CONSTRUCTION NOISE & HEARING LOSS PREVENTION

Webinar

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CPWR THE CENTER FOR CONSTRUCTION RESEARCH AND TRAINING

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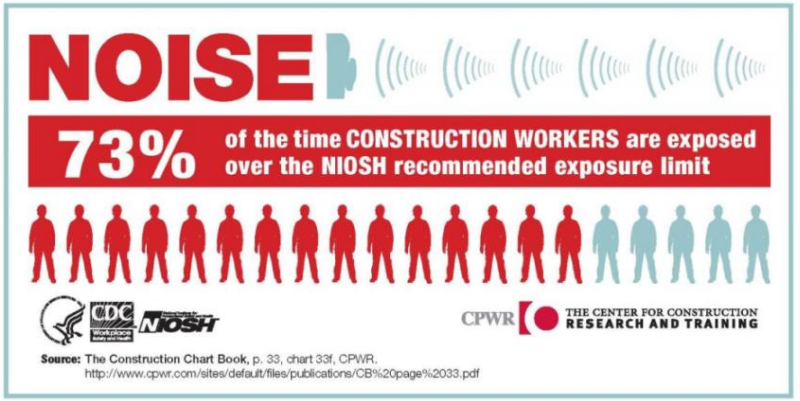
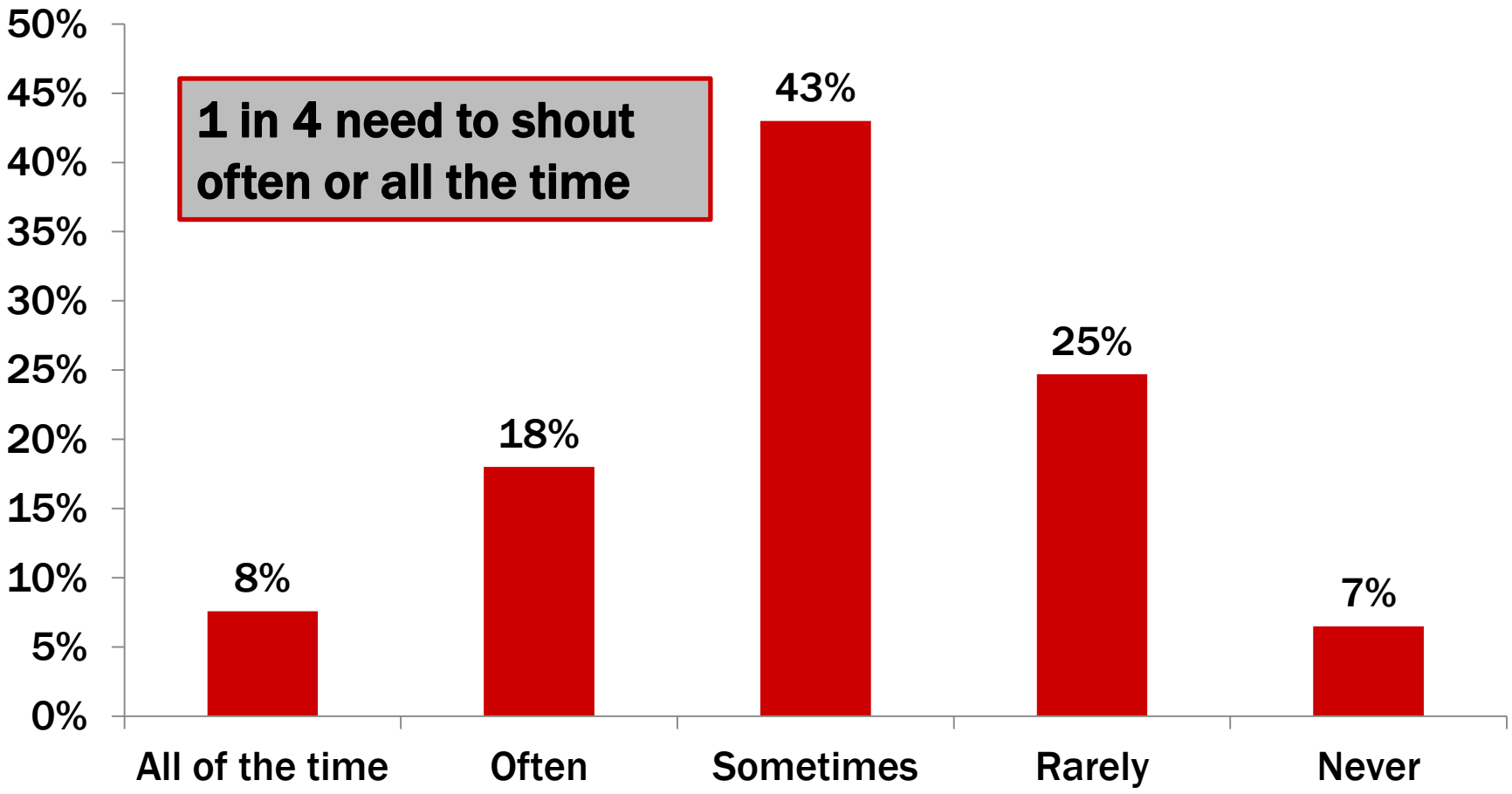
HEARING LOSS PREVENTION

