Welcome / Splash Screen

Welcome to the Florida Department of Transportation’s computer-based training series on OSHA Construction Awareness Training. This is Chapter 3 – Hearing Protection. To begin, select the start button or press Shift+N on your keyboard.

Welcome
A Help button is located at the top of each page in this course. Selecting this button will bring up a PDF file with information on how to navigate and use this course.

You may select the Help button now if you would like to review this useful information before you begin the course.

Introduction

Noise, or unwanted sound, is one of the most pervasive occupational health problems. 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 can 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.

OSHA’s hearing conservation program is designed to protect workers with significant occupational noise exposures. You should not suffer hearing impairment from your job, even if you are subject to high noise over your entire working lifetime.

This module covers the following aspects of a successful hearing conservation program:

- Monitoring
- Audiometric testing
- Hearing protection
- Employee participation
- Engineering and administrative controls

Monitoring
The hearing conservation program requires your employer to monitor every worker’s noise exposure level, in a way that accurately identifies any employees who are exposed to noise at or above 85 decibels (dB) averaged over 8 working hours. This is called an 8-hour time-weighted average (TWA), and it means that your noise exposure is compared to that of a hypothetical worker who is exposed to 85 dB (as loud as light traffic on a city street) continuously for an entire work day.

The exposure measurement your employer makes has to include all continuous, intermittent (reoccurring, with breaks in between), and impulsive (occurring only once) noise within a range of 80 dB (as loud as a telephone dial tone) to 130 dB (about as loud as a jet plane taking off). The measurement must be taken during a typical work situation.

For comparison, here is a list of common sounds and their approximate noise levels in dB:

- A quiet park: 20 dB
- Quiet conversation: 40 dB
- Heavy rainfall: 50 dB
- Dial tone: 80 dB
- Heavy traffic: 90 dB
- Rock concert: 110-120 dB
- Jet engine: 130-150 dB
- Gunshot: 140-160 dB

Your employer should also repeat the monitoring whenever a change in job site or procedure might increase noise exposure. These changes may mean that more employees need to be included in the program, or that their hearing protectors may no longer provide adequate protection. All employees are entitled to observe the monitoring procedures, and your employer is responsible for notifying all workers about the results.

The following steps should be taken in any monitoring procedure:

- Monitoring should be done at any site where noise exposure might be a problem, and should be repeated if changes at the site might increase the noise exposure.
- The monitoring process must be done during a normal workday, and workers may observe the process if they wish.
- The results of the monitoring should be made available to the employees as soon as possible, and should be in a format which can be easily understood.
Engineering and Administrative Controls

Engineering and administrative controls are essential to achieve an effective hearing loss prevention program.

Engineering and administrative controls represent the first two steps toward resolving hazardous situations: remove the hazard if possible, and if not, then remove the worker from the situation (the third step is employing personal protective equipment to minimize the remaining risks).

These controls should reduce employees’ exposure to hazardous levels of noise to the point where the risk to hearing can be managed by protective equipment, or is eliminated entirely.

Many noise sources can be reduced or eliminated using engineering controls, but the economic feasibility must be determined on a case-by-case basis.
In some instances the application of a relatively simple noise control solution, like attaching a muffler to a portable generator, can reduce a hazard to the extent that it no longer impacts worker safety. In other cases, however, the noise reduction process may be complex or expensive, and must be accomplished in stages over a period of time.

Each reduction of a few decibels, however, reduces the hazard to your hearing and improves communication at work.

Some typical engineering controls are:

- Reducing noise at the source
- Interrupting the noise path
- Reducing reverberation
- Reducing structure-borne vibration

These controls might be implemented by:

- Attaching a muffler to a generator
- Placing a concrete barrier between a jackhammer operator and other workers
- Moving stationary equipment out from beneath an overpass
- Providing a support for stationary equipment which isolates it from the ground

Administrative controls, which are changes in the work schedule or operations which reduce noise exposure, may also be used effectively. Examples include operating a noisy machine on the second or third shift when fewer people are exposed, or shifting an employee to a less noisy job once a hazardous daily noise dose has been reached.

Generally, administrative controls have limited use in industry because employee contracts seldom permit shifting from one job to another. Moreover, the practice of rotating employees between quiet and noisy jobs, although it may reduce the risk of substantial hearing loss in a few workers, may actually increase the risk of small hearing losses in many workers.

The employees who operate, maintain, and repair equipment are essential to the noise control process. Because they know the most about the process and the equipment, it is vital that employees express their ideas and concerns to their supervisors, so that the noise-control devices and procedures will be as practical and effective as possible.

Employees are also responsible for operating and maintaining machinery with noise controls in place, for following noise-reduction strategies on the job, and for helping supervisors evaluate how well the program is working.

**Audiometric Testing**
Audiometric testing is a process that monitors an employee’s hearing over time. It also provides an opportunity for you to learn about your hearing and how to protect it. Your employer must establish and maintain an audiometric testing program, which has to be available at no cost to anyone who is exposed to 85 dB or more (measured as an 8-hour time-weighted average).

