CPWR

THE CENTER FOR CONSTRUCTION RESEARCH AND TRAINING

Construction Noise

&

Hearing Loss Prevention

Training Program

Instructor Guide

In-Class & Hands-On Refresher Exercises

TABLE OF CONTENTS

Background……3

Lesson Plans……4

A. NOISE TRAINING EXERCISES FOR USE IN OSHA 10- AND 30-HOUR MODULES (SUCH AS TRAINING ON PPE, USE OF POWER TOOLS, ETC.)……4

Exercise A-1: The Impact of Hearing Loss……4

Exercise A-2: Are You Talking To Me? What it's like to lose your hearing……6

Exercise A-3: What Does Hearing Loss Sound Like?……12

Exercise A-4: How to Properly Use Ear Plugs……16

Exercise A-5: How Loud is TOO Loud?……20

Exercise A-6: How Would You Describe Your Hearing?……28

B. NOISE TRAINING EXERCISES FOR USE IN IN-CLASS FOR SKILLS TRAINING PROGRAMS……31

Exercise B-1 – Cumulative Presentation: Noise & Hearing Loss – The risk & prevention……31

Exercise B-2 (A–D) – Stand Alone Slides: Noise & Hearing Loss – The risk & prevention……35

Exercise B-2 (A): Noise – What are the risks?……36

Exercise B-2 (B): The Cost of Hearing Loss……37

Exercise B-2 (C): How Loud is TOO Loud?……38

Exercise B-2 (D): Preventing Hearing Loss……40

C. NOISE TRAINING EXERCISES FOR USE IN THE HANDS-ON PORTION OF SKILLS TRAINING PROGRAMS……41

Exercise C-1: Identifying Noise Levels of Equipment (Group Activity)……41

Exercise C-2: Measuring Noise Levels Throughout the Day (Individual Activity)……43

Exercise C-3: Choosing the Right Hearing Protection……45

Acknowledgements……46

Appendix……46

Version I February 2018

BACKGROUND

Construction work is often loud, putting workers at risk of exposure to hazardous noise levels. According to the National Institute for Occupational Safety and Health (NIOSH), roughly 3 out of 4 construction workers are exposed to noise levels above the recommended limit, putting them at risk for hearing loss. Many construction workers experience hearing loss at a young age. As a result, it is common for a construction worker to have the hearing of someone twice their age that has not been exposed to hazardous occupational noise.

There are steps construction employers can take to reduce noise levels and protect their employees from exposure to hazardous noise levels, including buying lower-noise equipment, isolating noisy generators or tasks, and providing appropriate hearing protection.

This noise and hearing loss program is designed to provide instructors/trainers with the information needed to raise worker awareness of hazardous noise levels and ways to prevent hearing loss. The program offers options for conducting noise and hearing loss training depending on the time available. It is divided into three parts, each with its own instructor's guide and materials.

This instructor guide, **In-Class & Hands-On Refresher Exercises,** is designed to provide instructors/trainers with the information needed to successfully conduct the in-class and hands-on short refresher exercises on construction noise and hearing loss prevention. It includes materials that can be incorporated into safety and health training modules (e.g., PPE, power tools, etc.) or as part of a hands-on skills training programs. The exercises are short (5 – 15 minutes), and each one identifies the materials and related information an instructor will need to carry out the exercise.

The other two program modules are:

- **1 Hour Module** – this module is designed to fulfill the OSHA 30-hour training program requirement for training on a health hazard.

- **30 Minute Module** – this module is designed to fulfill the OSHA 10-hour training program requirement for a ½ hour training module on a health hazard. Alternatively, it can be used for a portion of the OSHA 30-hour health hazard training requirement.

  NOTE: The materials can also be used as stand-alone training programs.

To access these and other training materials, and learn more about hearing loss and methods to control noise, visit https://www.cpwr.com/research/r2p-p2r-work-preventing-hearing-loss.

LESSON PLANS

A. NOISE TRAINING EXERCISES FOR USE IN OSHA 10- AND 30-HOUR MODULES (SUCH AS TRAINING ON PPE, USE OF POWER TOOLS, ETC.)

Exercise A-1: The Impact of Hearing Loss

Learning objective: By the end of this exercise, participants will be able to explain why noise and hearing loss is an important issue for construction workers.

Equipment needed:

- Set up an LCD projector and computer to show PowerPoint. Click on the slide to make sure the video is working properly. If you don't have a good sound system for your LCD projector, you will need speakers for the video clip.

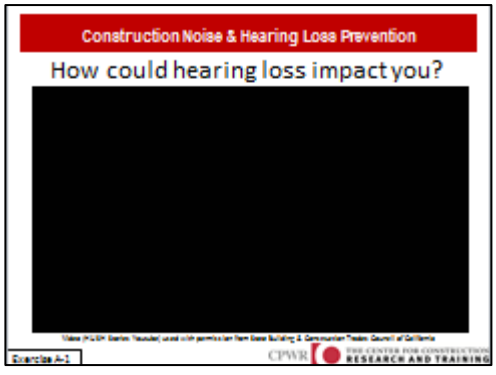
Teaching materials:

- Instructor Guide - includes:
  - Thumbnail of corresponding PowerPoint slide
  - Notes for slide
- PowerPoint slide – includes:
  - Notes for slide
  - Video clip: Testimonials from construction workers with hearing loss

How could hearing loss impact you? (video embedded in slide)

NOTES FOR SLIDE

Show the slide, but do not click on the video immediately – to play the video, click on the middle of the screen or the play button. The video is 2 minutes and 25 seconds long and does not need an internet connection to play.



When you use or work around **[insert the noisy equipment or work being covered]** you are at risk of being exposed to dangerous levels of noise. That

noise could damage your hearing and result in hearing loss.

You may think that your hearing is fine, and it won't happen to you. But the reality is that hearing loss is a serious problem for construction workers.

Let's hear from some construction workers about their personal experiences with noise on the job and hearing loss.

Click on slide to play video clip.

AFTER LISTENING TO THE VIDEO ASK THE CLASS:

Has there been a time where you didn't wear hearing protection? If not, Why?

Give participants a few minutes to respond.

Tell the class:

The good news is that hearing loss can be prevented. One way you can protect your hearing is by always wearing proper hearing protection when you work around hazardous noise levels.

INSTRUCTOR NOTES:

This video has been tested to play on the Windows platform. Mac users experiencing difficulty can view the video here, https://youtu.be/20KKMEyd6SE (requires internet connection) or contact CPWR's Training Department for a version of the presentation that includes Mac compatible video.

The full video was developed by the California State Building Trades. Excerpts are being used with their permission. The full video can be found on YouTube: https://www.youtube.com/watch?v=YX1kMPDZbgg&feature=youtu.be or you can request a copy from CPWR.

Exercise A-2: Are You Talking To Me? What it's like to lose your hearing

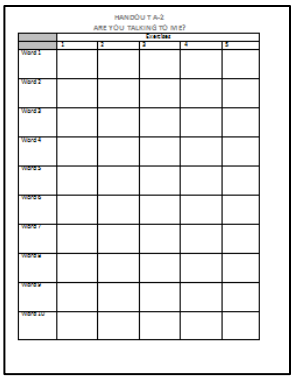
Learning objective: By the end of this exercise, participants will recognize the signs and effects of hearing loss.

Equipment needed:

- Set up an LCD projector and computer to show PowerPoint. Click on the slide to make sure the audio is working properly. If you don't have a good sound system for your LCD projector, you will need speakers for the noise simulators.
- A flip chart or white board and markers

Teaching materials:

- Instructor Guide - includes:
  - Thumbnail of corresponding PowerPoint slides
  - Notes for slides
- PowerPoint slide – includes:
  - Notes for slides
  - Noise simulations – audio files
- Handout (available in Appendix)
  - A-2 - *Are You Talking to Me?* Worksheet (one for each participant, and answer key included for instructor's use).



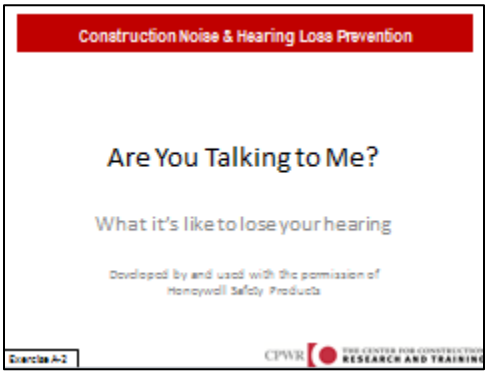
Are you talking to me? What it's like to lose your hearing

NOTES FOR SLIDE 1

When you work in construction, you are exposed to noise created by the work you're doing and noise created by other work on the jobsite.

Being able to hear what's going on around you has a direct impact on your safety and your life.

Let's do a listening activity that will help us experience what it's like to not be able to hear.



INSTRUCTOR NOTES:

The next 5 slides contain audio files. You may exclude the final 2 audio files – slides 6 and 7– if a shorter version is needed.

Play each of the audio files. At the end, show the slide that lists all of the words in the order they were said in the audio files and ask the class to check it against their worksheet.

The files include 10 words that are repeated in the first 4 audio files (the last audio file has a different set of 10 words). The ten words were picked to include a wide variety of speech sounds, but with particular emphasis on sounds that can be significantly affected by hearing loss.

- **The first file simulates what it would be like to have severe hearing loss on a construction site.**
- **The second file simulates what it would be like to have mild hearing loss on a construction site.**
- **The third file simulates what it is like to hear the words with normal hearing on a construction site.**
- **The fourth file simulates what it is like to hear the words with normal hearing in a quiet room.**
- **The fifth file simulates what it would be like to have moderate hearing loss in a quiet room, but with a female speaker.**

Are you talking to me? – Blank worksheet

NOTES FOR SLIDE 2

Hand out a copy of the worksheet – Are you talking to me? (Handout A-2) to each participant.

TELL THE CLASS:

We're going to go through five hearing exercises – there's a column for each on your worksheet. For each one, I'm going to play an audio file. Each audio file has 10 words in it. As you listen – try to write down each word that you hear in the correct column of your worksheet. Feel free to make a guess. At the end of this exercise, we will see how many we got correct.

I'm not going to collect the worksheets. The worksheets are for you, to keep track of what you hear for our discussion.

Are you talking to me? – Audio 1

NOTES FOR SLIDE 3

Let's start with the first audio file. You're going to fill in the first column. As you hear words, write them down in the order that you hear them – don't wait until the audio ends.