- **Conducted surveys of more than 200 trainers and 4,000 workers to identify:**
  - Awareness of noise hazards
  - Use of controls and hearing protection
  - Barriers to use of controls and hearing protection
  - Gaps in the types of training conducted & received

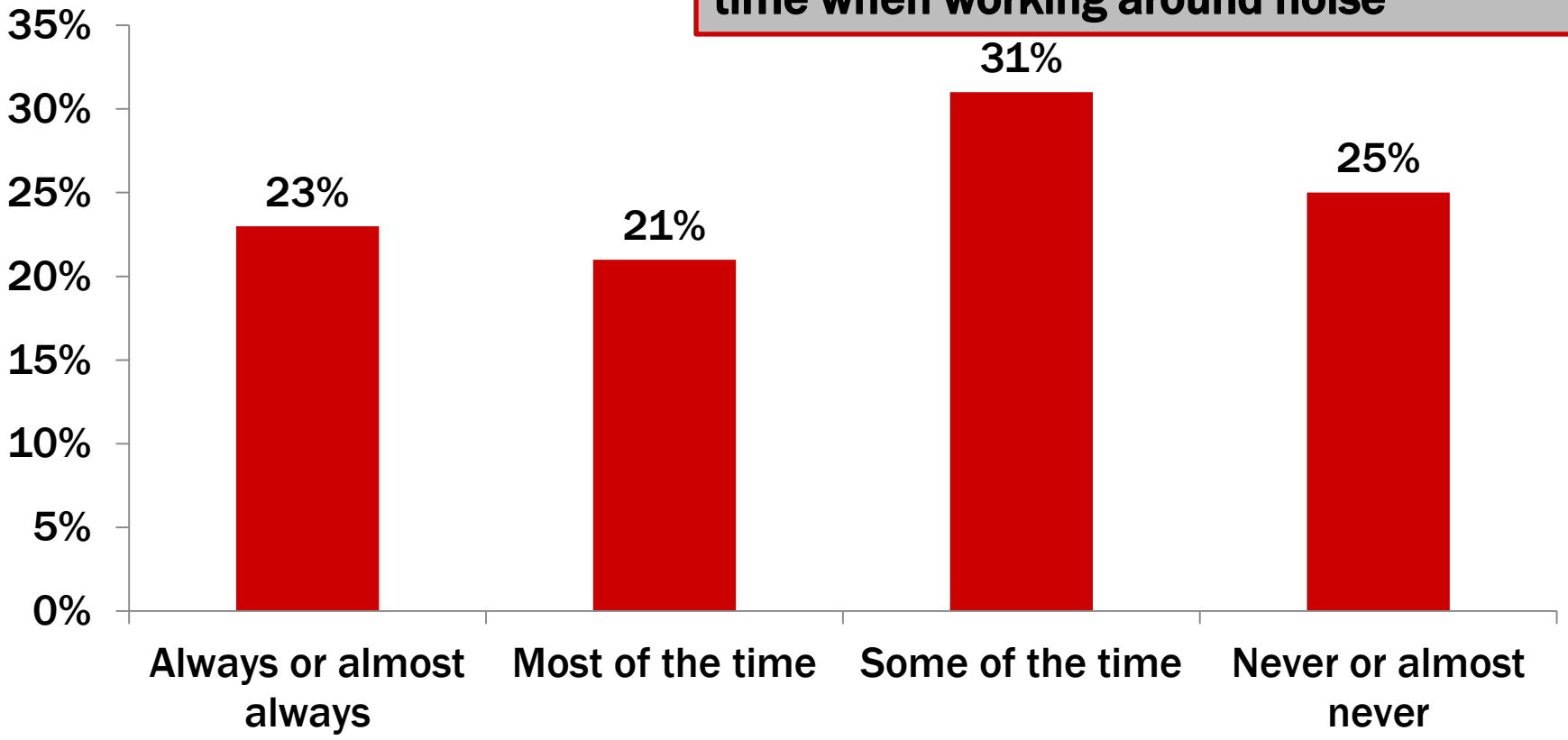


NOISE ON THE JOBSITE – HOW OFTEN WORKERS NEED TO SHOUT TO BE HEARD



USE OF HEARING PROTECTION WHEN WORKING AROUND NOISE

56% do not wear PPE most or all of the time when working around noise



NOISE-RELATED TOPICS THAT NEED MORE ATTENTION

- **How to recognize a hazard**
- **Use of hearing protection:**
  - ✓ *How to determine when needed*
  - ✓ *How to select*
  - ✓ *Limitations on use*
  - ✓ *When to replace*
- **Risk & signs of hearing loss**
- **Engineering & administrative controls**

