



Facilities Management
Occupational Health and Safety

1500 - Hearing Conservation Program

DOCUMENT HISTORY

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This document will be reviewed routinely and updated with changes as needed. Departments listed as having roles and responsibilities are provided an updated version of this document upon revision.

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ACRONYMS

AL	Action Level
ANSI	American National Standards Institute
CAOHC	Council of Accreditation in Occupational Hearing Conservation
CFR	Code of Federal Regulations
dB	Decibel
dBA	Decibel, A-weighted
FM	University of Virginia Facilities Management
FM-OHS	Facilities Management Occupational Health and Safety
HPD	Hearing Protection Device
Hz	Hertz
NIHL	Noise Induced Hearing Loss
NRR	Noise Reduction Rating
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
SOP	Standard Operating Procedure
STS	Standard Threshold Shift
TWA	Time-Weighted Average

PURPOSE

The purpose of this program is to comply with provisions set forth in OSHA's 29 CFR 1910.95 and 1926.52 *Occupational Noise Exposure* to limit employee exposure to hazardous noise. Noise-induced hearing loss (NIHL) is a permanent and irreversible occupational illness due to exposure to excessive noise. Facilities Management Occupational Health and Safety (FM-OHS) works with various University of Virginia Facilities Management (FM) departments to implement noise controls which protect employees from occupational hearing loss. While implementing control measures to further reduce occupational exposure to noise, employees may be enrolled in this Hearing Conservation Program.

SCOPE

This Hearing Conservation Program covers FM employees whose job duties potentially expose them to hazardous levels of noise. OSHA Standards 29 CFR 1910.95 and 1926.52 include requirements such as a Permissible Exposure Limit (PEL) and an Action Level (AL), for which this program takes appropriate measures to comply with. Elements of this program include: exposure monitoring, audiometric testing, engineering and administrative controls, use of hearing protection devices (HPD), training, recordkeeping, and program evaluation.

ROLES AND RESPONSIBILITIES

This Hearing Conservation Program for FM personnel is a cooperative effort between the FM-OHS, healthcare providers, supervisors, and employees. Specific responsibilities relating to this Hearing Conservation Program are outlined below.

Facilities Management Occupational Health and Safety

Specific responsibilities of FM-OHS related to the Hearing Conservation Program are to:

- Conduct noise exposure monitoring in accordance with 29 CFR 1910.95 when:
 - Information suggests employee noise exposure may equal or exceed the action level
 - It is determined that current HPD used are no longer adequate due to a change in production, process, or equipment
 - An employee has experienced a Standard Threshold Shift (STS)
- Notify employees or groups of employees of exposure monitoring results
- Enroll an employee in the Hearing Conservation Program after learning that an employee is assigned to a work area or combination of work areas where the occupational noise exposure is known to exceed the action level for occupational noise
- Notify employees and their supervisors in writing when an employee or group of employees is enrolled in the Hearing Conservation Program
- Train personnel enrolled in the Hearing Conservation Program at initial enrollment and annually thereafter
- Coordinate baseline audiometric testing within 6 months of an employee's enrollment in the Hearing Conservation Program
- Coordinate annual audiometric testing for all employees enrolled in FM's Hearing Conservation Program
- Provide the healthcare provider with a copy of the following:
 - 29 CFR 1910.95
 - FM's Hearing Conservation Program
 - The employee's baseline and most recent audiograms, including the measured background sound pressure levels and records of audiometric calibrations