Play the audio file by clicking on the sound image or the play button on the screen.

After the audio file finishes:

ASK THE CLASS:

Was it easy to make out the words? What level of hearing loss do you think this represents?

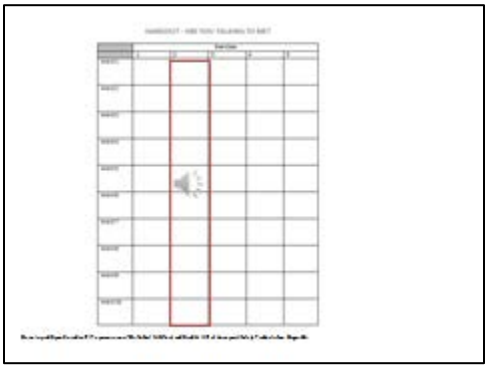
Give the class a few minutes to respond then

TELL THE CLASS:

This audio was an example of <u>severe</u> hearing loss with a man saying 10 words overtop background noise from a construction site.

Are you talking to me? – Audio 2

NOTES FOR SLIDE 4



Now let's listen to the second audio file – write down what you hear in the second column.

Play the audio file by clicking on the sound image or the play button on the screen.

After the audio file finishes:

ASK THE CLASS:

Was it easy to make out the words? What level of hearing loss do you think this represents?

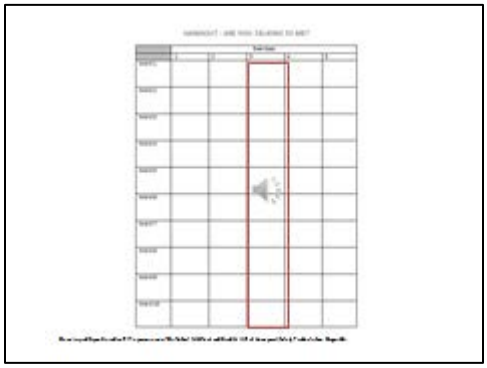
Give the class a few minutes to respond then

TELL THE CLASS:

This audio was an example of mild hearing loss with a man saying 10 words overtop background noise from a construction site.

Are you talking to me? – Audio 3

NOTES FOR SLIDE 5



Now let's listen to the third audio file – write down what you hear in the third column.

Play the audio file by clicking on the sound image or the play button on the screen.

After the audio file finishes:

ASK THE CLASS:

Was it easy to make out the words? What level of hearing loss do you think this represents?

Give the class a few minutes to respond then

TELL THE CLASS:

This audio was an example of no hearing loss with a man saying 10 words overtop background noise from a construction site.

INSTRUCTOR NOTE:

If you are doing a shorter version and not using slides 6 and 7, jump ahead to slide 8.

Are you talking to me? – Audio 4

NOTES FOR SLIDE 6

These last two audio files may be a test of how well you hear away from work. Write down what you hear in the fourth column.

Play the audio file by clicking on the sound image or the play button on the screen.

After the audio file finishes:

ASK THE CLASS:

Was it easy to make out the words? What level of hearing loss do you think this represents?

Give the class a few minutes to respond then

TELL THE CLASS:

This audio was an example of no hearing loss with a man saying 10 words with no background noise.

Are you talking to me? – Audio 5

NOTES FOR SLIDE 7

Now let's play the final audio file. Write down what you hear in the final column.

Play the audio file by clicking on the sound image or the play button on the screen.

After the audio file finishes, ASK THE CLASS:

Was it easy to make out the words? What level of hearing loss do you think this represents?

Give the class a few minutes to respond then

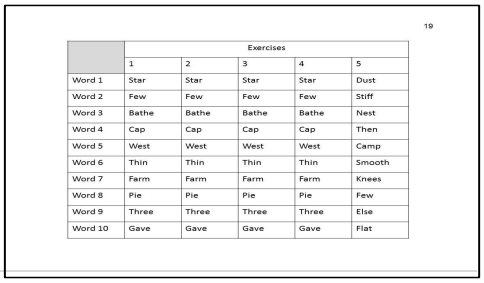
TELL THE CLASS:

This audio was an example of moderate hearing loss with a woman saying 10 words with no background noise.

Are you talking to me? – Answers to worksheet

NOTES FOR SLIDE 8

Tell the class to take a few minutes to check what they wrote down against the results.



	Exercises				
	1	2	3	4	5
Word 1	Star	Star	Star	Star	Dust
Word 2	Few	Few	Few	Few	Stiff
Word 3	Bathe	Bathe	Bathe	Bathe	Nest
Word 4	Cap	Cap	Cap	Cap	Then
Word 5	West	West	West	West	Camp
Word 6	Thin	Thin	Thin	Thin	Smooth
Word 7	Farm	Farm	Farm	Farm	Knees
Word 8	Pie	Pie	Pie	Pie	Few
Word 9	Three	Three	Three	Three	Else
Word 10	Gave	Gave	Gave	Gave	Flat

Here are the words that were in each audio file. Take a few minutes to check how you did.

ASK THE CLASS:

Raise your hand if you were surprised by how you did.

THEN ASK THE CLASS:

How did the jobsite noise in the background effect what you could hear?

Give the class a few minutes to respond

TELL THE CLASS:

Experts tell us that in the first stages of hearing loss, it becomes difficult to hear high frequencies. For example, you may have difficulty hearing or understanding the high-pitched voices of children. People with hearing loss often have difficulty differentiating words that sound alike, especially words that contain S, F, SH, CH, H, TH, T, K, or soft C sounds. The words on the audio files we heard today contained letter combinations that can are usually affected by work-induced hearing loss.

Exercise A-3: What Does Hearing Loss Sound Like?

Learning objective: By the end of this exercise, participants will recognize the signs and effects of hearing loss.

Equipment needed:

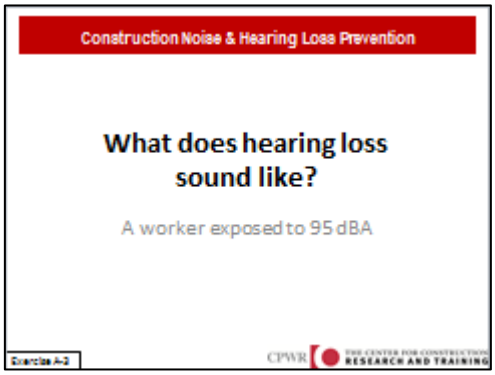
- Set up an LCD projector and computer to show PowerPoint. Click on the slides to make sure the audio is working properly. If you don't have a good sound system for your LCD projector, you will need speakers for the noise simulators.

Teaching materials:

- Instructor Guide - includes:
  - Thumbnail of corresponding PowerPoint slides
  - Notes for slides
- PowerPoint slide – includes:
  - Notes for slides
  - Noise simulations – audio files

What does hearing loss sound like?

NOTES FOR SLIDE 1



Let's do a listening activity that will help us experience what happens to a construction worker's hearing as they move through their career without wearing hearing protection.

I'm going to play several short audio files for you. The words in the recording are the same, but each will represent a different number of years of workplace exposure at 95 decibels – which is 10 decibels over the National Institute for Occupational Safety and Health's recommended exposure limit and 5 over OSHA's permissible exposure limit.

INSTRUCTOR NOTES:

The activity has 6 different audio files each around 13 seconds. The files have a female voice saying "You can prevent hearing loss from keeping away from loud noise. Wear ear muffs, ear plugs, or other hearing protection whenever you are around loud sounds. Loud noise causes permanent hearing loss." Each file has

the same noise exposure of 95 dB, however the number of years of exposure and age of the worker increases in steps of 5. The audio files were created using NIOSH's Hearing Loss Simulator.

At the beginning of a career

NOTES FOR SLIDE 2

This short clip is with no hearing loss – or what it would sound like at the beginning of a construction career before any workplace exposure.

Play the audio file by clicking on the sound image or play button on the screen.

After 10 years in construction

NOTES FOR SLIDE 3

This is a short clip of what a person hears after 10 years of exposure to 95 decibels of sound at work.

Play the audio file by clicking on the sound image or play button on the screen.

After 15 years in construction

NOTES FOR SLIDE 4

This is a short clip of what a person hears after 15 years of exposure to 95 decibels of sound at work.

Play the audio file by clicking on the sound image or play button on the screen.

After 20 years in construction

NOTES FOR SLIDE 5

This is a short clip of what a person hears after 20 years of exposure to 95 decibels of sound at work.

Play the audio file by clicking on the sound image or play button on the screen.

After 25 years in construction

NOTES FOR SLIDE 6

This is a short clip of what a person hears after 25 years of exposure to 95 decibels of sound at work.

Play the audio file by clicking on the sound image or play button on the screen.

After 30 years in construction

NOTES FOR SLIDE 7

This is a short clip of what a person hears after 30 years of exposure to 95 decibels of sound at work – or at retirement.

Play the audio file by clicking on the sound image or play button on the screen.

ASK THE CLASS:

What are some ways that hearing loss can be prevented?

If the class can't come up with some strategies for hearing loss prevention, remind them of the hierarchy of controls and the importance of hearing protection.

TELL THE CLASS:

The best ways to prevent hearing loss is to make sure workers are not exposed to loud noises for long periods, for example, by using lower noise equipment, putting up sound barriers, or scheduling noisy work when few workers are on site.

But even with these controls, noise levels may be over safe levels, which is why it's always important to be aware of the noise around you – not just the noise you're generating – and use appropriate hearing protection. Your employer should provide hearing protection.

Exercise A-4: How to Properly Use Ear Plugs

Learning objective: By the end of this exercise, participants will be able to use ear plugs properly and/or know what resources you can use to learn how to insert them properly.

Equipment needed:

- Set up an LCD projector and computer to show PowerPoint. Click on the slide to make sure the video and audio are working properly. If you don't have a good sound system for your LCD projector, you will need speakers for the noise simulators.

Teaching materials:

- Instructor Guide - includes:
  - Thumbnail of corresponding PowerPoint slides
  - Notes for slides
- PowerPoint slide – includes:
  - Notes for slides
  - Video demonstrating how to use ear plugs
- Handouts
  - One set of foam ear plugs for each participant
  - A-4 – Steps for Inserting Ear Plugs (available in Appendix)


HANDOUT – 5 STEPS FOR INSERTING EAR PLUGS

1. Roll

1. Roll the earplug up into a small, thin "snake" with your fingers. You can use one or both hands.

2. Pull Back ear

2. Pull the top of your ear up and back with your opposite hand to straighten out your ear canal. The rolled-up earplug should slide right in.