CHALLENGES

Reducing the risk of hearing loss

Training about hearing loss & prevention

1. Convincing workers of the hazard
2. Raising awareness of noise sources
3. Getting workers to apply what they learned

TRAINERS' RECOMMENDATIONS

1. Create noise-related training materials for use in training programs (OSHA 10-hour, 30-hour, etc.)
2. Send regular notices and reminders -- *"once is not enough."*
3. Include regular reminders in articles, magazines, newsletters, Facebook posts, and Twitter feeds

CONSTRUCTION NOISE & HEARING LOSS PREVENTION TRAINING PROGRAM

Goal – Respond to trainer needs for flexibility and ready access to materials that could be used for refresher training

Result – Training resources to use for a stand-alone class or as part of OSHA training:

- 1 Hour Module
- 30 Minute Module
- In-Class & Hands-On Refresher Exercises

Construction Noise & Hearing Loss Prevention

Provide the necessary training to identify a noise hazard, understand the risk for hearing loss, and know what steps should be taken to work safely to prevent hearing loss

The 1 Hour & 30 Minute Modules Cover

1. Why noise and hearing loss is an important issue for construction workers
2. The signs and effects of hearing loss and tinnitus
3. Hazardous noise, types of noise, and common noise sources
4. How to measure noise using common indicators and free mobile applications (apps)
5. Ways to control noise exposure
6. Types of hearing protection devices used in construction and their use

How big is the problem?

Did you know that hearing loss is one of the most common work-related illnesses in the United States?

50%
of construction workers have some job-related hearing problem, including hearing loss or ringing, whistling, buzzing, or humming in the ears (tinnitus).

You can do something to prevent hearing loss. Buy Quiet!

CDC Workplace Safety and Health NIOSH

http://www.cdc.gov/niosh/topics/buyquiet

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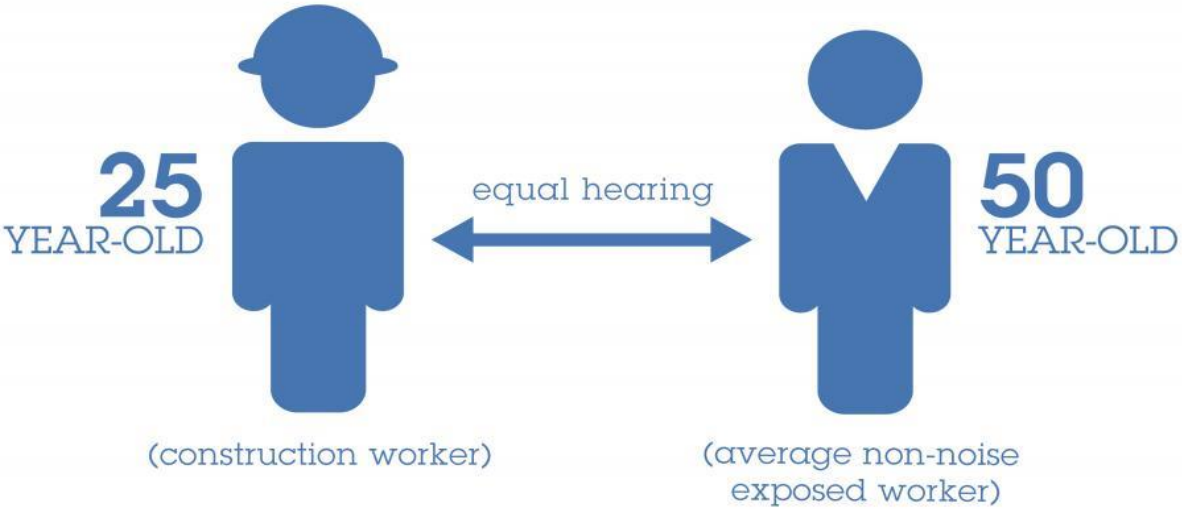
Why care about hearing loss?

It's common for construction workers to have the hearing of workers twice their age.



Is it too loud at work? Talk to your employer about quieter tools and machinery.

CDC Workplace Safety and Health NIOSH

http://www.cdc.gov/niosh/topics/buyquiet

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Have you experienced the following…

- ❑ Have trouble hearing people talk when there is background noise
- ❑ People sound like they are mumbling
- ❑ Often have to ask people to repeat what they say
- ❑ Turn up the radio or TV a lot
- ❑ Have difficulty hearing people on the phone
- ❑ Have constant ringing in your ears

Are You Talking to Me?

What it's like to lose your hearing

Developed by and used with the permission of Dr. Robert M. Ghent and Brad K. Witt of Honeywell Safety Products, San Diego, CA.