- Obtain a written opinion including the audiogram from the healthcare provider
- Coordinate follow-up medical evaluations recommended by the healthcare provider per 29 CFR 1910.95
- Revise the baseline audiogram if the hearing threshold on an annual audiogram shows significant improvement from the baseline audiogram
- Arrange for a re-test within 30 days of results of initial audiometric testing if the audiogram reading suggests that an STS has occurred
- If the repeat audiogram shows a persistent STS:
 - Notify the affected individual in writing within 21 days of confirmation of a persistent STS due to occupation exposure to noise
 - Revise the baseline audiogram against which future results will be compared
- Inform Workers' Compensation Specialist of any STS so it can be reflected on the OSHA 300 Log (The age correction calculation used in 29 CFR 1910.95 Appendix F will be used and considered prior to reporting an STS on the 300 Logs)
- Evaluate noise sources and consider feasible engineering and administrative controls that may be used to reduce employee exposure to occupational noise below the action level
- Evaluate the effectiveness of administrative and engineering controls by measuring the sound pressure levels
- Recommend HPD for employees exposed to noise in excess of the action level
- For employees who have experienced an STS, re-train the employee on the fit, use, care, and limitation of HPD and re-evaluate the effectiveness and fit of HPD used
- Remove enrolled employees from the Hearing Conservation Program upon receipt of one of the following:
 - Noise exposure monitoring results that show administrative or engineering controls have been implemented and have reduced employee exposure to occupational noise below the action level
 - Notification that an employee's job responsibilities change so that the employee is no longer a member of a similar exposure group included in the Hearing Conservation Program
 - Notification that the employee has terminated employment
- Notify employees and their supervisors in writing when an employee or group of employees is removed from the Hearing Conservation Program
- Coordinate exit audiometric testing
- Maintain training records, audiometric test records, and any medical reports related to 29 CFR 1910.95 for the duration of employment
- Conduct program evaluations

Healthcare Providers

A healthcare provider for the Hearing Conservation Program is a licensed or certified audiologist, otolaryngologist, or other physician, or a technician who is certified by the Council of Accreditation in Occupational Hearing Conservation (CAOHC), 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 operates microprocessor audiometers does not need to be certified. A technician who performs audiometric tests must be responsible to an audiologist, otolaryngologist, or physician. Specific responsibilities of healthcare providers related to Facilities Management's Hearing Conservation Program are to:

- Verify that the employee has avoided high levels of occupational and non-occupational noise for at least 14 hours prior to audiometric testing and reschedule if this has not occurred
- Conduct audiometric testing as outlined in 29 CFR 1910.95 and 29 CFR 1926.52

- Notify FM-OHS if any medical condition related to the use of HPD are found during the audiometric examination
- Inform employee of the need for otological examination if a medical condition unrelated to the use of HPD is suspected
- Provide FM-OHS with a written opinion containing a copy of the audiogram following each audiometric evaluation
- Conduct a re-test audiometric evaluation for an employee within 30 days if requested by FM-OHS

Supervisors

Supervisors include individuals that oversee work, activities, and employees. Specific responsibilities of supervisors related to the Hearing Conservation Program are to:

- Inform FM-OHS if noise is a concern in their area so it can be monitored and properly evaluated
- Provide HPD to employees working in environments where FM-OHS determines that noise exposure exceeds the action level
- Replace HPD as necessary
- Require employees exposed to noise in excess of the action level to wear HPD properly and to attend annual training, audiogram appointments, and any subsequent medical evaluations
- Allow time during normal working hours for employees to attend audiometric testing and Hearing Conservation training
- Forward employee concerns regarding the use of HPD to FM-OHS
- Notify FM-OHS if an employee enrolled in the Hearing Conservation Program transfers to a new position or terminates employment
- Provide feedback for program evaluation

Employees

Employees include all University of Virginia Facilities Management employees. Specific responsibilities of employees related to the Hearing Conservation Program are to:

- Review the written program
- Use required HPD according to training and product instructions when working in areas where exposure to noise in excess of the OSHA AL is suspected or determined that the employee has experienced an STS
- Attend initial audiogram within 6 months of enrollment in the Hearing Conservation Program
- Attend annual, repeat, and exit audiogram appointments and any subsequent medical evaluations within two weeks of receiving notification from FM-OHS
- Register for and attend initial training and annually thereafter
- Avoid high levels of occupational or non-occupational noise 14 hours prior to audiometric testing
- Notify the supervisor or FM-OHS of any concerns related to the use of HPD

EXPOSURE MONITORING

FM-OHS will conduct representative noise exposure monitoring when necessary to identify employees in similar exposure groups for inclusion in this Hearing Conservation Program and to enable proper selection of HPD when:

- Supervisors inform FM-OHS that noise is a concern in the work area. Inspection of work area by FM-OHS reveals that noise exposure may exceed the action level.