3. Insert

3. Hold the earplug in with your finger. Count to 20 or 30 out loud while waiting for the plug to expand and fill the ear canal. Your voice will sound muffled when the plug has made a good seal.

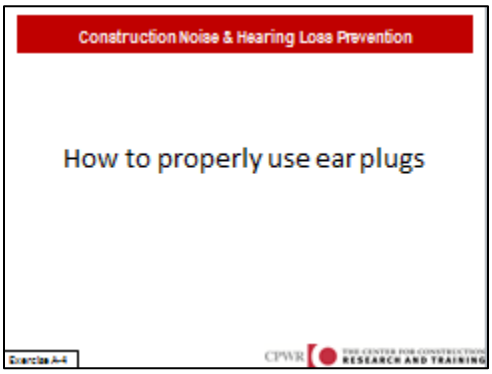
Watch NIOSH show you how to insert an ear plug at:

Check the fit when you're all done. Proper insertion should result in an acoustic seal, which causes a very pronounced lowering of noise levels. With earplugs inserted, cup your hands firmly over your ears and release. The earplugs should be blocking enough noise so that cause why the ears with your hands results in no significant change in noise level.

How to properly use ear plugs

NOTES FOR SLIDE 1

Protecting your hearing is critical for your safety on the job and your quality of life off the job. We are going to take a few minutes to learn how to properly use ear plugs.



Hearing – Without hearing protection

NOTES FOR SLIDE 2

Track 1 (hearing: without hearing protection) should be listened to by the class without hearing protection.

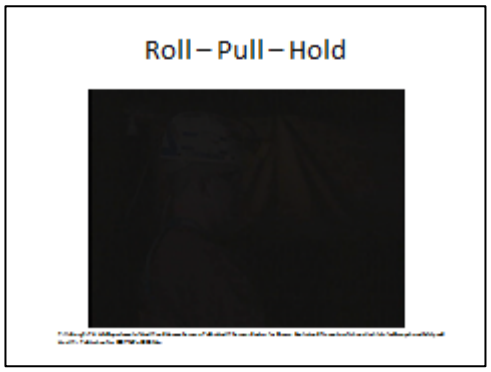
TELL THE CLASS:

First let's listen to this audio tape. This is what the sound is like without hearing protection.

Roll – Pull - Hold

NOTES FOR SLIDE 3

Since ear plugs will not protect your hearing unless they are inserted properly, let's start by watching this short NIOSH video on how to properly use ear plugs.



Adjust the volume so the sound is just loud enough for the class to hear. Click on the sound image or play button on the screen to play the audio. The video is 30 seconds. Internet connection is not required to play the video.

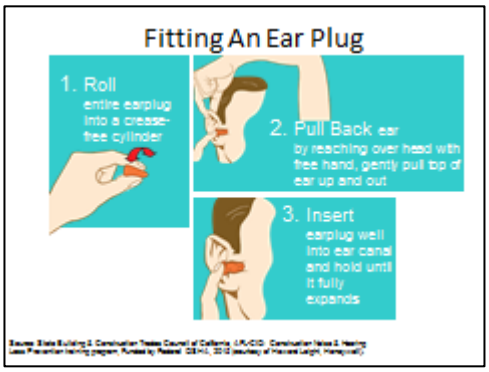
INSTRUCTOR NOTES:

This video has been tested to play on the Windows platform. Mac users experiencing difficulty can view the video here, https://www.youtube.com/watch?v=Veayb1NucTA (requires internet connection) or contact CPWR's Training Department for a version of the presentation that includes Mac compatible video.

Fitting an Ear Plug

NOTES FOR SLIDE 4

Give each participant a set of ear plugs. Tell them everyone is supposed to try to use them. Walk them through the steps and demonstrate using a set of ear plugs that you will insert in your own ears.



Now let's try to insert ear plugs correctly. I'll walk you through the steps so we're all doing it together, and then we're going to do a quick test to see if they're in correctly.

- First roll foam plug tightly. Make sure there are no creases.
- Next, pull your ear back gently at the top to straighten the ear canal.
- Insert the plug.
- Release your ear while holding the plug for 20-30 seconds. It will expand to the shape of your ear canal.
- When plug has expanded, tug on it gently to see if it is secure.

Now let's do our other ear. Remember:

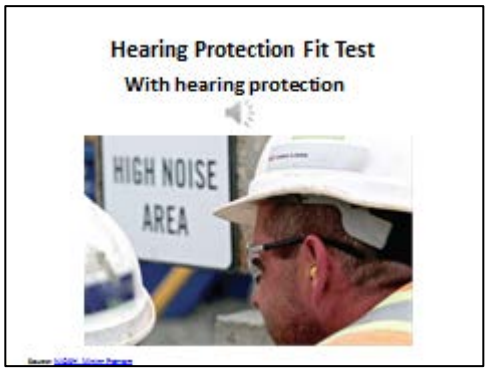
- First roll foam plug tightly. Make sure there are no creases.
- Next, pull your ear back gently at the top to straighten the ear canal.
- Insert the plug.
- Release your ear while holding the plug for 20-30 seconds. It will expand to the shape of your ear canal.
- When plug has expanded, tug on it gently to see if it is secure.

Hearing Protection Fit Test – With hearing protection

NOTES FOR SLIDE 5

Once everyone has their ear plugs in play the audio on this slide, play the audio file without changing the volume from the earlier audio file.

If a person's ear plugs have been put in properly they will not be able to hear the sound.



After you play the audio, tell the class to remove their ear plugs.

TELLTHE CLASS:

If you could hear the sound track, your ear plugs aren't inserted properly. Don't worry. It sometimes takes a few tries to get ear plugs inserted properly.

And don't hesitate to ask me or another instructor how to insert them properly – I guarantee you – we didn't all do it right the first time.


HANDOUT – 8 TEPS FOR INSERTIN G EAR PLUGS

1. Roll

1. Roll the earplug up into a small, thin 'snake' with your fingers. You can use one or both hands.

2. Pull the top of your ear up and back with your opposite hand to straighten out your ear canal. The rolled-up earplug should slide right in.

2. Pull Back ear by reaching over head with free hand, gently pull top of ear up and out

3. Insert earplug well into ear canal and hold until it fully expands.

3. Hold the earplug in with your finger. Count to 20 or 30 out loud while waiting for the plug to expand and fill the ear canal. Your voice will sound muffled when the plug has made a good seal.

Watch NIOSH show you how to insert an ear plug at:

Check the fit when you're all done. Proper insertion should result in an acoustic seal, which causes a very pronounced lowering of noise levels. With earplugs inserted, cup your hands firmly over your ears and release. The earplugs should be blocking enough noise so that cupping the ears with your hands results in no significant change in noise level.

Give all participants a copy of handout A-4. Tell the class:

This handout includes the steps for proper use of ear plugs and the link to the video we watched. I'd encourage you to retry inserting the ear plugs until you're comfortable that you understand how to do it properly.

INSTRUCTOR NOTES:

The test sounds are bands of random noise with a center frequency of 1000 Hz. This is the same type of sound used in standard hearing protector ratings including the "American National Standard Methods for Measuring the Real-Ear Attenuation of Hearing Protectors" (ANSI S12.6). Both tracks are the same, but the second track is 15 decibels (dB) louder than the first. Most hearing protectors will block or "attenuate" sound by more than 15 dB if they are the right size and shape to fit your ears and are worn correctly. A sound that is barely audible at your threshold of hearing without hearing protection should be inaudible though hearing protection even if it's boosted by 15 dB.

Exercise A-5: How Loud is TOO Loud?

Learning objective: By the end of this exercise, participants will be able to identify hazardous noise and describe hearing protection to reduce the risk for exposure.

Equipment needed:

- Set up an LCD projector and computer to show PowerPoint.

Teaching materials:

- Instructor Guide - includes:
  - Thumbnail of corresponding PowerPoint slides
  - Notes for slides
- PowerPoint slide – includes:
  - Notes for slides

INSTRUCTOR NOTES

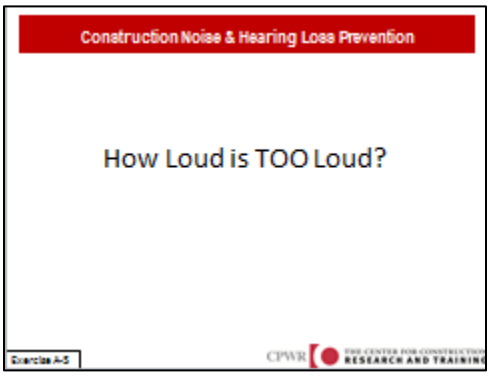
All equipment options do not have to be discussed. You may select the equipment slides that are most suitable for your class. Options include belt sander, hand drill, impact wrench, bull dozer, spray painter, and a jack hammer.

The equipment is followed by 2 slides showing examples of hearing protection and their Noise Reduction Rates (NRR).

How loud is too loud?

NOTES FOR SLIDE 1

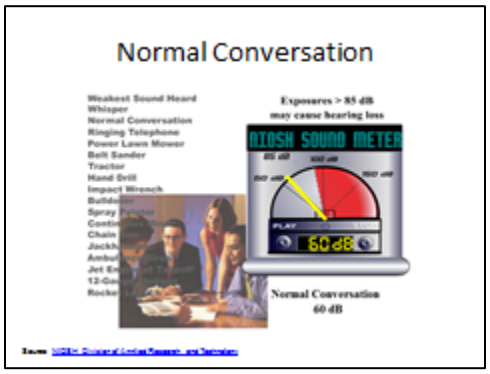
Much of the equipment used on job sites generates loud noises. How loud is too loud? And how do we know? For this activity we are going to quickly look at some common types of construction equipment, their noise levels, and then review different types of hearing protection.



Normal Conversation

NOTES FOR SLIDE 2

Before looking at construction equipment let's look at the level of decibels for a normal conversation. A normal conversation is about 60 decibels.



Keep in mind that the National Institute for Occupational Safety and Health (NIOSH) has a recommended exposure level – referred to as the REL of 85 decibels, and OSHA has a permissible exposure level or PEL of 90 decibels.

INSTRUCTOR NOTE:
For slides 3 to 8, you may use all of the slides or select those that are most applicable to your class participants.