	Exercises				
	1	2	3	4	5
Word 1					
Word 2					
Word 3					
Word 4					
Word 5					

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	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

Effects of Hearing Loss

- Temporary hearing loss
- Difficulty hearing warning signals on the job
- Increase the risk of falling
- Contribute to loneliness and depression
- Increase stress, blood pressure, hypertension and cardiovascular disease
- Lead to nervousness, sleeplessness fatigue

What causes hearing loss?

- ❑ Exposure to loud noise
- ❑ Certain drugs and chemicals
- ❑ Aging
- ❑ Heredity
- ❑ Head injury
- ❑ Headphone use
- ❑ Childhood illness

Photo courtesy of the International Masonry Institute & OSHA

Noise Induced Hearing Loss (NIHL)

- Most common work-related illness
- Damage to hearing depends how loud the noise is, and
- How long you are exposed to it

How do you know if it's too loud at work?

You have to:

- ❑ Shout to be heard an arm's length away (2-3 feet)
- ❑ Turn equipment off to be heard
- ❑ Move to another location to talk & be heard
- ❑ Turn up the car radio at the end of the day

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How Sound Is Measured

- Sound is measured in units called **decibels** (dB) using A-weighted sound levels (dBA)
- A reduction of 3 dBA cuts the noise energy in half

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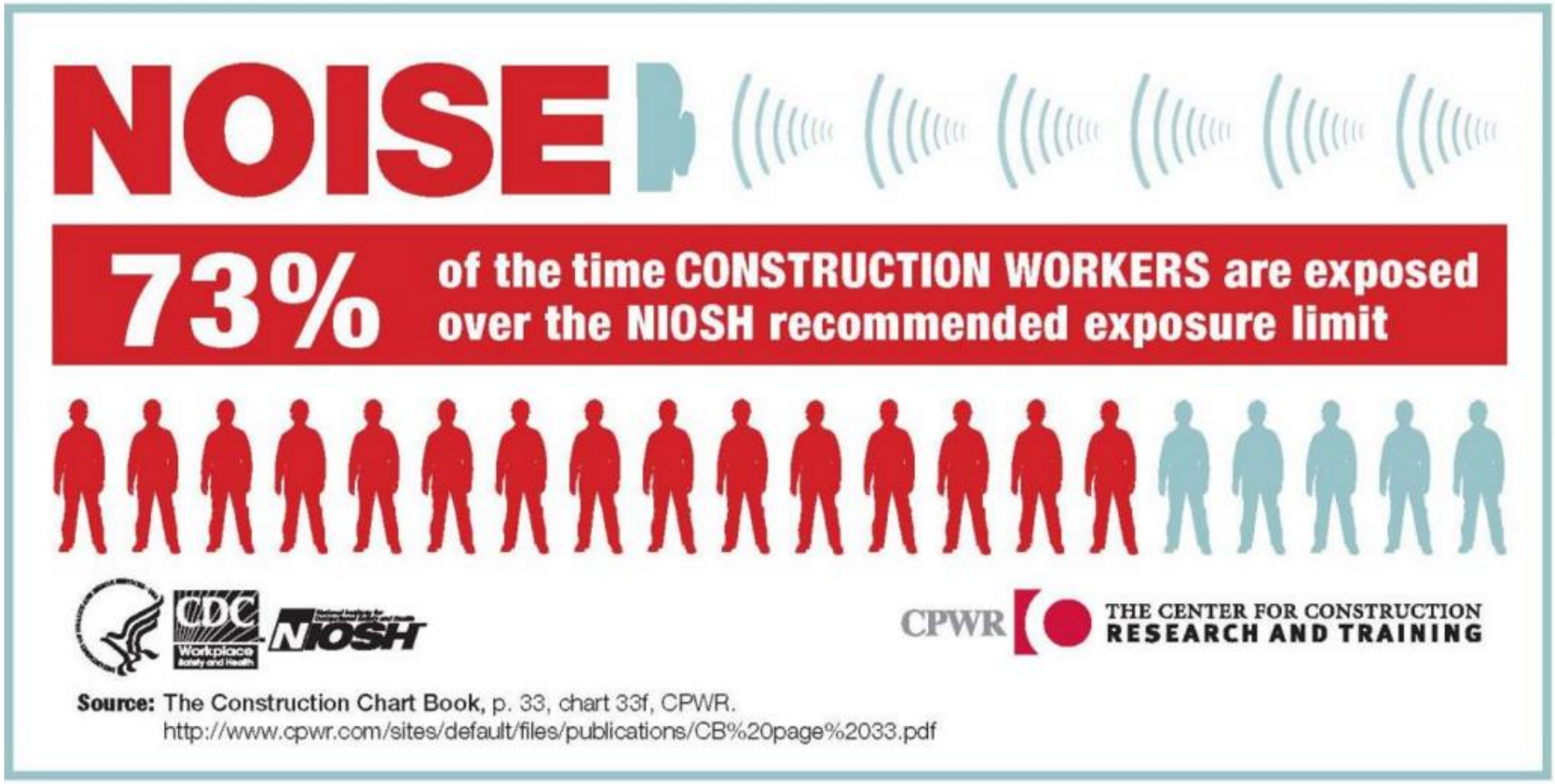
OSHA Noise Limits In Construction

