# 4.13 Hearing Conservation

## 4.13.1 Introduction

Occupational Safety and Health Administration (OSHA) general industry standard, Occupational Noise Exposure (29 CFR) 1910.95), requires employers to implement a Hearing Conservation program when noise equals or exceeds an 8-hour time-weighted average sound level (TWA) of 85 decibels measured on the A scale (slow response) or, equivalently. Employees whose Time Weighted Average (TWA) noise exposure levels exceed 85 dB (A) must be added to the Hearing Conservation program. The OSHA noise standard is a minimum standard and may be improved upon in numerous areas, as long as employers provide at least as much protection as the standard. Meeting the National Institute for Occupational Safety and Health (NIOSH) recommended Exposure Limits (REL) is the goal of this program.

## 4.13.2 Purpose

To apply policy and practices to reduce the potential for occupational hearing loss for all employees whose job duties expose them to noise levels above those recommended by OSHA.

## 4.13.3 Policy

It is the policy of University of Missouri, Campus Facilities to provide its employees with a safe and healthful work environment. This primary objective includes reducing hearing loss due to exposure to hazardous levels of noise. This is accomplished by applying effective engineering and administrative control measure where feasible. When effective engineering and administrative controls are not feasible, or while they are being implemented or evaluated, hearing protection may be required to achieve this goal. Under these conditions employees will be provided and expected to wear hearing protection per manufacturer's recommendations. **Employees shall only wear hearing protectors provided by Campus Facilities**.

## 4.13.4 Responsibilities

### Employer

The University of Missouri, Campus Facilities shall set the policy for the hearing conservation program; see that the policy is properly administered, and assure that it complies with OSHA recommendations. This includes delegation to or contracting with trained personnel to implement the various aspects of the hearing conservation program. In addition, the employer shall provide or contract for necessary noise control devices, noise measuring and audiometric equipment, and hearing protection devices.

### Program Administrator

The program administrator shall ensure that noise measurements, audiometric testing, employee training, and the selection and fitting of hearing protections devices be implemented by appropriately trained/certified and knowledgeable individuals. The Program Administrator need not perform all of these functions, but shall ensure that the functions are effectively coordinated. This may include the use of Departmental Administrators.

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|---|
| Program Administrator: CF-Safety Representative |
| Department: MU Environmental Health and Safety |
| *Departmental Administrators/Managers/supervisor responsible for scheduling audiometric testing, training, and employee compliance with this program.* |

### Management and Supervisory Personnel

Managers and Supervisors of each area are responsible for ensuring that all employees under their supervision are trained and made aware of the hearing conservation requirements for their respective work areas. They are also responsible for ensuring their employees comply with all facets of this program, ensuring hearing protection devices are properly used, inspected and maintained, and for disciplinary procedures for employees who do not comply with the requirements of this program.

### Employees

Employees in the Hearing Conservation Program shall be aware of the program requirements and responsible for complying with the all elements of the hearing conservation program, including properly wearing protective hearing devices per manufacturer's recommendations including, proper use and maintenance of these devices. Employees are encouraged to also protect their hearing while not at work, when participating in noisy task or hobbies.

## 4.13.5 Summary of OSHA's Noise Standard

OSHA standard CFR1910.95, calls for a maximum permissible exposure limit (PEL) of 90 dB(A). This noise limit is a time-weighted average level (TWA) for an eight hour exposure with no hearing protection. The standard also uses a 5 dB exchange rate or trading relationship between noise level and duration, meaning that the exposure level may be increased by 5 dB every time the duration is cut in half.

NIOSH publication #98-126 "Criteria for a recommended standard calls for a recommended exposure level (REL) of 85 dB(A). This limit is a time-weighted average level (TWA) for an eight hour exposure with no hearing protection. This standard also has a 140 dB(A) exposure ceiling. NIOSH uses a 3dB exchange rate or trading relationship between noise level and duration, meaning that the exposure level maybe increased by 3db every time the durations are cut in half. The following table below indicates the NIOSH based hearing protection needed for a given noise exposure level.

Table 1

| **dB(A)** (**slow response**) | **Protection Level** |
|---|---|
| 85- 96 | Single Protection Required |

| | |
|---|---|
| 97 and above | Double Protection Required |

**The above chart represents the protection level if employees are working in an area at the listed exposures. Hearing protection is encouraged, but not required for employees and visitors passing through an area at the listed exposures. A list of specific equipment and areas is listed in Appendix A**

## 4.13.6 Noise Exposure Monitoring

Noise levels will be tested to determine the extent of the exposures, to target areas where noise controls may be necessary, and to identify employees who shall be included in other aspects is of the hearing conservation program.