If you have internet connection, you can download and play the Noise Meter files for the equipment in slides 3 to 8 by at Download Noise Meter (.exe file)
or https://www.cdc.gov/niosh/topics/noise/solutions/downloads/noisemeter.exe

Belt Sander

NOTES FOR SLIDE 3

Show only the title of the slide.

ASK THE CLASS:

On a scale of 50 to 150 decibels, how loud do you think a belt sander might be?

Give the class a few minutes to respond

Click again to show the full slide.

TELL THE CLASS:

As you can see, the belt sander is 3 decibels over OSHA PEL and 8 over NIOSH's REL.

Then remind them (you only have to remind them once during this activity)

While it is helpful to know the average noise of equipment we use – what is a quick way we can know if the noise we are around is too loud? A rule of thumb to remember is if

you must shout to be heard by someone standing an arm's length away from you – the noise is too loud and you need protection.

Hand Drill

NOTES FOR SLIDE 4
Show only the title of the slide.

ASK THE CLASS:

On a scale of 50 to 150 decibels, how loud do you think a hand drill might be?

Give the class a few minutes to respond

Click again to show the full slide.

TELL THE CLASS:

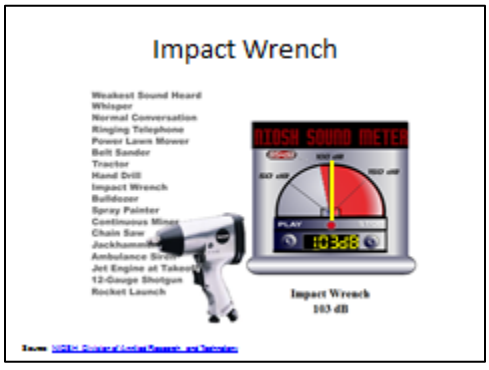
As you can see, the hand drill is 8 decibels over OSHA PEL and 13 over NIOSH's REL.

Then remind them (you only have to remind them once during this activity)

While it is helpful to know the average noise of equipment we use – what is a quick way we can know if the noise we are around is too loud? A rule of thumb to remember is if you must shout to be heard by someone standing an arm's length away from you – the noise is too loud and you need protection.

Impact Wrench

NOTES FOR SLIDE 5
Show only the title of the slide.



ASK THE CLASS:

On a scale of 50 to 150 decibels, how loud do you think an impact wrench might be?

Give the class a few minutes to respond

Click again to show the full slide.

TELL THE CLASS:

As you can see, the impact wrench is 13 decibels over OSHA PEL and 18 over NIOSH's REL.

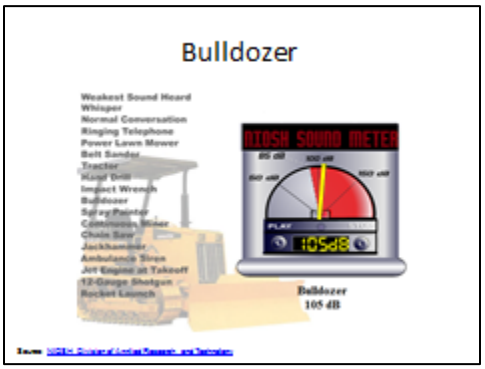
Then remind them (you only have to remind them once during this activity)

While it is helpful to know the average noise of equipment we use – what is a quick way we can know if the noise we are around is too loud? A rule of thumb to remember is if you must shout to be heard by someone standing an arm's length away from you – the noise is too loud and you need protection.

Bulldozer

NOTES FOR SLIDE 6

Show only the title of the slide.



ASK THE CLASS:

On a scale of 50 to 150 decibels, how loud do you think a bulldozer might be?

Give the class a few minutes to respond

Click again to show the full slide.

TELL THE CLASS:

As you can see, the bulldozer is 15 decibels over OSHA PEL and 20 over NIOSH's REL.

Then remind them (you only have to remind them once during this activity)

While it is helpful to know the average noise of equipment we use – what is a quick way we can know if the noise we are around is too loud? A rule of thumb to remember is if you must shout to be heard by someone standing an arm's length away from you – the noise is too loud and you need protection.

Spray Painter

NOTES FOR SLIDE 7
Show only the title of the slide.

ASK THE CLASS:

On a scale of 50 to 150 decibels, how loud do you think a spray painter might be?

Give the class a few minutes to respond

Click again to show the full slide.

TELL THE CLASS:

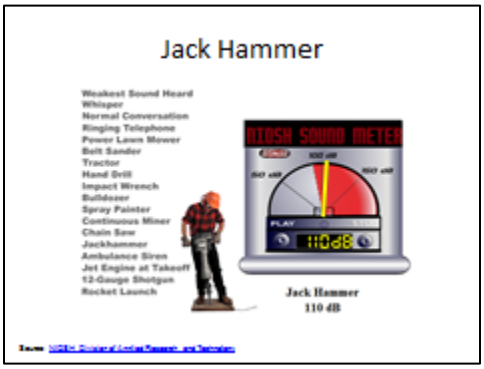
As you can see, the spray painter is 15 decibels over OSHA PEL and 20 over NIOSH's REL.

Then remind them (you only have to remind them once during this activity)

While it is helpful to know the average noise of equipment we use – what is a quick way we can know if the noise we are around is too loud? A rule of thumb to remember is if you must shout to be heard by someone standing an arm's length away from you – the noise is too loud and you need protection.

Jackhammer

NOTES FOR SLIDE 8
Show only the title of the slide.



ASK THE CLASS:

On a scale of 50 to 150 decibels, how loud do you think a jackhammer might be?

Give the class a few minutes to respond

Click again to show the full slide.

TELL THE CLASS:

As you can see, the jackhammer is 20 decibels over OSHA PEL and 25 over NIOSH's REL.

Then remind them (you only have to remind them once during this activity)

While it is helpful to know the average noise of equipment we use – what is a quick way we can know if the noise we are around is too loud? A rule of thumb to remember is if you must shout to be heard by someone standing an arm's length away from you – the noise is too loud and you need protection.

Examples of Hearing Protection: 20 + dB

NOTES FOR SLIDE 9

This slide shows examples of hearing protection with a Noise Reduction Rate of 20 or higher.

Now that you know how loud some construction equipment is, how do you select the right hearing protection for the noise you are being exposed to?

TELL THE CLASS:
Here are some examples of hearing protection. It's important to keep in mind that there are different levels of hearing protection within one type. For example – some ear plugs protect around 15 decibels, while others protect against 33 decibels.

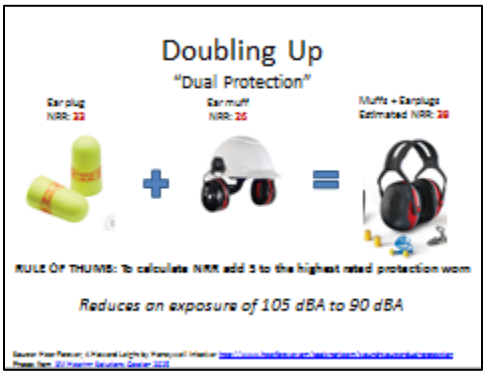
It is also important to pay attention to the **N**ose **R**eduction **R**ating, also referred to as the NRR, of the hearing protection and how much noise needs to be reduced in order to protect you hearing. Hearing protection devices are tested in a laboratory to determine how much noise they block from reaching your ears. The EPA requires manufacturers to list the NRR on the hearing protection device's package.

The higher the NRR, the greater the protection, however, since lab conditions are not the same as workplace conditions, the actual noise reduction is at least 7 dBA less than the printed NRR. So if, for example, you select hearing protection with a NRR of 29, you should plan for noise reduction of 22.

Here's one way to figure out how much your hearing protection is reducing your exposure. If your hearing protection's NRR is 33, for example. You would subtract 7 from 33 and divide the results by 2 – so 33 minus 7 equals 26. 26 divided by 2 equals 13. Subtracting that number from your noise exposure of 95 dBA will let you know that your exposure with this hearing protection is 82 – below the NIOSH REL and the OSHA PEL.

Doubling Up

NOTES FOR SLIDE 10



What do you do when the noise on the job site is too loud and ear plugs or ear muffs are not enough to protect your ears?

Isolating the noise sources, using low noise equipment, limiting access to noisy areas to those workers essential for completing the work, and other engineering or administrative controls are always recommended. However, sometimes the noise levels are so high that you may need to wear both ear plugs and ear muffs. This is known as dual protection. The Mine Safety and Health Administration (MSHA) recommends that workers wear dual protection when exposed to noises over 105 decibels over an 8 hour time weighted average (TWA).

While dual protection provides more protection than using just one or the other, the level of protection is not equal to the sum of the NRR provided by the each. As a rule of thumb, you can estimate the level of protection from wearing dual protection by adding 5 to the highest reported NRR that you are wearing. For example, if you use ear plugs with an NRR of 33 decibels with an ear muff with an NRR of 26 decibels the estimated NRR would be 38 -- not 59 decibels (33 plus 26). When adjusted for the realities of the jobsite, this dual protection would reduce an exposure of 105 decibels to roughly 90 decibels.

TELL THE CLASS:
Remember, for maximum protection, hearing protection must be worn correctly and consistently. Always take time to insert your ear plugs correctly, check for defects, and wear protection whenever you are working around noise. If you must shout to be heard by someone standing an arm's length away from you – the noise is too loud and you need protection.

INSTRUCTOR NOTE:
There is not a set formula for how much wearing both ear plugs and muffs protects against noise. However, a rule of thumb is to add the 5 decibels to the higher NRR protection. For more information see: http://www.hearforever.org/tools-to-learn/sound-source-dual-protection.

Exercise A-6: How Would You Describe Your Hearing?

Learning objective: By the end of the exercise, participants will understand the importance of protecting their hearing from the beginning of their construction career.

Equipment needed:

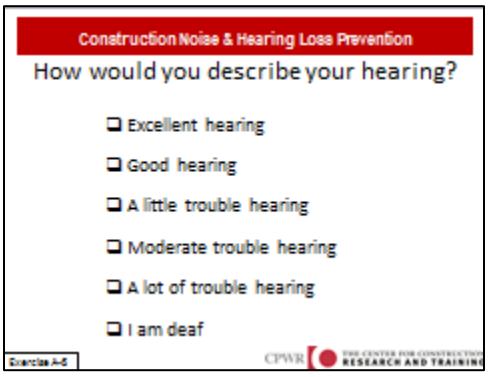
- Set up an LCD projector and computer to show PowerPoint.