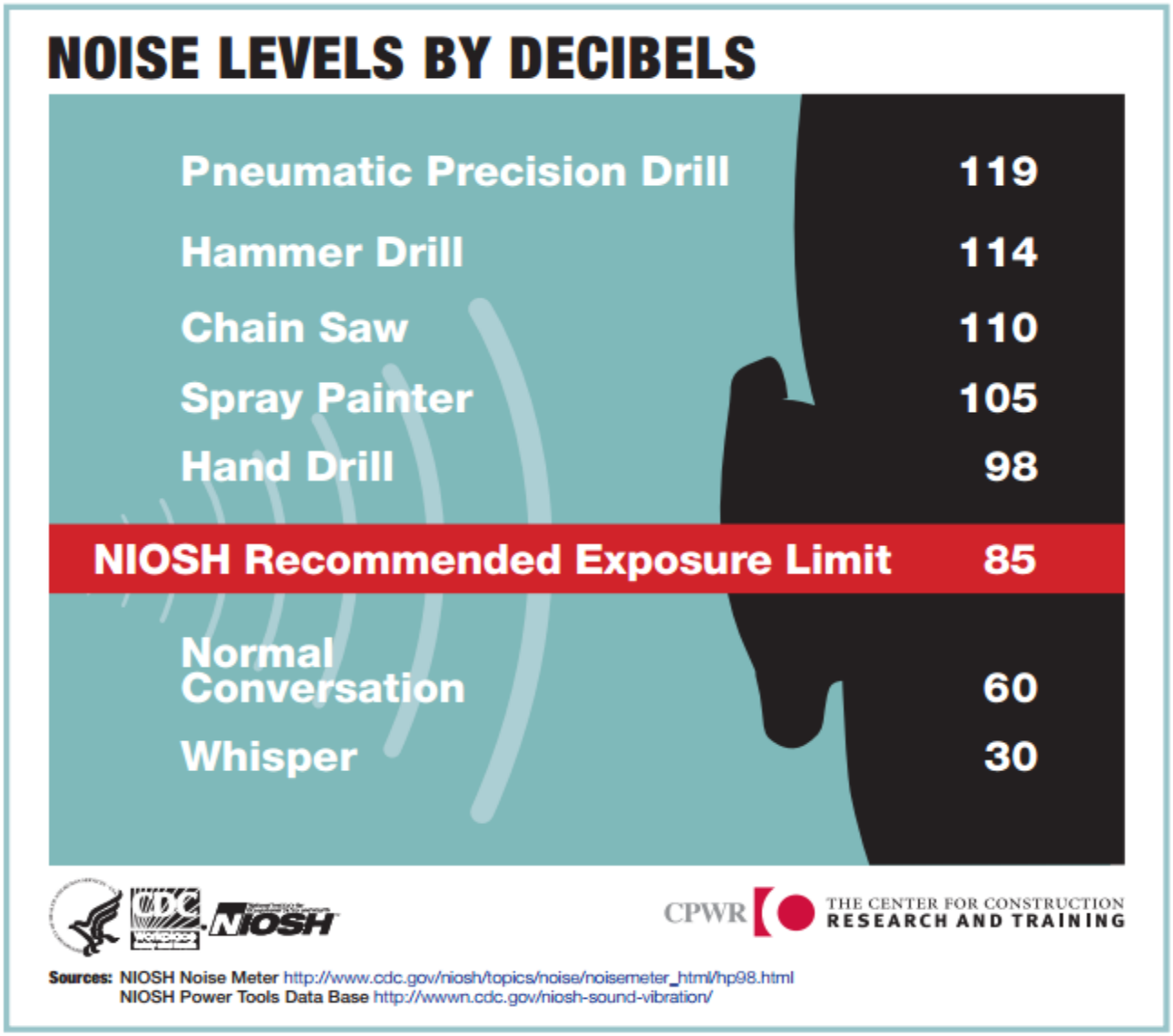
Permissible Noise Exposure Limits (dBA)		
Duration per day in hours	NIOSH (recommended)	OSHA (Construction Standard)
8	85	**90**
4	88	**95**
2	91	**100**
1	94	**105**
½	97	**110**
¼	100	**115**

Source: NIOSH, Occupational Noise, Revised Criteria, 1998. Table 1-1, and OSHA, 1910.95 (b)(2); Table G-16

How frequently are construction workers exposed to dangerous noise levels?