- It is determined that the current HPD are no longer adequate due to a change in production, process, or equipment
- An employee has experienced an STS

FM-OHS will notify affected employees of exposure monitoring results and an explanation of what those results mean.

Exposure Limits

The OSHA PEL for noise is based on an 8-hour Time-Weighted Average (TWA) of 90 dBA. The OSHA AL is 85 dBA with a doubling rate of 5 dBA. Exposure to impulse or impact noise should not exceed 140 dB peak sound pressure level without proper hearing protection.

HEARING CONSERVATION PROGRAM ENROLLMENT

Employees must be enrolled in the Hearing Conservation Program if they are assigned to a work area (or work in a similar exposure group) where occupational exposure to noise exceeds the action level of 85 dBA.

Enrolling Employees in the Hearing Conservation Program

Upon receipt of written results that an employee or a group of employees who are exposed to occupational noise above the action level, FM-OHS will enroll the employee or group of employees in the Hearing Conservation Program. Below lists FM departments currently enrolled in this program.

- Landscaping
- Heat Plants
- Chiller Plants
- Cabinet Shop
- Sheet Metal Shop

Removing Employees from the Hearing Conservation Program

FM-OHS will remove employees from the Hearing Conservation Program if any of the following criteria are met:

- Exposure monitoring results indicate that an employee or a group of employees who work in a similar exposure group are no longer exposed to occupational noise above the action level after implementing engineering or administrative controls
- Notification from the employee's supervisor that an employee's job responsibilities have changed and the employee is no longer a member of a similar exposure group included in the Hearing Conservation Program
- Notification that the employee has terminated employment

FM-OHS will send a letter to the employee and the supervisor, prior to removing the employee from the Hearing Conservation Program. The letter will contain the following information:

- Explanation of why the employee is being removed from the Hearing Conservation Program, including the following, if applicable:
 - Description of the engineering or administrative controls implemented
 - Summary of exposure monitoring results

AUDIOMETRIC TESTING

FM-OHS coordinates all audiometric testing for employees enrolled in the Hearing Conservation Program, including initial, annual, repeat, and exit audiometric evaluations. For new enrollees in the program, employees are required to attend audiometric testing within six months of being enrolled in the Hearing Conservation Program and annually thereafter.

The employee is instructed in training to avoid exposure to occupational and non-occupational noise for at least 14 hours prior to testing. Before testing, the healthcare provider must verify that the employee has avoided exposure to occupational and non-occupational noise for at least 14 hours prior to testing and reschedule if this has not occurred.

The healthcare provider must conduct audiometric testing with an audiometer (including microprocessor audiometers) that has been calibrated prior to use and meets American National Standards Institute (ANSI) Standard S3.6-1996, *American National Standard Specifications for Audiometers*. If a pulsed tone or self-recorded audiometer is used, it must meet the requirements outlined in 29 CFR 1910.95 Appendix C, *Audiometric Measuring Instruments*. Audiometric testing must be administered in a room meeting the requirements outlined in 29 CFR 1910.95 Appendix D, *Audiometric Test Rooms*. The audiometer must be checked at least annually, in accordance with 29 CFR 1910.95 Appendix E, *Acoustic Calibration of Audiometers*.

FM-OHS must obtain a written opinion from the healthcare provider, including a copy of the audiogram, following each audiometric evaluation.