Teaching materials:

- Instructor Guide - includes:
  - Thumbnail of corresponding PowerPoint slides
  - Notes for slides
- PowerPoint slide – includes:
  - Notes for slides

How would you describe your hearing?

NOTES FOR SLIDE 1



I'd like you all to think about your hearing.

ASK THE CLASS:

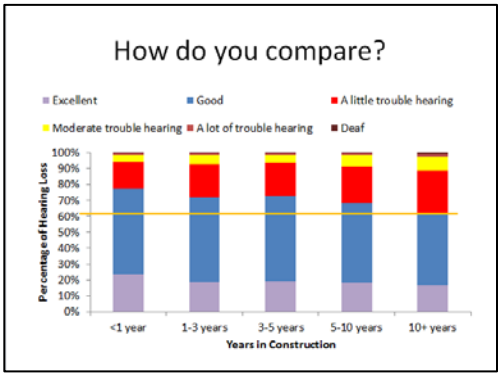
As I read this list, make a note to yourself of which one best describes your hearing.

- Excellent hearing
- Good hearing
- A little trouble hearing
- Moderate trouble hearing
- A lot of trouble hearing
- I am deaf

How do you compare?

NOTES FOR SLIDE 2

Now let's see how you compare to some other construction workers.



This slides show the results of roughly 4,000 workers who participated in a noise survey in one of their training classes.

Look at where you fall in terms of how long you've been in the construction industry.

Then look at the bars above – each bar shows how the members in each "years of experience" category rated their hearing. The purple bar show the percentage in each category that rated their hearing as excellent, the blue bar shows the percentage that said their hearing is good. The red bar shows the percentage who said they have a little trouble hearing, the yellow bar shows the percentage who said they have moderate trouble hearing, and the brown bar shows the percentage who said they have a lot of trouble hearing. Only a very small percentage in each category characterized themselves as being deaf.

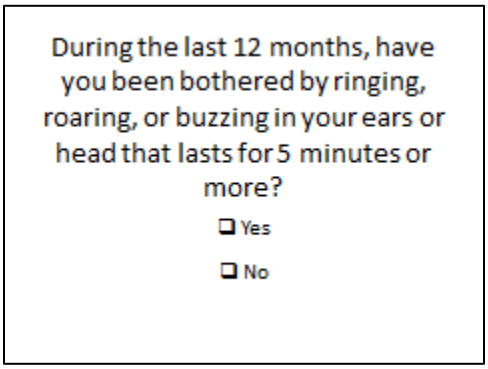
If you look at the orange line, you can see that the percentage of workers reporting hearing loss increased the longer they worked in construction.

During the last 12 months, have you been bothered by ringing, roaring, or buzzing in your ears or head that lasts for 5 minutes or more?

NOTES FOR SLIDE 3

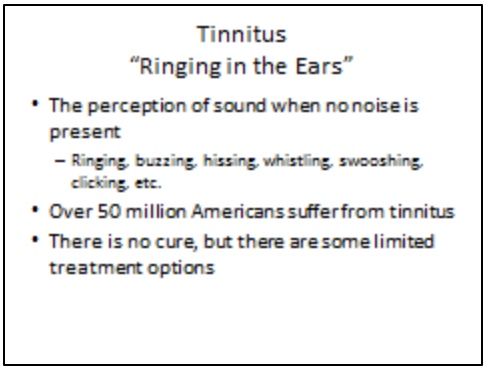
ASK THE CLASS:

Now I want you to answer this question – just make a note to yourself. During the last 12 months, have you been bothered by a noise such as ringing, roaring or buzzing in your ears or head that lasts for 5 minutes or longer?



Tinnitus "Ringing in the Ears"

NOTES FOR SLIDE 4



If you answered yes, this is an early sign of some level of hearing loss.

This condition, called tinnitus *(pronounced either ti-NIGHT-us or TIN-i-tus)* is the perception of sound when there is no external noise present.

Many people suffer from tinnitus – the American Tinnitus Association estimates over 50 million Americans have symptoms.

Unfortunately there is no cure for tinnitus, but there are a few treatment options to help those manage the symptoms – including hearing aids to help with overall hearing loss and sound therapy to help counteract tinnitus sounds.

TELL THE CLASS:

The best way to prevent hearing loss and tinnitus is to protect your hearing when faced with loud noises on the job or in your personal life.

One way is to make sure to use the right hearing protection for the noise you're being exposed to.

B. NOISE TRAINING EXERCISES FOR USE IN IN-CLASS FOR SKILLS TRAINING PROGRAMS

Exercise B-1 – Cumulative Presentation: Noise & Hearing Loss – The risk & prevention

Learning objective: By the end of this exercise, participants will be able to explain why noise and hearing loss is an important issue for construction workers.

Equipment needed:

- Set up an LCD projector and computer to show PowerPoint.

Teaching materials:

- Instructor Guide - includes:
  - Thumbnail of corresponding PowerPoint slides
  - Notes for slides
- PowerPoint slide – includes:
  - Notes for slides
- Sound Meter App (downloaded on to your phone in advance of the class):
  - iPhone® – NIOSH SLM - https://www.cdc.gov/niosh/topics/noise/app.html
  - Android™ – SoundMeter App - https://play.google.com/store/apps/details?id=com.gamebasic.decibel

INSTRUCTOR NOTE:

Each of the four slides can be used individually to insert into other presentation materials, or they can be used together for a longer 15 minute presentation. The content varies depending on the option you select.

Please use the Stand-Alone version when using individual slides and use the Cumulative version when all 4 are used as a single exercise.

These are the instructions for the Cumulative Presentation.

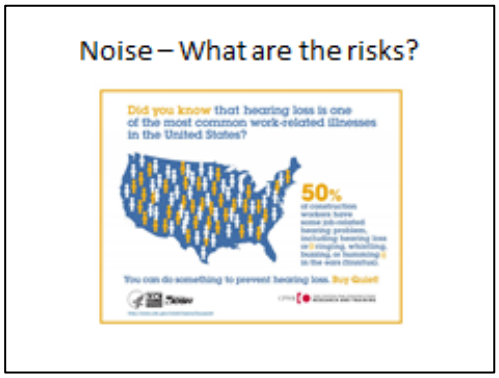
Noise & Hearing – The risk & prevention

Notes for Slide 1

Construction sites are often extremely noisy and hearing loss is a major issue for workers. It is important to be aware of the risks and know how to prevent exposure to high noise levels.

Noise – What are the risks?

Notes for Slide 2



Let's start with the risk. Hearing loss is one of the most common work-related illnesses in the U.S. Repeated exposure to high noise levels can lead to PERMANENT hearing loss. Because construction jobsites often expose workers to high levels of noise, you are at a much higher risk of developing hearing loss than workers in other industries.

According to the National Institute for Occupational Safety and Health (NIOSH), roughly half of construction workers have some job-related hearing problem.

To put it in perspective, the average construction worker who is only 25 years old has the same hearing as a 50 year old who is not exposed to high noise levels at work.

Noise damages the nerves in the ears and it can also lead to tinnitus, or ringing in the ears, which often interferes with sleep and quality of life, and can cause high blood pressure and increased levels of stress.

Noise and hearing loss can also affect your ability to work safely on the job:

- Hearing loss has been linked to THREE TIMES the risk of falling (the number one cause of deaths in construction)
- If you have trouble hearing or there is too much noise, you may miss important instructions or warnings on the jobsite
- And surrounding noise can distract you from performing your job safely

Once your hearing is gone, it's gone forever.

The Cost of Hearing Loss

Notes for Slide 3

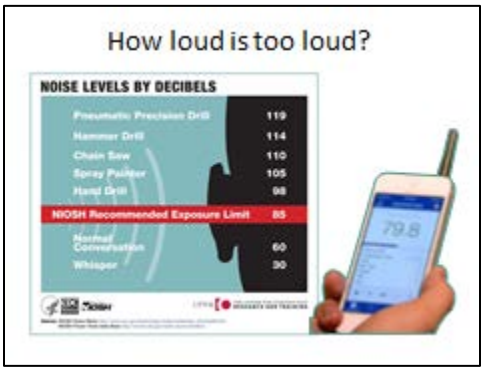
In addition to the human toll, hearing loss is one of the most common work-related disabilities in the United States and costs businesses an estimated $242 million in workers' compensation payments each year, and results in lost income for workers. It is estimated that people with untreated hearing loss lose an estimated $176 billion in annual income due to underemployment.

A study of more than 40,000 households showed that those with severe hearing loss had unemployment rates almost twice as high as workers without hearing loss. And the income level of those suffering the most hearing loss was about $14,000 less than that earned by the group with the mildest hearing losses.

In short, hearing loss can impact your ability to work and your income.

How loud is too loud?

Notes for Slide 4



INSTRUCTOR NOTE:

RECOMMENDED– Download and familiarize yourself with one of the apps in advance of the class and demonstrate it during the class

So how loud is too loud?

According to NIOSH, noise over its recommended exposure level, or REL, of 85 decibels is hazardous. OSHA's permissible exposure level or PEL is slightly higher at 90 decibels.

Fortunately, it's getting easier to identify your level of exposure so you know when to use hearing protection.

The NIOSH Sound Level Meter mobile application is a tool to measure sound levels in the workplace and includes recommendations to reduce hearing loss. It can be downloaded on an iPhone https://www.cdc.gov/niosh/topics/noise/app.html. For those with an Android device, NIOSH recommends the SoundMeter App.

If there is time to do a demonstration - use the NIOSH Sound Level Meter app or the Android SoundMeter App on your phone to take a reading of the noise level in the room.

TELL THE CLASS:

Let's test out the [insert name of app being used]. I want everyone to start talking and making noise

As the class is making noise, take a reading and then briefly describe the results, focusing on the decibel level.

The reading was [insert the reading minus 85] above/below the NIOSH REL and [insert the reading minus 90] above/below the OSHA PEL.

Preventing Hearing Loss

Notes for Slide 5

If your jobsite noise level is over 85 decibels, or if you think it might be, do the following:

- Use comfortable hearing protection such as ear muffs or ear plugs.
- Be sure to properly insert disposable ear plugs.
- Avoid inserting or removing ear plugs if your hands are dirty. Better to clean first.
- Take breaks from loud noise even if protective gear is worn.
- Keep as far away from the noise source as possible.
- Encourage management to Buy Quiet whenever possible. Buying a tool just 3 decibels lower will cut the noise energy reaching your ear in half!