Noise Levels



NIOSH Power Tools Database: https://wwwn.cdc.gov/niosh-sound-vibration/

Noise Sources At Work

- ❑ Noise you create
- ❑ Noise your trade creates
- ❑ Noise from other trades

Photo courtesy of the International Masonry Institute & OSHA

Measuring Noise

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Source:
3-M Company website :
https://www.3m.com/3M/en_US/company-us/all-3m-products/~/3M-NoisePro-Dosimeter-Kit-NP-DLX-AC3-AC300-Calibrator?N=5002385+8709322+8711405+3293843541&rt=rud

Noise Measurement Devices

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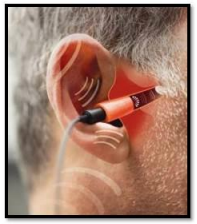
PERSONAL DOSIMETER

Source:
3-M Company website :
https://www.3m.com/3M/en_US/company-us/all-3m-products/~/3M-NoisePro-Dosimeter-Kit-NP-DLX-AC3-AC300-Calibrator?N=5002385+8709322+8711405+3293843541&rt=rud



IN-EAR DOSIMETER

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).

SOUND LEVEL METER

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).

Sound Level Meter Apps

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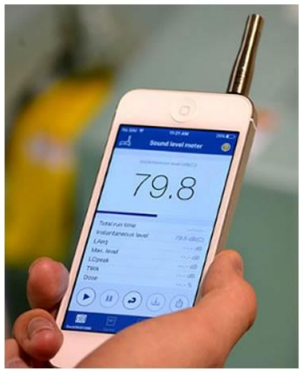
NIOSH SLM for iPhones

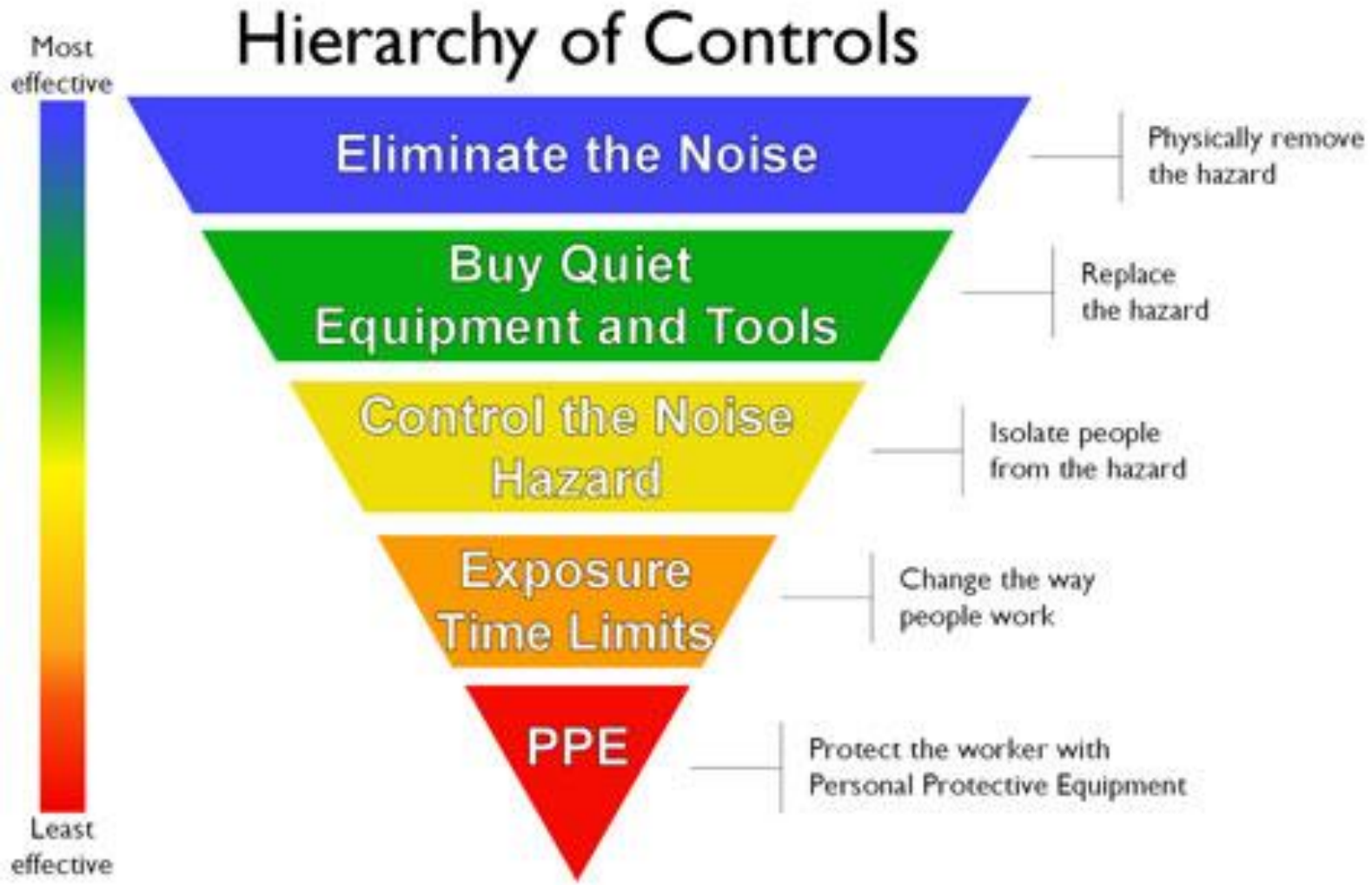
https://itunes.apple.com/us/app/niosh-slm/id1096545820?mt=8Iphone app