Information Provided to Healthcare Providers

FM-OHS will provide the examining healthcare provider with copies of the following if the healthcare provider does not already have it on file:

- 29 CFR 1910.95
- The baseline and most recent audiograms FM-OHS have on file for the employee, including measured background sound pressure levels and records of audiometer calibrations (This information is provided by contractor doing audiometric testing)
- The Hearing Conservation Program

Review of Audiogram Results

The healthcare provider will compare the annual audiogram to the baseline to determine whether the employee has experienced an STS as a result of exposure to occupational noise. An STS is defined as a loss of 10 dB or more averaged over the 2000, 3000, and 4000 Hz octave bands. The healthcare provider will review the audiograms and determine whether there is a need for further evaluation.

If the healthcare provider determines that an STS has occurred as a result of occupational noise exposure or aggravated by occupational noise exposure, FM-OHS must request a re-test within 30 days of the initial test. If the results still indicate that an STS has occurred as a result of occupational noise exposure, the following actions will be taken:

- FM-OHS will notify the employee in writing that an STS has occurred as a result of occupational noise exposure (or aggravated by occupational noise exposure) within 21 days of being notified by the healthcare provider
- The supervisor must obtain HPD for the employee. FM-OHS will fit the employee with HPD and provide training in the care, use, and limitations of HPD

- If the employee already uses HPD, FM-OHS will evaluate the fit of HPD the employee is using and make recommendations for any changes to the HPD, such as for those with greater noise attenuation capabilities. The supervisor will obtain the recommended HPD. FM-OHS will then fit and provide training in the care, use, and limitations of HPD.
- If additional testing or medical evaluations are needed or the employee exhibits a medical condition that may be caused or aggravated by wearing HPD, the healthcare provider will recommend the appropriate level of care for the employee, such as a clinical audiological or otological evaluation. FM-OHS will coordinate follow-up medical evaluations per the healthcare provider's recommendations.
- The healthcare provider will inform the employee of the need for a medical examination if a medical condition of the ear unrelated to the use of HPD is suspected
- FM-OHS must record any STS of 10 dB or more (as an average within the 2000, 3000, and 4000 Hz range) on the OSHA 300 log, per 29 CFR 1904.10, *Recording Criteria for Cases Involving Occupational Hearing Loss*

Revised Baseline

FM-OHS will designate the annual audiogram as the new baseline audiogram if one of the following occurs:

- A persistent STS is confirmed
- The hearing threshold in the annual audiogram indicates significant improvement over the baseline

CONTROLS

After enrolling an employee or a group of employees in the Hearing Conservation Program, FM-OHS must evaluate the noise sources and consider feasible administrative or engineering controls to reduce occupational exposure to noise. FM-OHS will conduct additional exposure monitoring to determine the effectiveness of these controls. If data demonstrates that the employee exposure to occupational noise has been reduced below the action level, FM-OHS will remove the affected individuals from the Hearing Conservation Program.

Administrative Controls

Administrative controls that may be used to reduce employee exposure to hazardous noise include implementing work/rest cycles and increasing the distance between the employee and the noise source. FM-OHS will evaluate the area and make appropriate administrative control recommendations or requirements. This will be done with the help of the employee as well as the supervisor.

Engineering Controls

Examples of engineering controls designed to reduce employee noise exposure include replacing the noise source with a quieter machine or enclosing the machine. FM-OHS will evaluate the work area to determine what engineering controls may be feasible.

Evaluating Noise Sources

Before implementing engineering and administrative controls to reduce employee exposure to occupational noise, FM-OHS must evaluate the noise levels and frequencies by conducting noise surveys with an octave band analyzer. Noise surveys to evaluate the effectiveness of administrative and engineering controls should also be conducted after implementation of controls.

HEARING PROTECTION DEVICES

FM-OHS will recommend a selection of HPD when it is not feasible to reduce employee noise exposure below the action level with engineering or administrative controls and while those controls are being implemented. Supervisors must provide HPD to employees working in environments where noise exposure is believed to

exceed the action level; HPD must be replaced as necessary. Employees are required to use HPD according to training and product manufacturer instructions when working in environments where exposure to noise is believed to exceed the action level.