There are several important elements of a testing program:

- Baseline audiograms
- Annual audiograms
- Follow-up procedures

The baseline audiogram is the reference audiogram against which future audiograms are compared. Employers must provide baseline audiograms within six months (one year, in some cases) of a worker's first exposure at or above the safe level of 85 dB. It is important that employees be away from workplace noise and not wear hearing protection for 14 hours before the test.

Employers must provide annual audiograms within one year of the baseline. Testing your hearing annually helps identify any problems as early as possible, which will allow you and your employer to take steps to protect you before the hearing loss gets worse.

Employers must compare annual audiograms to the baseline taken when any worker is first exposed to a noisy environment, so they can determine whether the employee has lost any hearing ability. Professionals might call hearing loss a "standard threshold shift", or STS. An STS in either ear means that at a particular frequency, the softest noise you can hear has gotten 10 dB louder.

The audiometric testing program follow-up should indicate whether the hearing conservation program is working to keep you from developing any hearing loss. Such a follow-up might include referral to a qualified doctor for further testing.

Anyone who shows an STS needs to have hearing protection if he or she doesn’t already have it, and the employer is responsible for making sure your training about
personal hearing protection equipment is up-to-date. If you have an STS, your employer has to tell you within 21 days after they receive the results of your audiometric test. Depending on the precise results, you may need additional testing or medical visits.

**Hearing Protection**

Determining whether employees at a particular jobsite need hearing protection can be difficult. In general, employers have to consider several factors:

- The loudness of the noise, as measured in decibels (dB)
- The duration of exposure to the noise
- Whether workers move between sites with different noise levels.
- How many sources generate loud noises

Generally, the louder the noise, the shorter time employees can listen to it before they need hearing protection.

For instance, 85 dB (as loud as normal traffic) over a full work day is the lowest level at which hearing protection is required. A noise level of 95 dB is ten times as loud, and your exposure should be limited to six hours or less. A noise at 115 dB (what you would hear at the front row of a rock concert) is only safe to listen to for about 15 minutes.

If any recurring noise at your work site causes pain, it is far too loud for safety, and you should have hearing protection.

Any of the following situations would mean you need hearing protection:

- If you have worked in a high-exposure environment for less than six months and have not yet had a baseline audiogram.
- If they are exposed to noise over the permissible exposure limit of 85 dB over an 8-hour TWA.
- If an audiometric exam shows that you have a standard threshold shift (STS).

If exposure to workplace noise is too high for safety, or if an audiometric test shows that your hearing is starting to decline, your employer will require that you wear appropriate hearing protection.

Hearing protectors reduce, or attenuate, the amount of noise that gets through to the ears. The amount of attenuation depends on the type of hearing protection used and how well it fits, but your hearing protection should keep your noise exposure down to 85 dB or less as a time-weighted average.

Some types of hearing protection include:


- **Single-use earplugs** are made of waxed cotton, foam, silicone rubber or fiberglass wool. They are self-forming and, when properly inserted, they work as well as most molded earplugs.

- **Pre-formed or molded earplugs** have to be fitted for you by a professional, and can be disposable or reusable. Reusable plugs should be cleaned after each use.

- **Earmuffs** require a perfect seal around the ear. Glasses, facial hair, long hair or facial movements such as chewing can reduce the protective value of earmuffs.

Employers must provide their employees with a selection of at least one kind of ear plug and at least one type of earmuff. Workers should decide, preferably with the help of someone trained in OSHA-compliant hearing protection, which size and type of protection is most suitable for their work environment. The hearing protection you select should be comfortable to wear and must reduce the noise level to below the 85 dB 8-hour TWA level in order to prevent hearing loss.

Most employers use the equipment’s Noise Reduction Rating (NRR), which represents the protective equipment’s ability to reduce noise under ideal laboratory conditions. The employer then adjusts the NRR to reflect the amount of attenuation (reduction in noise level) in the actual working environment.

Your employer is also responsible for showing you and your coworkers how to use and care for your hearing protection, and for making sure that everyone wears their protective equipment correctly while on the job site.

**Employee Participation**

Workers who understand why the program exists and how it benefits them are more motivated to wear their hearing protection, make sure they understand how to use it, and spend time taking audiometric tests.

Although your employer has many responsibilities related to your hearing safety, you must take responsibility for your own hearing health by acting in accordance with hearing conservation policies, and by contributing to your own education about hearing hazards.

You also have the right and the responsibility to voice any questions or concerns you have about your employer’s hearing conservation program, to inform the officials in charge of the program if some aspect of the procedure is inconvenient or impractical for you and your coworkers, and to suggest alternatives that would be easier and more workable.

You are an essential part of hearing loss prevention program, and can serve as a source of information for your employer, as a consumer of information. You can help
train your coworkers in how to use hearing protection, and work as a group to approach the hearing conservation program’s facilitator with any concerns you have.