Sound Meter for Android

https://play.google.com/store/apps/details?id=com.gamebasic.decibel



Ways To Control Construction Noise



Source: NIOSH Workplace Safety & Health Topics, Controls for Noise Exposure

What Employers Should Do to Protect You

- ❑ Plan: Before the job starts identify noisy tasks and equipment and plan for controlling noise – including buying or renting quieter equipment.
- ❑ Each day - do a walk-around inspection to make sure the plan is being implemented
- ❑ Monitor noise levels
- ❑ Provide different types of hearing protection - one size or style may not fit all workers
- ❑ Conduct training on each type of hearing protection provided

"Buy Quiet" Now, Hear Later

Hearing Protection Devices (HPDs)

Source: 3M Company - https://www.3m.com/3M/en_US/company-us/all-3m-products/~/3M-Diamond-Grade-Safety-Signs-200-299-Series?N=5002385+3294571656&rt=rud

Types of Hearing Protection

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- ❑Foam (formable) plugs
- ❑Reusable earplugs
- ❑Custom molded plugs
- ❑Banded or semi-aural
- ❑Earmuffs

Source: State Building & Construction Trades Council of California, AFL-CIO: Construction Noise & Hearing Loss Prevention training program, Funded by Federal OSHA, 2015 (courtesy of Build It Smart)

Selecting Hearing Protection

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- ❑Convenience
- ❑Comfort
- ❑Communication needs
- ❑Hygiene
- ❑Hearing ability of worker
- ❑Noise level
- ❑**Noise reduction needed**

Care and Maintenance

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Foam roll plugs

- ✓dispose of foam roll plugs after each use

Reusable plugs

- ✓clean with soap and water, replace when damaged

Custom plugs

- ✓wash in mild soapy water

Advantages & Disadvantages of Different Types of Hearing Protection

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Type	Noise Reduction	Advantages	Disadvantages
Foam Plugs/ Moldable	High	Readily Available	-Hygiene Issues -Take Time to Fit
Reusable (Pre-formed Plugs)	Mid	Quick Fit	-Costly to replace
Banded/ Semi-aural	Low	Quick Fit	-Uncomfortable -If the band is hit it transfers sound to the ear
Earmuffs	High	Quick Fit	-Hot, heavy, cumbersome
Custom	Low to Mid	Quick Fit	-Costly -Replace in 3-5 yrs

Source: State Building & Construction Trades Council of California, AFL-CIO: Construction Noise & Hearing Loss Prevention training program, Funded by Federal OSHA, 2015.

Noise Reduction Rating (NRR)

- NRR is measured in decibels
- The NRR is found on the earplug package
- The higher the NRR number, the greater the protection
- Calculating the level of protection:

(NRR – 7)/2 = NRR reduction

Exposure level – NRR reduction = level of protection

(33-7)/2 = 13 95dBA – 13 = 82 dBA (level of protection)

Source: State Building & Construction Trades Council of California, AFL-CIO: Construction Noise & Hearing Loss Prevention training program, Funded by Federal OSHA, 2015 (courtesy of WISHA)

Hearing Protection Won't Work if it Doesn't Fit

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)

Fitting An Ear Plug

1. Roll
   entire earplug into a crease-free cylinder

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

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)

10-15 MINUTE IN-CLASS & HANDS-ON REFRESHER EXERCISES

Section 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
- **Exercise A-2** – Are You Talking To Me?
- **Exercise A-3** – What Does Hearing Loss Sound Like?
- **Exercise A-4** – How to Properly Use Ear Plugs
- **Exercise A-5** – How Loud is TOO Loud?
- **Exercise A-6** – How Would You Describe Your Hearing?