Types of Hearing Protection Devices

HPD, a type of personal protective equipment designed to reduce noise exposure, include formable and pre-molded earplugs and ear muffs. Ear plugs are worn inside the ear and seal against the ear canal walls. Ear muffs seal against the side of the head, outside the ear and are typically mounted on a headband.

Formable Ear Plugs:

Formable earplugs are made of a flexible material designed to expand and conform to the user's ear canal and are available in a variety of shapes and sizes. Formable ear plugs are preferred over pre-molded ear plugs because they may be adapted to the user and obtain a better fit. Formable ear plugs are recommended for low frequency noise sources up to 1000 Hz.

The following procedures should be followed in order to obtain a proper fit:

- Roll the formable ear plug into a crease-free cylinder thin enough for half the length of the plug to easily fit into the ear canal
- Reach over the head and open the ear canal by pulling the ear upwards using the opposite hand
- Use the other hand to insert the ear plug into the ear canal and allow the ear plug to expand inside the ear

Pre-molded Ear Plugs:

Pre-molded ear plugs are made from silicone, plastic or rubber and are manufactured as either "one-size-fits-most" or are available for small, medium or large ear canals. Sometimes users need a different size plug for each ear. Pre-molded ear plugs are also recommended for low frequency noise sources.

The following procedures should be followed in order to obtain a proper fit:

- Reach over the head and open the ear canal by pulling the ear upwards using the opposite hand.
- Use the other hand to insert the ear plug into the ear canal by gently rocking the plug until it seals the ear canal.

Ear Muffs:

Ear muffs form a seal covering the entire ear held in place with an adjustable headband. As a result, users with facial hair and who wear glasses are the most likely to have difficulty obtaining a proper fit. Ear muffs are recommended for high frequency noise sources.

To obtain a proper fit, the headband should be adjusted so that the tension allows the cushion to form a seal against the head without resting on the outer ear.

Noise-Canceling/Signal-Producing Ear Buds and Head Phones:

Certain types of ear buds and head phones use noise-canceling technology to limit noise exposure by producing out-going sound frequencies that match in-coming sound frequencies, potentially reducing the amount of sound that passes through the device. Due to the uncertainty of protection that these devices offer, they are prohibited from use as HPD in the workplace.

Signal-producing ear buds and head phones, such as radios or mp3 players, potentially compromise employees' attention to tasks at hand and the ability to communicate with each other, and are prohibited from use as HPD in the workplace.

Care and Maintenance of Hearing Protection Devices

HPD are prone to damage and degradation, compromising their ability to protect the user from noise exposure. Employees are responsible for the care and maintenance of their assigned HPD, and must inspect them for dirt, damage, deformation, or hardness prior to fitting.

Foam ear plugs are designed for single-use, and should be discarded at the end of each shift.

Custom or pre-molded ear plugs are designed for multiple-use, and should be cleaned regularly with mild soap and warm water only. Pat dry with a towel and store in a case when not in use. With proper maintenance, multiple-use ear plugs can last for several weeks.

Ear muff cups and cushions should be checked for cracks or leaks, and discarded if found to be visibly damaged or compromised. Ear cushions may be replaced if damaged. Ear muffs should be cleaned regularly by wiping them with soap and water, and may be shared among multiple users.