Noise exposure monitoring will be conducted for all employees exposed to a TWA of 85 dB(A) or above.

Area monitoring may be used under some circumstances when recommended by the monitoring entity, but personal monitoring will be used when workers are highly mobile, noise levels vary considerably, or when the noise has a significant impulsive component. All continuous, intermittent, and impulsive sound from 80 dB(A) to 140 dB(A) shall be included in the calculation of noise exposure level or dose. The dosimeter shall be set to a threshold of 80 dB(A) to determine the need to implement a hearing conservation program and permissible exposure limits.

It is understood that noise conditions can be altered when equipment is eliminated, added, or rearrange in the workplace. When noise levels have been altered due to the above changes or when engineering review warrants it, additional testing may be performed.

Noise measurement equipment shall be recalibrated and maintained and used according to manufacturer's recommendations.

## 4.13.7 Engineering/Administrative Noise Control

When procuring new equipment, the University of Missouri Campus Facilities shall address noise levels in the specifications and selection when feasible. Feasible engineering or administrative controls shall be used to reduce noise levels to at least the PEL TWA or 85 dB(A) or less.

## 4.13.8 Audiometric Testing

New Campus Facilities employees participating in the CF Hearing Conservation program shall have a baseline audiometric test scheduled within the first six months of first exposure at, or above, the 85 db(A) with the appointed testing group. Baseline and annual audiograms will be preceded by at least 14 hours without exposure to workplace noise. Hearing protectors may be substituted for the 14 hour noise-free period, but this practice is not recommended. The responsibility for this

scheduling shall be in accordance with section 4.13.4 of this document. Thereafter, all employees that are routinely exposed to equal or greater than a TWA of 85 dB(A) shall receive an audiometric test annually.

Audiograms will be conducted by a certified technician or by a trainee under the direct supervision of a licensed audiologist. Audiometric testing entities will be selected by Campus Facilities.

Audiograms shall be evaluated to determine whether a standard threshold shift (STS) has occurred, which is defined as a change in hearing threshold from a baseline in either ear of an average of 10dB or more at the audiometric frequencies of 2000, 3,000 and 4,000 Hz. Employees and those who experience an STS shall be notified in writing within 21 days of determination. Notification will also be sent by the testing entity to the Campus Facilities hearing Protection Program Administrator. The departmental administrator, manager, or supervisor will also receive a letter to direct the employee to use hearing protection and have their hearing protectors checked. They may be provided with hearing protectors, which offer greater attenuation if necessary. An annual audiogram may be substituted for the baseline if the reviewing professional determines that an STS is persistent. Employees shall be referred for further evaluation, if additional testing is necessary, or if a medical condition of the ear is thought to cause aggravation by the use of hearing protection.

The testing entity shall maintain accurate records of the measurements of the background sound pressure levels in audiometric test rooms to assure that, at a minimum, they meet the OSHA requirements as set out in Appendix D of standard 1910.95.

Names of employees who display work related hearing shifts of an average of 10 dB or more from the original baseline at 2,000, 3,000 and 4,000 HZ in either ear must be sent to University of Missouri Risk Management.

## 4.13.9 Hearing Protection

All employees exposed to noise at or above 85 dB(A) shall be provided with hearing protectors and shall wear them in accordance with this policy. All hearing protectors should have a noise reduction rating of 29 dB(A) or greater.

Employees shall be provided with a choice of suitable protectors, which OSHA has interpreted to mean at least one model of ear plugs and one model of ear muffs, more styles are preferred. More are preferred. Protectors will be provided at no cost to the employee.

Hearing protectors shall attenuate exposures to at least 85 dB(A) for an 8-hour TWA. Hearing protectors shall attenuate exposures to at least 85 dB(A) for employees who have experienced an STS. A Noise Reduction Rating of 29 or greater is required for all formable foam hearing protection.

Employers must reassess the adequacy of hearing protector attenuation whenever there is a change in exposure or process that might necessitate a change in attenuation.

