservation Program and revise the program as necessary.
2. Identify and establish a written agreement with an audiometric testing clinic for occupationally exposed employees.
3. Coordinate monitoring to identify areas or operations requiring inclusion in a hearing conservation program.
4. Assist in noise control measures (i.e. hearing protection, noise control).
5. Identify approved hearing protection for use by NCCU employees requiring protection.

B. Supervisors and Managers

1. Identify potentially hazardous noise locations and operations and contact EHS for evaluation.
2. Identify personnel and jobs which require participation in the HCP.
3. Notify EHS when personnel no longer require enrollment in the HCP.
4. Ensure that employees required to participate in the HCP complete their annual audiometric testing and all other requirements of the program.
5. Order necessary required hearing protection devices for employees.

Approved: 5/25/2022

Approved by: K. Long-Witter

NORTH CAROLINA CENTRAL UNIVERSITY • 1801 FAYETTEVILLE STREET • DURHAM, NC 27707
EMAIL ehs@ncsu.edu • TELEPHONE 919-530-7125 • <https://ncsu.edu/ehs>

NORTH CAROLINA CENTRAL UNIVERSITY IS A CONSTITUENT INSTITUTION OF THE UNIVERSITY OF NORTH CAROLINA



C. Employees

1. Assist in identifying potentially hazardous noise locations or operations to which they may be exposed.
2. Schedule and complete audiometric testing or exposure assessments as instructed.
3. Use hearing protection as required and in accordance with training received.

VII. GENERAL REQUIREMENTS

A. Identification of Affected Personnel

It is the responsibility of Managers and Supervisors to notify EHS when personnel are required to participate in the HCP based on their job duties. This is done for new personnel using the [Job-Specific Health and Safety Assessment Form](#) at the time of hire. For current employees who require enrollment or to remove personnel from the program, send an email to ehs@ncu.edu to notify them of the change.

B. Monitoring

The HCP program requires employers to monitor noise exposure levels in a way that accurately identifies employees exposed to noise at or above 85 decibels (dB) averaged over 8 working hours, or an 8-hour time-weighted average (TWA). Employers must monitor all employees whose noise exposure is equivalent to or greater than a noise exposure received in 8 hours where the noise level is constantly 85 dB.

The exposure measurement must include all continuous, intermittent, and impulsive noise within an 80 dB to 130 dB range and be taken during a typical work situation. The method of monitoring is performance-oriented such that EHS may select the monitoring method that best suits a situation. Types of monitoring that may be used include:

- Sound level measurements for locations where the noise level is stationary and expected to be continuous
- Personal noise dosimetry for work operations that are highly mobile or random in noise level.

Re-monitoring may be warranted if a change in equipment, process or control increases the noise level to the extent that:

- Additional employees may be exposed at or above the action level
- Current form of hearing protection does not reduce the noise exposure level to 85 dBA as 8 hour TWA
- An STS occurs

Employees may observe monitoring procedures and must receive notification of the results of exposure monitoring. EHS will provide results via NCCU email to affected employees and Supervisors.

Approved: 5/25/2022

Approved by: K. Long-Witter

NORTH CAROLINA CENTRAL UNIVERSITY • 1801 FAYETTEVILLE STREET • DURHAM, NC 27707
EMAIL ehs@ncu.edu • TELEPHONE 919-530-7125 • <https://ncu.edu/ehs>



C. Audiometric Testing Program

Audiometric testing monitors an employee's hearing over time. It also provides an opportunity for employers to educate employees about their hearing and the need to protect it. All employees exposed to noise at or above the Action Level are required to participate in this program at no cost to the employee. Testing consists of:

1. Baseline test to be completed within 6 months of the employee's first exposure above the action level. This test must be preceded by at least 14 hours without exposure to workplace noise at or above 85 dBA or hearing protection devices must be used prior to testing.
2. Annual testing thereafter provided that exposure at or above the action level is expected.
3. A follow-up audiogram may be provided within 30 days if a standard threshold shift has been identified. The employee shall be informed in writing within 21 days of the determination.
4. Audiometric testing reviewed by an audiologist. The audiologist will determine if further evaluation is needed.

VIII. NOISE CONTROL

Engineering controls will be reviewed for feasibility in noise reduction. Until proper controls are implemented or if adequate controls are not feasible NCCU will provide hearing protectors to all workers exposed to 8-hour TWA noise levels of 90 dB or above at no cost to the employee. For employees exposed to noise levels at or above 85 dBA, but below 90 dBA as an 8 hour TWA the use of hearing protection devices shall be strongly encouraged.

Employees will be provided with a selection of at least one variety of hearing plug and one variety of hearing muff. Employees will work with EHS to decide which protector is most suitable for the working environment. The protector selected should be comfortable to wear and offer sufficient protection to prevent hearing loss.