10-15 MINUTE IN-CLASS & HANDS-ON REFRESHER EXERCISES

Section B -- NOISE TRAINING EXERCISES FOR USE IN IN-CLASS FOR SKILLS TRAINING PROGRAMS:

- **Exercise B-1** – Cumulative Presentation: Noise & Hearing Loss – The risk & prevention
- **Exercise B-2** – Stand-Alone Slides: Noise & Hearing Loss – The risk & prevention
  - **B-2 (A)** – Noise – What are the risks?
  - **B-2 (B)** – The Cost of Hearing Loss
  - **B-2 (C)** – How Loud is TOO Loud?
  - **B-2 (D)** – Preventing Hearing Loss

10-15 MINUTE IN-CLASS & HANDS-ON REFRESHER EXERCISES

Section B -- NOISE TRAINING EXERCISES FOR USE IN THE HANDS-ON PORTION OF SKILLS TRAINING PROGRAMS:

- **Exercise C-1 –** Identifying Noise Levels of Equipment (Group Activity)
- **Exercise C-2 –** Measuring Noise Levels Throughout the Day (Individual Activity)
- **Exercise C-3 –** Choosing the Right Hearing Protection

HANDOUTS

HANDOUT - ARE YOU TALKING TO ME?

	Exercises				
	1	2	3	4	5
Word 1					
Word 2					
Word 3					
Word 4					

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=Veavb1NuCTA&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.

HAZARD ALERT — NOISE AND HEARING LOSS

CPWR

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

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.

2 Wear hearing protection

According to OSHA, your employer must provide you with hearing protection when

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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 2.5 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, comfortable 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	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

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

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/topics/noise/hpdcomp/

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WWW.CPWR.COM/RESEARCH/RESEARCH-PRACTICE-LIBRARY/R2P-AND-P2R-WORK/PREVENTING-HEARING-LOSS

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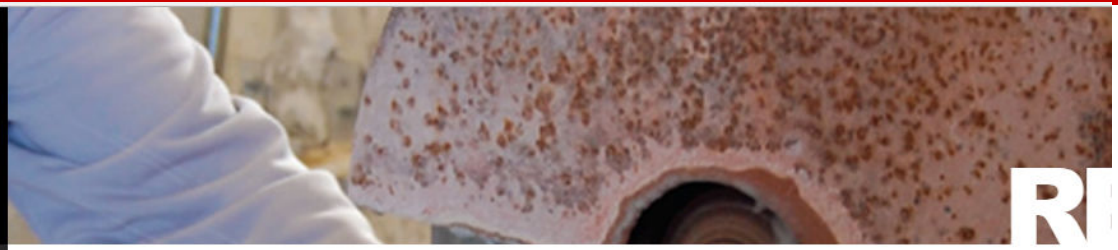

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research

- research projects
- small study program
- research to practice (r2p) library
  - r2p tools
  - prevention partnership resources
  - construction ergonomic research & solutions
  - r2p and p2r at work
    - technology transfer
    - reaching vulnerable workers
    - career technical education
    - preventing hearing loss
  - construction safety & health social marketing toolkit
  - mining resource for constructions
- safety culture & safety climate
- foundations for safety leadership (fsl):
- methylene chloride
- rf radiation awareness
- working in hot weather

r2p & p2r at Work: Preventing Hearing Loss

Hearing loss is a serious problem for workers in the construction industry, with three out of every four construction workers being overexposed to noise on a jobsite. That is why hearing loss prevention is a priority for the OSHA-NIOSH-CPWR r2p Working Group. In order to understand more about noise exposure and hearing loss prevention, CPWR used its Trainers and Researchers United Network (TRU-Net) to conduct multi-trade surveys of trainers and workers.

The results of the trainer and worker surveys identified a need for additional training materials and new strategies to improve retention of training materials. Based on these findings, CPWR's r2p and training staff developed the **Construction Noise and Hearing Loss Prevention Training Program**. This comprehensive program includes modules and exercises that can be used on their own or as part of OSHA training programs:

- **1 Hour Elective Module.** Provides instructors/trainers with the information needed to successfully fulfill the OSHA 30-hour training program requirement for training on a health hazard.
  - Instructor Manual
  - Presentation
- **30 Minute Elective Module.** 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.
  - Instructor Manual
  - Presentation
- **In-Class & Hands-On Refresher Exercises.** A series of short (5-10 minutes) exercises designed to reinforce and apply lessons learned about noise hazards 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 program.
  - Instructor Manual
  - Presentations for Noise Training Exercises for use in OSHA 10- & 30-Hour Modules
    - Exercise A-1: The Impact of Hearing Loss
    - Exercise A-2: Are you talking to me?
    - Exercise A-3: What does hearing loss sound like?
    - Exercise A-4: How to Properly Use Ear Plugs

QUESTIONS?

Acknowledgments:

State Building and Construction Trades Council of California, and Dr. Robert M. Ghent and Brad K. Witt of Honeywell Safety Products, San Diego, CA.

Project team: Eileen Betit, MK Fletcher, Jessica Bunting, Gary Gustafson, Jim Maddux