### 4.13.10 Hearing Conservation Training Program

At time of hire and annually thereafter, a training program shall be provided for employees exposed to a TWA of 85 dB(A) or above. This program shall include the following:

1. An explanation of the effects of noise on hearing.

2. The purposes and procedures of audiometric testing.

3. Several aspects of hearing protection:
   *The purposes of hearing protectors.
   *The advantages, disadvantages, and attenuation of various types.
   *Selection, fitting, use, and care of the devices.

*It is also advisable to discuss extra-curricular (non-occupational) noise exposures as this noise exposure also affect hearing in the same manner as occupational noise exposures*.

The entire training program need not be conducted all at one time. Employees shall be re-trained every 12 months.

### 4.13.11 Record Keeping

Records shall be kept of noise exposure and audiometric tests, including details about instrumentation and calibration. Noise exposure measurements shall be kept for the duration of employment and audiometric test records shall be kept for the duration of employment by the testing entity It is recommended, however, that both types of records be maintained for substantially longer periods.

For employees that have been tested and determined to have an STS a copy of the STS will be sent to University of Missouri Risk Management.

Reviewed and approved by Campus Facilities Directors April 25, 2016

## Appendix A
## Single hearing protection required working in areas 85 dbA-96 db(A)
## Double hearing protection required working in areas 97 db(A) and over

| Equipment/Area | Single Hearing Protection | Double Hearing Protection |
|---|---|---|
| **Landscape Services** | | |
| Back Pack Leaf Blower | | Required |

| | | |
|---|---|---|
| Hand Held Leaf Blower | Required | |
| John Deere 1145 | | Required |
| String Trimmer | Required | |
| Hedge Trimmer | Required | |
| John Deere 1445 | Required | |
| John Deere 495 | Required | |
| X-Mark Laser | Required | |
| X-Mark Turf Tracer | Required | |
| **Power Plant Areas** | | |
| Boiler 12 Basement feed pumps and fans | Required | |
| Boiler 10 Basement next to fans | Required | |
| Gas turbine 1 | Required | |
| Gas Turbine 2 | Required | |
| Turbine deck when turbines are operating | Required | |
| East and West Ash Silo (Blower Rooms) | | Required |
| Gas Compressor Building | | Required |
| High pressure feed Water Pump | | Required |
| **Tools** | | |
| Caron Arc Gouging & Hammering | | Required |
| Chop saw | | Required |
| 6 Inch Grinder | | Required |
| Masonry Table Saws | | Required |
| Handheld Masonry Saws | | Required |
| Radial | | Required |
| Metal Chop saw | | Required |
| Hammer Drill | | Required |
| Circular Saw | Required | |
| Disc Grinder | Required | |
| Band Saw | Required | |
| Handheld Grinders | Required | |
| Saber Cut Saw | Required | |
| Skill Saw | Required | |
| Pierce and Shear | Required | |
| Band Saw Lock Former | Required | |
| Plasma Cutter | Required | |
| 24" Plainer | Required | |
| Power Mastic Shaper | Required | |
| 36" Belt Sander | Required | |
| 16" Plainer | Required | |
| Table Saw | Required | |
| Panel Saw | Required | |

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|---|---|---|
| Belt Sander | Required | |
| Router | Required | |
| Miter Saw | Required | |
| Impact Driver | Required | |
| Square Scrub | Required | |
| Loading Cinder Trucks | | Required |
| Kubota | Required | |
| Chainsaw | | |

*For equipment not listed in Appendix A, follow manufacturer's recommendations on hearing protection use. If not available contact Cf Safety Representative or Environmental Health and Safety for testing
*For areas not listed, contact Environmental Health and Safety or Campus Facilities Safety for further noise monitoring.

## 4.13.12 Hearing Protector Selection Standard Operating Procedure

Selecting the right type of hearing protectors depends on the type of noise and working conditions. Your safety, industrial hygiene, and/or health personnel should be able to find the right one for you.

One of the most important points is the length of time that you use your hearing protectors. The more comfortable and easy they are to use, the longer you will wear them.

Remember the following points when choosing your hearing

protectors: FIT
There must be an effective seal.

EFFICIENCY
Noise must be reduced to safe levels.

COMFORT
As you must use the hearing protectors all the time you are exposed to noise, they should be as light and as comfortable as possible.

EASY TO USE
Practical and simple to use.

COMPATIBLE WITH OTHER FORMS OF PROTECTION
You should be able to use other protective devices like safety glasses, hardhats, goggles, welding helmets or respirators with your hearing protectors.

You are encouraged to take hearing protection home for use in non-occupational noisy activities.