Hearing protectors must adequately reduce the noise level for each employee's work environment. EHS will use the Noise Reduction Rating (NRR) that represents the protector's ability to reduce noise under ideal laboratory Conditions adjusted for noise levels in the actual working environment. Hearing protectors must reduce employee exposures to at least 90 dB and to 85 dB when an STS already has occurred in the worker's hearing

Employees must wear hearing protectors:

- For any period exceeding 6 months from the time they are first exposed to 8-hour TWA noise levels of 85 dB or above, until they receive their baseline audiogram if testing is delayed due to scheduling.
- If they have incurred standard threshold shifts that demonstrate they are susceptible to noise; and

Approved: 5/25/2022

Approved by: K. Long-Witter

NORTH CAROLINA CENTRAL UNIVERSITY • 1801 FAYETTEVILLE STREET • DURHAM, NC 27707
EMAIL ehs@ncu.edu • TELEPHONE 919-530-7125 • <https://ncu.edu/ehs>

NORTH CAROLINA CENTRAL UNIVERSITY IS A CONSTITUENT INSTITUTION OF THE UNIVERSITY OF NORTH CAROLINA



- If they are exposed to noise over the permissible exposure limit of 90 dB over an 8-hour TWA.

IX. TRAINING

Employees exposed to TWAs of 85 dB and above must be trained annually in the following:

- Effects of noise
- Purpose, advantages, and limitations of hearing protection devices
- Selection, fit, use and care of protectors
- Purpose and procedures of audiometric testing.

X. RECORD-KEEPING

The audiometric testing clinic shall maintain audiometric exams for each tested employee for the duration of that employee's participation in the program. Records must include the employee's name, job, date, examiner's name, date of last equipment calibration, measurements of background sound pressure levels in test rooms, and employees most recent noise exposure measurement.

EHS will keep records of any noise induced hearing loss (NIHL) cases when an employee's hearing test shows a marked decrease in overall hearing not attributable to age or other cause. A physician or licensed health-care professional will be consulted to determine if a loss is work-related, and perform additional hearing tests to verify the persistence of the hearing loss.

EHS will maintain copies of all audiometric testing results for the duration of the affected employee's employment. Noise exposure measurement data will be retained by EHS for two years.

Approved: 5/25/2022

Approved by: K. Long-Witter

NORTH CAROLINA CENTRAL UNIVERSITY • 1801 FAYETTEVILLE STREET • DURHAM, NC 27707
EMAIL ehs@ncsu.edu • TELEPHONE 919-530-7125 • <https://ncsu.edu/ehs>

NORTH CAROLINA CENTRAL UNIVERSITY IS A CONSTITUENT INSTITUTION OF THE UNIVERSITY OF NORTH CAROLINA



XI. OSHA TABLE 1

8- HOUR A-WEIGHTED* SOUND LEVELS & ALLOWABLE EXPOSURE TIMES		
A-Weighted Sound Level (dBA)	Allowable Exposure Duration (Hours)	When the sound level is constant over the entire work shift, noise dose or percent noise exposure (D) is calculated as $D=100 C/T$ C = length of work day in hours T = reference duration corresponding to the measured sound level $T= 8/2^{(L-90)/5}$ L = A-Weighted Sound Level
80	32	When the sound level is not constant over the work shift but is composed of two or more periods of noise at different levels, the total noise dose over the work day is given by where C_n indicates total time of exposure at specific noise level and T_n indicates reference duration for that level. $D = 100(C_1 / T_1 + C_2 / T_2 + C_n / T_n),$ Full table for all dBA values available in 1910.95 Appendix A Table G-16A
85	16	
90	8	
95	4	
100	2	
105	1	
110	0.5	
115	0.25	
120	0.125	
125	0.063	
130	0.031	

* A-weighted sound level discriminates against low frequencies, in a manner similar to the response of the ear.

Approved: 5/25/2022

Approved by: K. Long-Witter

NORTH CAROLINA CENTRAL UNIVERSITY • 1801 FAYETTEVILLE STREET • DURHAM, NC 27707
EMAIL ehs@ncu.edu • TELEPHONE 919-530-7125 • <https://ncu.edu/ehs>

NORTH CAROLINA CENTRAL UNIVERSITY IS A CONSTITUENT INSTITUTION OF THE UNIVERSITY OF NORTH CAROLINA



XII. OSHA TABLE 2

PERCENT NOISE EXPOSURE (DOSE) AND EQUIVALENT 8-HOUR TWA		
Dose (%)	8-Hour TWA	<p>Exposure is usually measured by equipment giving a readout in terms of dose (D). Dose values can be converted to TWA using this chart.</p> <p>Full table for all doses available in 1910.95 Appendix A Table A-1</p> <p>For a dose not included in the chart, use the following equation to calculate the TWA:</p> $6.61 \log_{10}(D/100) + 90$ <p>Where D = accumulated dose in percent exposure</p>
10	73.4	
20	78.4	
30	81.3	
40	83.4	
50	85.0	
60	86.3	
70	87.9	
80	88.4	
90	89.2	
100	90.0	
120	91.3	
140	92.4	
160	93.6	
180	94.2	
200	95.0	
240	96.3	
280	97.9	
300	97.9	
400	100.0	
500	101.6	

Approved: 5/25/2022

Approved by: K. Long-Witter

NORTH CAROLINA CENTRAL UNIVERSITY • 1801 FAYETTEVILLE STREET • DURHAM, NC 27707
EMAIL ehs@ncsu.edu • TELEPHONE 919-530-7125 • <https://ncsu.edu/ehs>

NORTH CAROLINA CENTRAL UNIVERSITY IS A CONSTITUENT INSTITUTION OF THE UNIVERSITY OF NORTH CAROLINA