Exercise B-2 (A – D) – Stand-Alone Slides: Noise & Hearing Loss – The risk & prevention

INSTRUCTOR NOTE:

Each of the four slides can be used individually to insert into other presentation materials, or they can be used together for a longer 15 minute presentation. The content varies depending on the option you select.

Please use the Stand-Alone version when using individual slides and use the Cumulative version when all four are used as a single exercise.

These are the instructions for the Stand-Alone.

Exercise B-2 (A): Noise – What are the risks?

Learning objective: By the end of this lesson, participants should be able to list and understand the possible effects of noise exposure.

Equipment needed:

- Set up an LCD projector and computer to show PowerPoint.

Teaching materials:

- Instructor Guide - includes:
  - Thumbnail of corresponding PowerPoint slide
  - Notes for slide
- PowerPoint slide – includes:
  - Notes for slide

Notes for Slide

Hearing loss is one of the most common work-related illnesses in the U.S. Repeated exposure to high noise levels can lead to PERMANENT hearing loss. Because construction jobsites often expose workers to high levels of noise, you are at a much higher risk of developing hearing loss than workers in other industries.

According to the National Institute for Occupational Safety and Health (NIOSH), roughly half of construction workers have some job-related hearing problem. To put it in perspective, the average construction worker who is only 25 years old has the same hearing as a 50 year old who is not exposed to high noise levels at work.

Noise damages the nerves in the ears and it can also lead to tinnitus, or ringing in the ears, which often interferes with sleep and quality of life, and can cause high blood pressure and increased levels of stress. Noise and hearing loss can also affect your ability to work safely on the job:

- Hearing loss has been linked to THREE TIMES the risk of falling (the number one cause of deaths in construction)
- If you have trouble hearing or there is too much noise, you may miss important instructions or warnings on the jobsite
- And surrounding noise can distract you from performing your job safely

Once your hearing is gone, it's gone forever.

Exercise B-2 (B): The Cost of Hearing Loss

Learning objective: By the end of this lesson, participants should be aware of the financial cost of hearing loss to the industry and individuals.

Equipment needed:

- Set up an LCD projector and computer to show PowerPoint.

Teaching materials:

- Instructor Guide - includes:
  - Thumbnail of corresponding PowerPoint slide
  - Notes for slide
- PowerPoint slide – includes:
  - Notes for slide

Notes for Slide

Why should you care about hearing loss – besides losing your hearing? Hearing loss is one of the most common work-related disabilities in the United States and costs businesses an estimated $242 million in workers' compensation payments each year.

Hearing loss also results in lost income for workers. It is estimated that people with untreated hearing loss lose an estimated $176 billion in annual income due to underemployment.

A study of more than 40,000 households showed that those with severe hearing loss had unemployment rates almost twice as high as workers without hearing loss. And the income level of those suffering the most hearing loss was about $14,000 less than that earned by the group with the mildest hearing losses.

In short, hearing loss can impact your ability to work and your income.

Exercise B-2 (C): How Loud is Too loud?

Learning objective: By the end of this lesson, participants should know when they are being exposed to high noise levels and how to use a sound meter app can help them to find out.

Equipment needed:

- Set up an LCD projector and computer to show PowerPoint.

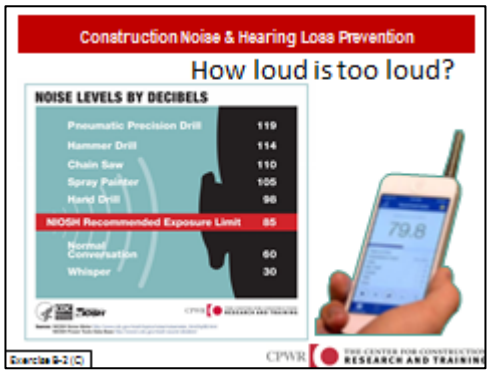
Teaching materials:

- Instructor Guide - includes:
  - Thumbnail of corresponding PowerPoint slide
  - Notes for slide
- PowerPoint slide – includes:
  - Notes for slide
- Sound Meter App (downloaded on to your phone in advance of the class):
  - iPhone – NIOSH SLM - https://www.cdc.gov/niosh/topics/noise/app.html
  - Android – SoundMeter App - https://play.google.com/store/apps/details?id=com.gamebasic.decibel

Notes for Slide

INSTRUCTOR NOTE:

RECOMMENDED– Download and familiarize yourself with one of the apps in advance of the class, and demonstrate it during the class.



Noise is all around you when you're on a construction site. Loud noise can lead to hearing loss, but how loud is too loud?

According to NIOSH, noise over its recommended exposure level, or REL, of 85 decibels is hazardous. OSHA's permissible exposure level or PEL is slightly higher at 90 decibels.

Fortunately, it's getting easier to identify your level of exposure so you know when to use hearing protection.

The NIOSH Sound Level Meter mobile application is a tool to measure sound levels in the workplace and includes recommendations to reduce hearing loss. It can be downloaded on an iPhone https://www.cdc.gov/niosh/topics/noise/app.html. For those with an Android device, NIOSH recommends the SoundMeter App.

If there is time to do a demonstration - use the NIOSH Sound Level Meter app or the Android SoundMeter App on your phone to take a reading of the noise level in the room.

TELL THE CLASS:

Let's test out the [insert name of app being used]. I want everyone to start talking and making noise

As the class is making noise, take a reading and then briefly describe the results, focusing on the decibel level.

The reading was [insert the reading minus 85] above/below the NIOSH REL and [insert the reading minus 90] above/below the OSHA PEL.

Exercise B-2 (D): Preventing Hearing Loss

Learning objective: By the end of this lesson, participants will know steps they can take to protect their hearing.

Equipment needed:

- Set up an LCD projector and computer to show PowerPoint.

Teaching materials:

- Instructor Guide - includes:
  - Thumbnail of corresponding PowerPoint slide
  - Notes for slide
- PowerPoint slide – includes:
  - Notes for slide

Notes for Slide

Construction noise can damage your hearing. If your jobsite noise level is over 85 decibels, or if you think it might be, do the following:

- Use comfortable hearing protection such as ear muffs or ear plugs.
- Be sure to properly insert disposable ear plugs.
- Avoid inserting or removing ear plugs if your hands are dirty. Better to clean first.
- Take breaks from loud noise even if protective gear is worn.
- Keep as far away from the noise source as possible.
- Encourage management to Buy Quiet whenever possible. Buying a tool just 3 decibels lower will cut the noise energy reaching your ear in half!

C. NOISE TRAINING EXERCISES FOR USE IN THE HANDS-ON PORTION OF SKILLS TRAINING PROGRAMS

Exercise C-1: Identifying Noise Levels of Equipment (Group Activity)

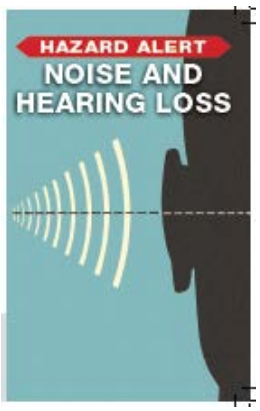
Learning objective: By the end of the exercise, participants should understand how to download and use the NIOSH Sound Level Meter App (or a comparable Android App – NIOSH recommends SoundMeter) to inform decisions about hearing protection and other noise-reducing efforts.

TEACHING MATERIALS:

- Sound Meter App (downloaded on to your phone in advance of the class)
  - iPhone – NIOSH SLM - https://www.cdc.gov/niosh/topics/noise/app.html
  - Android – SoundMeter App - https://play.google.com/store/apps/details?id=com.gamebasic.decibel

Handouts:

- What and When of Hearing Protection (C-A)
- Hazard Alert Card (C-B) ***Note:*** *We have included the English 8.5 x 11 PDF version of this handout in this training program. Both the English and Spanish versions are available online at https://www.cpwr.com/publications/hazard-alert-cards. Contact CPWR in advance of any training at 301-495-8500 to order stock of the pocket size versions for free.*



INSTRUCTOR NOTE:

This activity is intended to be integrated into hands-on training. It should be conducted on a day when training will involve loud equipment and/or noise producing tasks. Alternatively, you can conduct a demonstration of how to measure noise levels using the app with available equipment on hand.

Before training begins:

1. Download the app you plan to use on your phone ahead of time and familiarize yourself with its features and how to read it.
2. Determine if the equipment you will be using will create noise levels above the NIOSH Recommended Exposure Level (85 decibels). If it will, make sure there is appropriate hearing protection for all participants in the training/demonstration.
3. Before training begins, you, or a worker willing to download one of the apps (preferably the NIOSH SLM app) on their phone, should download the app. If you are using a worker volunteer, explain that he/she will be assisting with a training activity.
4. Explain to the class that you will be measuring the noise level of the equipment/task you are about to use or demonstrate.
5. Prior to turning on the equipment/beginning a task, either you or your volunteer will take a reading of the environment as a baseline.
6. If needed, hand out appropriate hearing protection and make sure everyone present understands how to use it and inserts/puts it on before the equipment is turned on/the task begins.
7. Once the equipment is turned on/the task begins, you or the volunteer will take another reading.
8. Tell the rest of the class what the measurements were, and explain what this means regarding the need for hearing protection.
9. Repeat with any additional equipment being used.

At the end of the training distribute the handouts and explain that they contain information that the workers should refer back to periodically to make sure they are taking appropriate steps to protect their hearing.

INSTRUCTOR NOTE:

The NIOSH Sound Level Meter app has been validated through research as a way to easily use mobile phones on a jobsite to measure the surrounding noise level in order to determine whether hearing protection is needed, and if so how much.

Exercise C-2: Measuring Noise Levels Throughout the Day (Individual Activity)

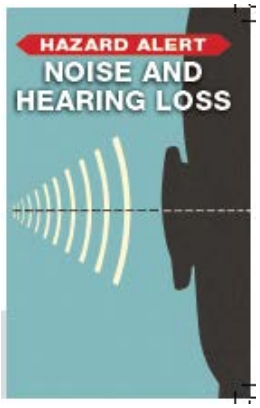
Learning objective: By the end of this exercise, participants should understand how to download and use the NIOSH Sound Level Meter App (or a comparable Android App – NIOSH recommends SoundMeter) to inform decisions about hearing protection and other noise-reducing efforts.