Noise Reduction Rating (NRR)

The Noise Reduction Rating (NRR) is the average protection most users can obtain when HPD is worn. Scientific research shows that HPD's used in the field provides less than half the attenuation obtained by manufacturers in the laboratory setting. Below is a formula to use when evaluating effectiveness of HPD's:

$$\text{Estimated exposure level with HPD} = TWA - (NRR - 7)$$

When considering whether engineering controls are to be implemented, a 50% safety factor adjusts labeled NRR values for workplace conditions.

$$\text{Estimated exposure level with HPD} = TWA - [(NRR - 7) \times 50\%]$$

When workplace sound exposure levels exceed 105 dBA, employees must use double-hearing protection, consisting of both ear plugs and ear muffs. The combined use typically adds more protection than either used alone. However, the combined noise reduction provided from double-hearing protection is much less than the NRR's added together. Below is a formula to use when evaluating effectiveness of double-hearing protection:

$$\text{Estimated exposure level with double-hearing protection} = TWA - [(higher NRR of both HPD's - 7) + 5]$$

In these situations FM-OHS will evaluate noise levels and provide HPD recommendations.

TRAINING

Hearing Conservation Training is provided by FM-OHS. All employees enrolled in the Hearing Conservation Program must register for and attend Hearing Conservation Training after initial enrollment and annually thereafter. The training must include:

- Hazards associated with excess noise
- Explanation of regulations outlined in 29 CFR 1910.95
- Description of engineering controls designed to reduce employee exposure to hazardous noise

- Instructions in the fit, care, use, and limitations of HPD
- Description of the purpose and procedures of audiometric testing

RECORDKEEPING

Audiometric test records must be maintained by FM-OHS throughout the duration of an individual's employment. Audiometric test records should include:

- Employee name
- Date of audiogram
- Healthcare provider's name
- Baseline audiometric results
- Annual audiometric results
- Date of last acoustic or exhaustive calibration of the audiometer
- Measurements of background sound pressure levels in audiometric test room

Copies of noise exposure monitoring records, including area and personal sampling results, must be maintained by FM-OHS for at least two years following sampling. Noise exposure monitoring records will include:

- Employee name
- Name of supervisor
- Location of work area
- Date of sampling
- Sampling start and stop times
- Name of individual conducting sampling
- Make, model, and serial number of device used
- Equipment calibration date
- Sampling results (i.e., L-average, dose, TWA, peak)

FM-OHS will maintain copies of current training materials and training records for employees in the Hearing Conservation Program.

PROGRAM EVALUATION

All elements of the Hearing Conservation Program to include this Hearing Conservation Program will be reviewed by FM-OHS, incorporating feedback from the supervisors and employees enrolled in the program. Revisions will be made as necessary to reflect changes in University of Virginia Facilities Management policies, industry standards, and government regulations.

APPENDIX-A

Definitions

Action Level (AL) means a concentrations designated for specific substances that initiates certain required activities, such as exposure monitoring and medical surveillance.

A-Weighted Decibels (dBA) means an expression of the relative loudness of sounds in air as perceived by the human ear.

Decibels (dB) means a unit used to measure the intensity of sound. In the measurement of sound intensity, decibel increases effect sound intensity exponentially.

Hearing Protection Device (HPD) means a device worn to reduce the level of sound that enters an employee's ear.

Hertz (Hz) means a unit used to measure frequency. In the measurement of sound, frequency determines the pitch of a sound.

Noise Reduction Rating (NRR) means a guideline that indicates the average amount of potential protection a hearing protection device will give in the presence of noise. It is a laboratory derived value that hearing protection device manufacturers place on their products, as a guide to gauge effectiveness of the device. Actual sound attenuation is much lower than the NRR depicts.

Permissible Exposure Limit (PEL) means the maximum concentration of a specific substance that an employee is allowed to be exposed to over an 8-hour shift, without suffering adverse health effects.

Sound Attenuation means a reduction in the intensity of sound.

Standard Threshold Shift (STS) means a change in an employee's hearing threshold, relative to their baseline audiogram, of an average of 10 decibels or more at 2000, 3000, and 4000 hertz in one or both ears.

Time-Weighted Average (TWA) means a method used to calculate an employee's daily exposure to a hazardous substance, averaged over an 8-hour workday. TWA's take into account the substance concentrations and the amount of time an employee is exposed to that substance.