If anyone is worried about their hearing or has questions about the program, you do not have to wait for a scheduled meeting to talk to your employer about the issue. These concerns should not have to wait until the regularly scheduled safety meetings, but should be expressed as soon as they arise. If hearing loss prevention program personnel fail to provide adequate consideration or follow-up, employees need to appeal to higher management until their concerns are addressed.

**Common Questions**

**Q:** Will hearing protection keep me from hearing warning sounds, like a backup alarm?

**A:** Some on-the-job injuries do occur because workers can’t hear warnings. These injuries, however, are most often due to overwhelming background noise or prior hearing loss. Hearing protection decreases background noise as much as it decreases the volume of the warning sound, so if the warning is audible without hearing protection, it will be audible with it. Protective equipment also prevents hearing loss that otherwise might cause someone to miss a vital warning. Wearing protective equipment will not change your ability to hear and respond to warnings, and is a benefit to your workplace safety program.

**Q:** In my job, I need to be able to hear the machinery I work with so that I can detect changes that might indicate a problem. Will hearing protection keep me from being able to do my job?

**A:** If detecting changes in machine noise is an important component of your job, your employer can help you find specialized protection. Some hearing protectors only “turn on” when noise reaches dangerous levels, and others are available that lower the sound level without losing the fidelity, or quality, of the sounds you hear.

**Q:** Will I still be able to hear my coworkers talk while wearing hearing protectors?

**A:** The ability to hear and understand speech depends on a number of factors, like the distance between you and the speaker, the amount of background noise, existing hearing loss, and even whether you can see the speaker’s face. Many people do find it hard to hear others talking through their protective equipment, and this is part of the reason that hand signals are often used in construction and industrial situations. If speaking and listening is an important part of your job, your employer can help you find protection with a different fit, which may help you hear speech. Earmuffs are also available with built-in communications systems, which can be a great help in noisy situations.
**Q:** How long does it take to get used to hearing protectors?

**A:** Hearing protection is like any other piece of protective equipment, or even a piece of normal clothing. Some things fit perfectly right away, and some may take some time before they are properly “broken in”. If your hearing protection is uncomfortable, though, or if your ears ever hurt - from noise or from the protection - your hearing protection doesn’t fit properly, and you need a different size or kind.

**Q:** How can I tell if a noise situation is too loud?

**A:** There are a few good general rules. If you have to raise your voice above a normal conversation level when someone is standing at arm’s length, then the noise is too loud for safety over a workday. If you ever experience ringing in your ears, or if you leave a noisy area and other sounds seem flat or dulled, then you need hearing protection in the noisy area. Last, if you ever experience pain from a sound, particularly if it is a noise that you experience often throughout your day, it is far too loud for safety and you definitely need to be protected from it.

**Q:** How long can I hear a loud noise before it becomes dangerous?

**A:** This is like asking how long you can touch a hot surface before being burned, or how long you can look at a bright light without hurting your eyes. There are a number of factors involved, particularly the level of noise and how long you hear it - but just as you wear mitts before removing a hot pan from the oven, and you wear sunglasses on a clear day, you should wear hearing protection any time you are around loud noise on the job.

**Q:** How often should I have my hearing tested?

**A:** In general, everyone should have their hearing tested every three years. Your employer should conduct annual audiometric testing for anyone who is exposed to hazardous levels of noise at work. If you ever notice a change in your hearing, particularly if you notice you can no longer hear quiet sounds, you should be tested. Ringing in your ears is also often a sign of the beginning of long-term hearing damage, and is definitely a reason to get a hearing test.

**Q:** If I already have damaged hearing and wear a hearing aid at work, why should I worry about my employer’s hearing conservation program?

**A:** Hearing loss is not an “on-or-off” situation; your hearing can continue to degrade even if you already need a hearing aid, making it even harder to communicate with coworkers, friends, and family.

**Q:** Where can I get a hearing test?
A: Your usual doctor should be able to refer you to a qualified hearing professional, and your local phone book should provide the name and contact information of hearing clinics in your area. You can also find more information by visiting OSHA on the World Wide Web at http://www.osha.gov, or the National Institute of Occupational Safety and Health at http://www.cdc.gov/niosh.

Conclusion

Excessive, unwanted noise is just as much of a hazard as many of the more obvious dangers on a work site – but as with asbestos or lead poisoning, the effects can be subtle, take years to develop and result in a long-term disability. Unlike asbestos or another toxin, hearing loss won’t kill you – but failure to protect your hearing will significantly impact your quality of life. Act now to ensure you’ll still be listening in the years to come.

Exam

You are about to begin a 10 question exam on the material that was presented in this module. You must pass this exam with a score of 70% to receive credit for this course.

You may take this exam as many times as necessary. Feel free to review the material if you feel you are not ready to proceed.

You must agree to the following affidavit before you can begin to the exam.

AFFIDAVIT

By entering my name in the field below, I hereby declare, warrant and confirm, under penalty of perjury, that I have not misrepresented my identity, and I intend to personally take and complete the following exam.

Please enter your name: ______________

Press the "next" button to begin after you have signed the affidavit.