TEACHING MATERIALS:

- Sound Meter App (downloaded on to your phone in advance of the class)
  - iPhone – NIOSH SLM - https://www.cdc.gov/niosh/topics/noise/app.html
  - Android – SoundMeter App - https://play.google.com/store/apps/details?id=com.gamebasic.decibel

Handouts (available in Appendix):

- When and What of Hearing Protection (C-A)
- Hazard Alert Card (C-B) ***Note:*** *We have included the English 8.5 x 11 PDF version of this handout in this training program. Both the English and Spanish versions are available online at https://www.cpwr.com/publications/hazard-alert-cards. Contact CPWR in advance of any training at 301-495-8500 to order stock of the pocket size versions for free.*



INSTRUCTOR NOTE:

Download the app on your phone ahead of time and familiarize yourself with its features and how to read it.

This activity is intended to be integrated into hands-on training.

This activity will be ongoing throughout the day – ideally on a day when their will noisy equipment used or work performed.

1. **Before training begins:**
   a. Provide the class with background on the app (what it is and how it can be used).

b. Tell the trainees that NIOSH recommends the use of hearing protection at or above 85 decibels; make sure they have appropriate hearing protection and are using it. Note: Be prepared to reinforce the need for and use of hearing protection throughout the day.
c. Tell them you will be taking readings at intervals throughout the day. Note: Depending on what type of hands-on training you have planned, you may want to take a reading every time the activity changes. Or you may simply take a reading once every hour.

2. At the end of the day:,

a. Take a few minutes to bring the class back together as a group to report on the readings and explain what they mean.
    - *What was the loudest reading?*
    - *What work was being done at the time? (What type? Was the reading taken next to the operator, or of someone standing nearby?)*
    - *How many readings were over 85 decibels?*
    - *Do they have any questions on how to use the app?*
    - *Do they have any questions about the use of hearing protection?*

b. Distribute the handouts and explain that they contain information that the workers should refer back to periodically to make sure they are taking appropriate steps to protect their hearing**.**

INSTRUCTOR NOTE:

The NIOSH Sound Level Meter app has been validated through research as a way to easily use phones on a jobsite to measure the surrounding noise level in order to determine whether hearing protection is needed, and if so how much.

Exercise C-3: Choosing the Right Hearing Protection

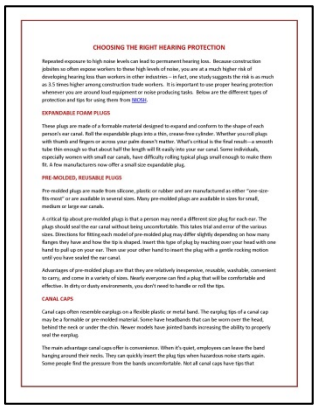
Learning objective: By the end of this exercise, participants should be familiar with resources available to help them work safely.

TEACHING MATERIALS:

- Choosing the Right Hearing Protection Handout
- The hearing protection participants will be required to use that day **(If used as a training exercise)**

Handouts (available in Appendix):

- Choosing the Right Hearing Protection (C-C)
- When and What of Hearing Protection (C-A)



CHOOSING THE RIGHT HEARING PROTECTION

Repeated exposure to high noise levels can lead to permanent hearing loss. Because construction jobsites so often expose workers to these high levels of noise, you are at a much higher risk of developing hearing loss than workers in other industries – in fact, one study suggests the risk is as much as 3.5 times higher among construction trade workers. It is important to use proper hearing protection whenever you are around loud equipment or noise producing tasks. Below are the different types of protection and tips for using them from NIOSH.

EXPANDABLE FOAM PLUGS

These plugs are made of a formable material designed to expand and conform to the shape of each person's ear canal. Roll the expandable plugs into a thin, crease-free cylinder. Whether you roll plugs with thumb and fingers or across your palm doesn't matter. What's critical is the final result—a smooth tube thin enough so that about half the length will fit easily into your ear canal. Some individuals, especially women with small ear canals, have difficulty rolling typical plugs small enough to make them fit. A few manufacturers now offer a small size expandable plug.

PRE-MOLDED, REUSABLE PLUGS

Pre-molded plugs are made from silicone, plastic or rubber and are manufactured as either "one-size-fits-most" or are available in several sizes. Many pre-molded plugs are available in sizes for small, medium or large ear canals.

A critical tip about pre-molded plugs is that a person may need a different size plug for each ear. The plugs should seal the ear canal without being uncomfortable. This takes trial and error of the various sizes. Directions for fitting each model of pre-molded plug may differ slightly depending on how many flanges they have and how the tip is shaped. Insert this type of plug by reaching over your head with one hand to pull up on your ear. Then use your other hand to insert the plug with a gentle rocking motion until you have sealed the ear canal.

Advantages of pre-molded plugs are that they are relatively inexpensive, reusable, washable, convenient to carry, and come in a variety of sizes. Nearly everyone can find a plug that will be comfortable and effective. In dirty or dusty environments, you don't need to handle or roll the tips.

CANAL CAPS

Canal caps often resemble earplugs on a flexible plastic or metal band. The earplug tips of a canal cap may be a formable or pre-molded material. Some have headbands that can be worn over the head, behind the neck or under the chin. Newer models have jointed bands increasing the ability to properly seal the earplug.

The main advantage canal caps offer is convenience. When it's quiet, employees can leave the band hanging around their necks. They can quickly insert the plug tips when hazardous noise starts again. Some people find the pressure from the bands uncomfortable. Not all canal caps have tips that

When to use Hearing Protection

Hearing protection should be used anytime the noise level is above 85 decibels. To give you an idea of what that means, normal conversation is about 60 decibels and a hand drill is 98 decibels. If you have to raise your voice to be heard by someone an arm's length away, it is probably too loud!

Noise Levels by Decibel	
Pneumatic Precision Drill	110
Hammer Drill	110
Chain Saw	110
Spray Painter	105
Hand Drill	98
OSHA Permissible Exposure Limit (PEL)	90
NIOSH Recommended Exposure Limit (REL)	85
Normal Conversation	60

Not sure how loud it is?
Download the NIOSH Sound Level Meter App in your Phone app store

What you need to know about
Hearing Protection

Your employer should provide hearing protection. The louder the job, the more protection is needed. Common types include: expandable foam ear plugs, pre-molded, reusable plugs, canal caps, and earmuffs. They only protect your hearing if used correctly.

Expandable foam ear plugs are one of the most common. Follow these steps when inserting them:

1. **Roll** of into earplug into a crease-free cylinder,
2. **Pull Back** your ear by reaching over your head with your free hand, and gently pull the top of the ear up and out.
3. **Insert** the earplug well into ear canal, and
4. **Hold** until it fully expands.

What type of hearing protection should I use?
NIOSH's Hearing Protector Compendium can help you decide:

CPWR

INSTRUCTOR NOTE:

This can be used as a training activity, or can simply be handed out to workers as a reference. If used as an activity, hearing protection appropriate for the hands-on training that will be taking place should be demonstrated.

The handout "Choosing the Right Hearing Protection" is meant to reinforce why use of the hearing protection in use during the hands-on training is needed. The handout "When to Use Hearing Protection" is intended as a takeaway that trainees can use as a reference.

ACKNOWLEDGEMENTS

Acknowledgements:

Many of the materials for this module were adapted from a training program produced by the State Building and Construction Trades Council of California (under an OSHA Susan Harwood Grant -SH-26283-SH4) and used with the permission of Laura Boatman, Project Coordinator for the SBCTC of CA.

The “Are You Talking To Me?” audio demonstration and exercise materials were developed, edited, produced by and used with the permission of Dr. Robert M. Ghent and Brad K. Witt of Honeywell Safety Products, San Diego, CA. They were originally created on behalf of Laura Boatman, Project Coordinator for the State Building and Construction Trades Council of California, for a training project produced under grant SH-26283-SH4 from the Occupational Safety and Health Administration, U.S. Department of Labor. Original recordings of the English and Spanish speech materials were developed and produced by Dr. Richard W. Harris, Dr. Ron W. Channel, and Dr. Shawn Nissen, Department of Communication Disorders, Brigham Young University, Provo, UT, and supported in part by grants from Brigham Young University and the David O. McKay School of Education. Copyright 1998 – 2008, Richard W. Harris, Ph.D., Ron W. Channel, Ph.D., Shawn Nissen, Ph.D., and Brigham Young University. Used by permission. The recording of the construction worksite environment is a segment of a track obtained from the Bainbridge Living Sound Effects Library, Volume 1. The tracks in this collection were processed, edited, and mixed by Dr. Robert M. Ghent using Adobe Audition versions 3.0 and CS6. The audio files included in this demo collection are not for sale. Resale of these materials is expressly prohibited. They may be freely, but narrowly distributed for the purposes of hearing loss prevention education. This document should accompany distribution of the files.

Funding is provided by Cooperative Agreements ES06185 and ES09764 from the National Institute of Environmental Health Sciences (NIEHS), NIH. The contents are solely the responsibility of the authors and do not necessarily represent the official views of NIEHS or NIH.

APPENDIX

Section A

Handout A-2 *Are You Talking to Me Worksheet*

Handout A-4 *Steps for Inserting Ear Plugs*

Section C

Handout C-A *When and What of Hearing Protection*

Handout C-B *Noise Hazard Alert Card*

Handout C-C *Choosing the Right Hearing Protection*

ARE YOU TALKING TO ME?

	Exercises				
	1	2	3	4	5
Word 1					
Word 2					
Word 3					
Word 4					
Word 5					
Word 6					
Word 7					
Word 8					
Word 9					
Word 10					

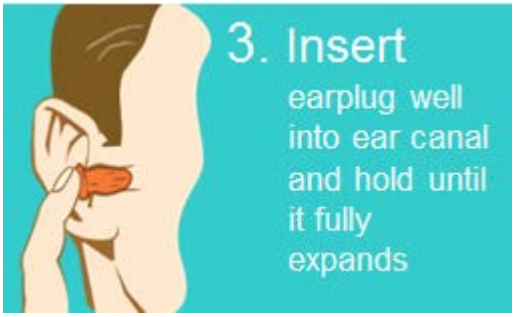
ARE YOU TALKING TO ME? ANSWER KEY

	1	2	3	4	5
Word 1	star	star	star	star	dust
Word 2	few	few	few	few	stiff
Word 3	bathe	bathe	bathe	bathe	nest
Word 4	cap	cap	cap	cap	then
Word 5	west	west	west	west	camp
Word 6	thin	thin	thin	thin	smooth
Word 7	farm	farm	farm	farm	knees
Word 8	pie	pie	pie	pie	few
Word 9	three	three	three	three	else
Word 10	gave	gave	gave	gave	flat

STEPS FOR INSERTING EAR PLUGS

1. Roll the earplug up into a small, thin "snake" with your fingers. You can use one or both hands.

2. Pull the top of your ear up and back with your opposite hand to straighten out your ear canal. The rolled-up earplug should slide right in.