## 4.13.13 Hearing Protector Fit Test Protocol

Before using any hearing protection devices, always make sure that the device is clean and in good condition.

For all hearing protection devices, refer to the packaging materials for more specific information.

**HOW TO FIT FOAM EARPLUGS**

1. Wash your hands. Roll the earplug between your fingers to squeeze into as small a diameter as possible.

2. To insert the earplug more easily, straighten the ear canal by reaching over the head with the opposite hand and pulling slightly upward and back on the pinna (outer ear). Insert the earplug into the ear canal.

3. Hold the earplug in this position for several seconds until it has expanded.

**HOW TO FIT PREMOLDED EARPLUGS**

Premolded earplugs are made from flexible materials which are preformed to fit the ear. Many are sold in two or more sizes and must be individually sized for each ear. If you have difficulty with a premolded earplug, you should check with your fitter to make sure that the size is appropriate.

1. Straighten the ear canal by reaching over the head with the opposite hand and pulling slightly upward and back on the pinna (outer ear).

2. Grasp plug and insert until you feel it sealing.

3. If a good seal cannot be obtained with a slight twisting motion, use a smaller or larger size or try another type of ear protector.

**HOW TO FIT CANAL CAPS (SEMI-AURAL DEVICES)**

Canal caps have flexible tips connected to a lightweight headband.

1. Hold the large end of the tips and place them in the ear canal openings.

2. Continue to push and wiggle the tips until a firm seal is obtained.

**HOW TO FIT EAR MUFFS**

1. Align the height of the ear cup so as to completely cover the entire ear. Brush excess hair away from ear cushions as much as possible. Be certain the cushions seal tightly against the head, with no interference from objects such as respirator headbands, glasses, or earrings, in order to obtain the best performance.

2. The ear cups may be slipped up or down to adjust for a firm, comfortable fit on the

ear. Note: Ear muffs may not fit all head sizes and shapes.

## 4.13.14 Hearing Protection Training and Protocol

1. Explain to the employee the importance of paying attention to all noise exposures, both at work and at home.

2. Explain the difference between disposable and reusable earplugs.

a. Disposable earplugs are thrown away after a limited number of usings while reusable earplugs may last several months.
b. Disposable earplugs may be formed or molded to fit in the ear; reusable earplugs are usually pre-molded.

3. Discuss the proper fitting of earplugs
a. When the first plug is inserted, sounds will be heard as if the ear is stuffed or plugged up. When the second plug is inserted, sounds should appear equal on both sides.

b. Cup your hands over the ear after the plug is inserted. If sounds appear quieter when the hand is in place, the plug is not sealing properly.

c. If the plug has a handle, pump it. You should feel a change in pressure. d.

Make sure that the earplug does not slide out of the ear easily.

e. To check the fit of foam plugs, insert the plug, allow it to expand fully, and then remove it. There should be a smooth indentation in the plug approximately 1/3 to 1/2 way down the plug and there should be no wrinkles or creases.

4. Explain the proper care and use of hearing protectors

a. Disposable Earplugs
1. Always ensure that hands are clean before inserting plugs.
2. Discard any plug which becomes dirty or loses its flexibility.

b. Reusable Earplugs
1. Always ensure that hands are clean before inserting plugs.
2. Wash daily with mild soap and water, rinse, dry and place in a storage container or plastic bag.
3. Discard any plugs which are brittle, misshapen, or discolored or which have begun to
shrink.
4. Make sure canal caps, if used, have a tight and springy headband.

c. Ear Muffs
1. Wash ear muff seals daily with mild soap and water. Rinse and dry.
2. Replace muff cushions which have become cracked, dried out or brittle. Replace entire muff when the headband has lost its tension.

3. Personalize ear muffs with markers or tape labels. DO NOT drill initials into the ear muff caps.
4. Make sure that the seal is tight by keeping long hair away from the seals, using glasses with small bows/temples, and avoiding large earrings.
5. If the employee has experienced an STS, have the employee demonstrate to the trainer how hearing protection is worn.
a. Check the condition of the hearing protection device. b.
Check for fit and reinstruct on insertion or use.
c. Discuss the importance of using hearing protection for all activities with noise exposure. Discuss the work area, work situation, exposure levels and use of hearing protection devices. Refit with a protector having greater attenuation if appropriate.

6. Complete records:
a. Have each employee sign a form indicating that training has been received. b.
Make sure that all training forms are dated and include topics covered, training materials used and name(s) of presenter(s).

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