3. Hold the earplug in with your finger. Count to 20 or 30 out loud while waiting for the plug to expand and fill the ear canal. Your voice will sound muffled when the plug has made a good seal.

Check the fit when you're all done. Proper insertion should result in an acoustic seal, which causes a very pronounced lowering of noise levels. With earplugs inserted, cup your hands firmly over your ears and release. The earplugs should be blocking enough noise so that covering the ears with your hands results in no significant change in noise level.

Watch NIOSH show you how to insert an ear plug at:

https://www.youtube.com/watch?v=Veayb1NucTA&feature=youtu.be

Source: State Building & Construction Trades Council of California, AFL-CIO: Construction Noise & Hearing Loss Prevention training program, Funded by Federal OSHA, 2015 (courtesy of Howard Leight, Honeywell). Additional content sourced from The National Institute for Occupational Safety & Health (NIOSH) - https://www.cdc.gov/niosh/mining/content/earplug.html and Hear Forever - A Howard Leight by Honeywell Initiative - http://www.hearforever.org/tools-to-learn/assessing-fit-effectiveness-of-earplugs.

When to use Hearing Protection

Hearing protection should be used anytime the noise level is above 85 decibels. To give you an idea of what that means, normal conversation is about 60 decibels and a hand drill is 98 decibels. If you have to raise your voice to be heard by someone an arm's length away, it is probably too loud!

Not sure how loud it is?

Download the NIOSH Sound Level Meter App in your iPhone app store!

https://www.cdc.gov/niosh/topics/noise

Noise Levels by Decibel	
Pneumatic Precision Drill	**119**
Hammer Drill	**114**
Chain Saw	**110**
Spray Painter	**105**
Hand Drill	**98**
OSHA Permissible Exposure Limit (PEL)	**90**
NIOSH Recommended Exposure Limit (REL)	**85**
Normal Conversation	**60**

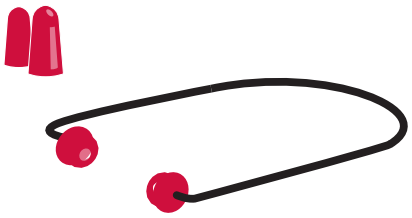
Source: The National Institute for Occupational Safety & Health, https://www.cdc.gov/niosh/topics/noise/choose.html

What you need to know about **Hearing Protection**

Your employer should provide hearing protection. The louder the job, the more protection is needed. Common types include: expandable foam ear plugs, pre-molded, reusable plugs, canal caps, and earmuffs. They only protect your hearing if used correctly.

Expandable foam ear plugs are one of the most common. Follow these steps when inserting them:

1. **Roll** entire earplug into a crease-free cylinder,
2. **Pull Back** your ear by reaching over your head with your free hand, and gently pull the top of the ear up and out,
3. **Insert** the earplug well into ear canal, and
4. **Hold** until it fully expands.



What type of hearing protection should I use?

NIOSH's Hearing Protector Compendium can help you decide.

https://www.cdc.gov/niosh/docs/2012-178/

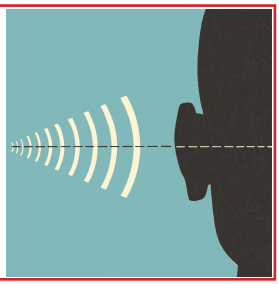
 CPWR is the research and training arm of NABTU. Production of this document was supported by cooperative agreement OH009762 from the National Institute for Occupational Safety and Health (NIOSH). The contents are solely the responsibility of the authors and do not necessarily represent the official views of NIOSH.

CPWR
THE CENTER FOR CONSTRUCTION
RESEARCH AND TRAINING

HAZARD ALERT

CPWR THE CENTER FOR CONSTRUCTION RESEARCH AND TRAINING

NOISE AND HEARING LOSS



What?

You can damage – even lose – your hearing from working:

- Around loud noises (85 decibels or higher); and/or
- With paints, degreasing, cleaning, and other construction products that contain solvents such as toluene.

NOISE LEVELS BY DECIBELS

What will you miss when you lose your hearing?

- On the job: Hearing your boss or co-worker alert you to a hazard
- At home: The ability to communicate with friends and family

According to the National Institute for Occupational Safety and Health (NIOSH), approximately 1 out of 4 construction workers suffer from some level of hearing loss.

Once your hearing is gone, it's gone forever.

If you think you are in danger:

Contact your supervisor.
Contact your union.
Call OSHA
1-800-321-OSHA

Learn more about NIOSH's Sound Level Meter App and how to prevent hearing loss at
http://bit.ly/CPWR-NOISE

To receive copies of this Hazard Alert and cards on other topics
Call 301-578-8500

When you work around noise ...

1 Ask for controls

Noise is measured in decibels (dBs). Using equipment just 3 dBs lower can cut the noise energy reaching your ears by half.

Ask your employer to rent or buy low-noise equipment, or put a sound barrier around loud equipment like compressors.

Worker using earplugs for hearing protection.

2 Wear hearing protection

According to OSHA, your employer must provide you with hearing protection when you work around loud noise.* Types of hearing protection include earplugs and earmuffs.

Make sure your hearing protection fits and is comfortable. The louder the job, the more hearing protection you need.

*Source: The Occupational Safety and Health Administration (OSHA) – 29 CFR 1926.101

Worker taking a hearing test.

3 Get trained and tested

Your employer should train you on how to:

- Protect your hearing; and
- Use hearing protection.

An annual hearing test will let you know if your hearing is getting worse.*

*The hearing test is called an audiometric test.

Noise is bad for your safety and health

- Noise can distract you.
- You may not hear warnings.
- Hearing loss increases your risk of falling.
- Years of noisy job sites can make you deaf.

Noise can cause "tinnitus" or ringing in the ears, which can interfere with your sleep. Noise can cause high blood pressure and stress.

If you have to raise your voice to be heard by someone an arm's length away, your hearing is in danger.

 CPWR is the research and training arm of North America's Building Trades Unions. Production of this document was supported by cooperative agreement OH 009762 from the National Institute for Occupational Safety and Health (NIOSH). The contents are solely the responsibility of the authors and do not necessarily represent the official views of NIOSH.

CHOOSING THE RIGHT HEARING PROTECTION

Repeated exposure to high noise levels can lead to permanent hearing loss. Because construction jobsites so often expose workers to these high levels of noise, you are at a much higher risk of developing hearing loss than workers in other industries – in fact, one study suggests the risk is as much as 3.5 times higher among construction trade workers. It is important to use proper hearing protection whenever you are around loud equipment or noise producing tasks. Below are the different types of protection and tips for using them from NIOSH.

EXPANDABLE FOAM PLUGS

These plugs are made of a formable material designed to expand and conform to the shape of each person's ear canal. Roll the expandable plugs into a thin, crease-free cylinder. Whether you roll plugs with thumb and fingers or across your palm doesn't matter. What's critical is the final result—a smooth tube thin enough so that about half the length will fit easily into your ear canal. Some individuals, especially women with small ear canals, have difficulty rolling typical plugs small enough to make them fit. A few manufacturers now offer a small size expandable plug.

PRE-MOLDED, REUSABLE PLUGS

Pre-molded plugs are made from silicone, plastic or rubber and are manufactured as either “one-size-fits-most” or are available in several sizes. Many pre-molded plugs are available in sizes for small, medium or large ear canals.

A critical tip about pre-molded plugs is that a person may need a different size plug for each ear. The plugs should seal the ear canal without being uncomfortable. This takes trial and error of the various sizes. Directions for fitting each model of pre-molded plug may differ slightly depending on how many flanges they have and how the tip is shaped. Insert this type of plug by reaching over your head with one hand to pull up on your ear. Then use your other hand to insert the plug with a gentle rocking motion until you have sealed the ear canal.

Advantages of pre-molded plugs are that they are relatively inexpensive, reusable, washable, convenient to carry, and come in a variety of sizes. Nearly everyone can find a plug that will be comfortable and effective. In dirty or dusty environments, you don't need to handle or roll the tips.

CANAL CAPS

Canal caps often resemble earplugs on a flexible plastic or metal band. The earplug tips of a canal cap may be a formable or pre-molded material. Some have headbands that can be worn over the head, behind the neck or under the chin. Newer models have jointed bands increasing the ability to properly seal the earplug.

The main advantage canal caps offer is convenience. When it's quiet, employees can leave the band hanging around their necks. They can quickly insert the plug tips when hazardous noise starts again. Some people find the pressure from the bands uncomfortable. Not all canal caps have tips that

adequately block all types of noise. Generally, the canal caps tips that resemble stand-alone earplugs seem to block the most noise.

EARMUFFS

Earmuffs come in many models designed to fit most people. They work to block out noise by completely covering the outer ear. Muffs can be "low profile" with small ear cups or large to hold extra materials for use in extreme noise. Some muffs also include electronic components to help users communicate or to block impulsive noises.

Workers who have heavy beards or sideburns or who wear glasses may find it difficult to get good protection from earmuffs. The hair and the temples of the glasses break the seal that the earmuff cushions make around the ear. For these workers, earplugs are best. Other potential drawbacks of earmuffs are that some people feel they can be hot and heavy in some environments.

MISCELLANEOUS DEVICES

Manufacturers are receptive to comments from hearing protection users. This has led to the development of new devices that are hybrids of the traditional types of hearing protectors. Because many people like the comfort of foam plugs, but don't want to roll them in dirty environments, a plug is now available that is essentially a foam tip on a stem. You insert this plug much like a pre-molded plug without rolling the foam.

Scientists are developing earmuffs using high-tech materials to reduce weight and bulk, but still effectively block noise. On the horizon may be earplugs with built in two-way communication capability.

Still, the best hearing protector is the one that is comfortable and convenient and that you will wear every time you are in an environment with hazardous noise.

For additional assistance finding the right hearing protection for your comfort and the level of noise you are being exposed to, use NIOSH's Hearing Protector Device Compendium.