

# CONSTRUCTION NOISE & HEARING LOSS PREVENTION

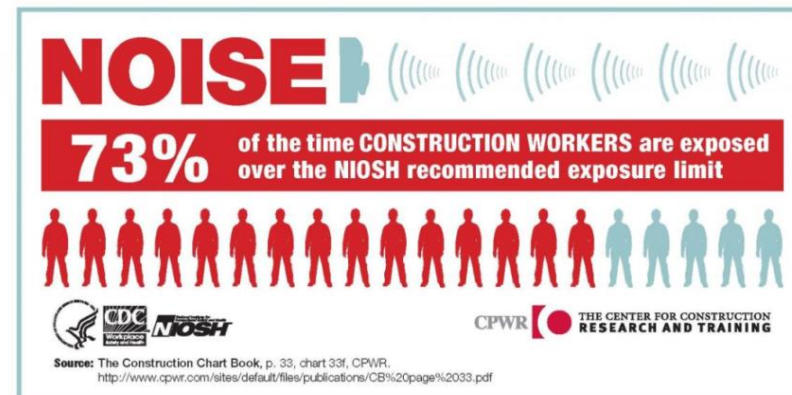
## Webinar

Gary Gustafson, Director, Environmental  
Hazard Training

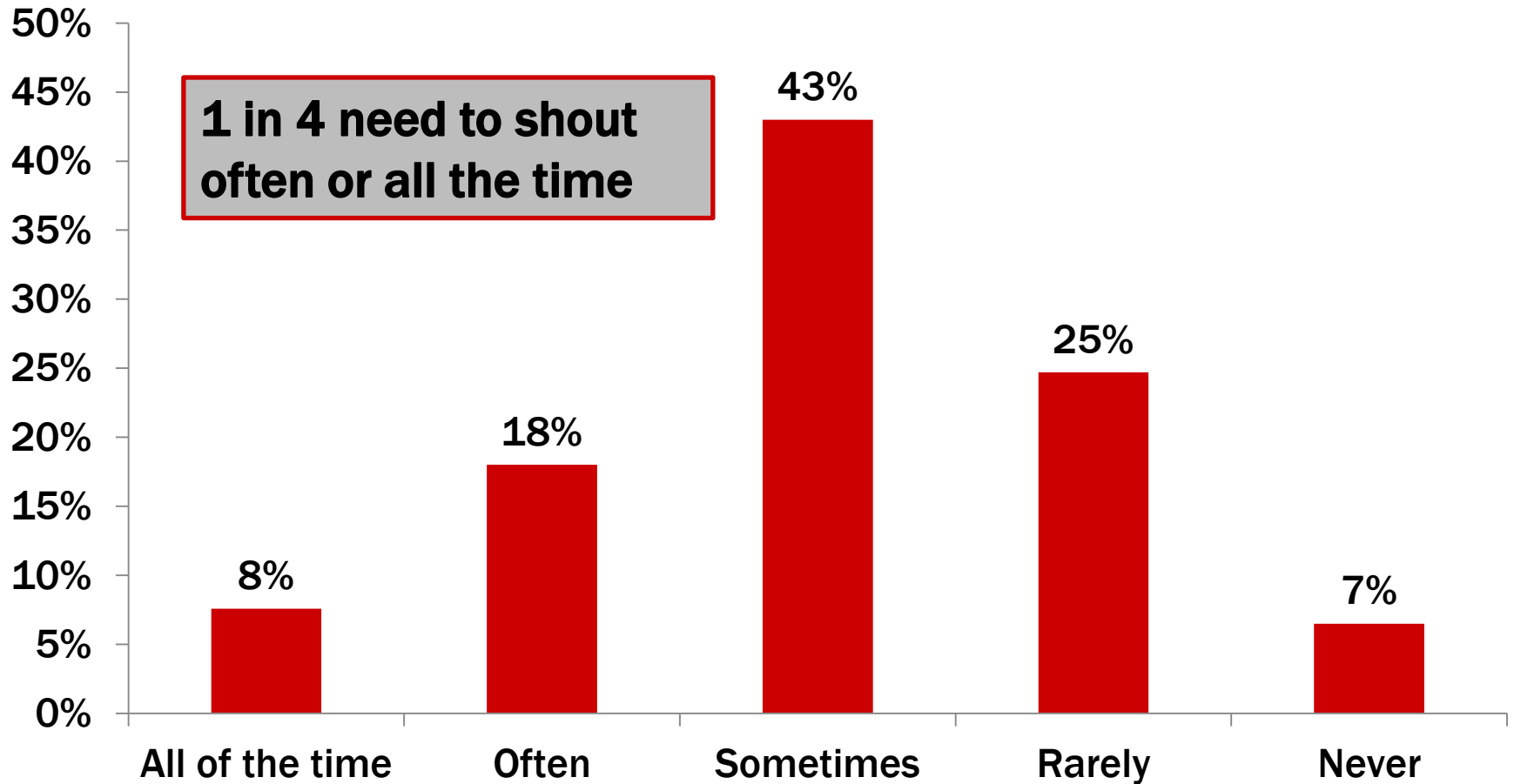
Eileen Betit, Director, Research to Practice

# 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

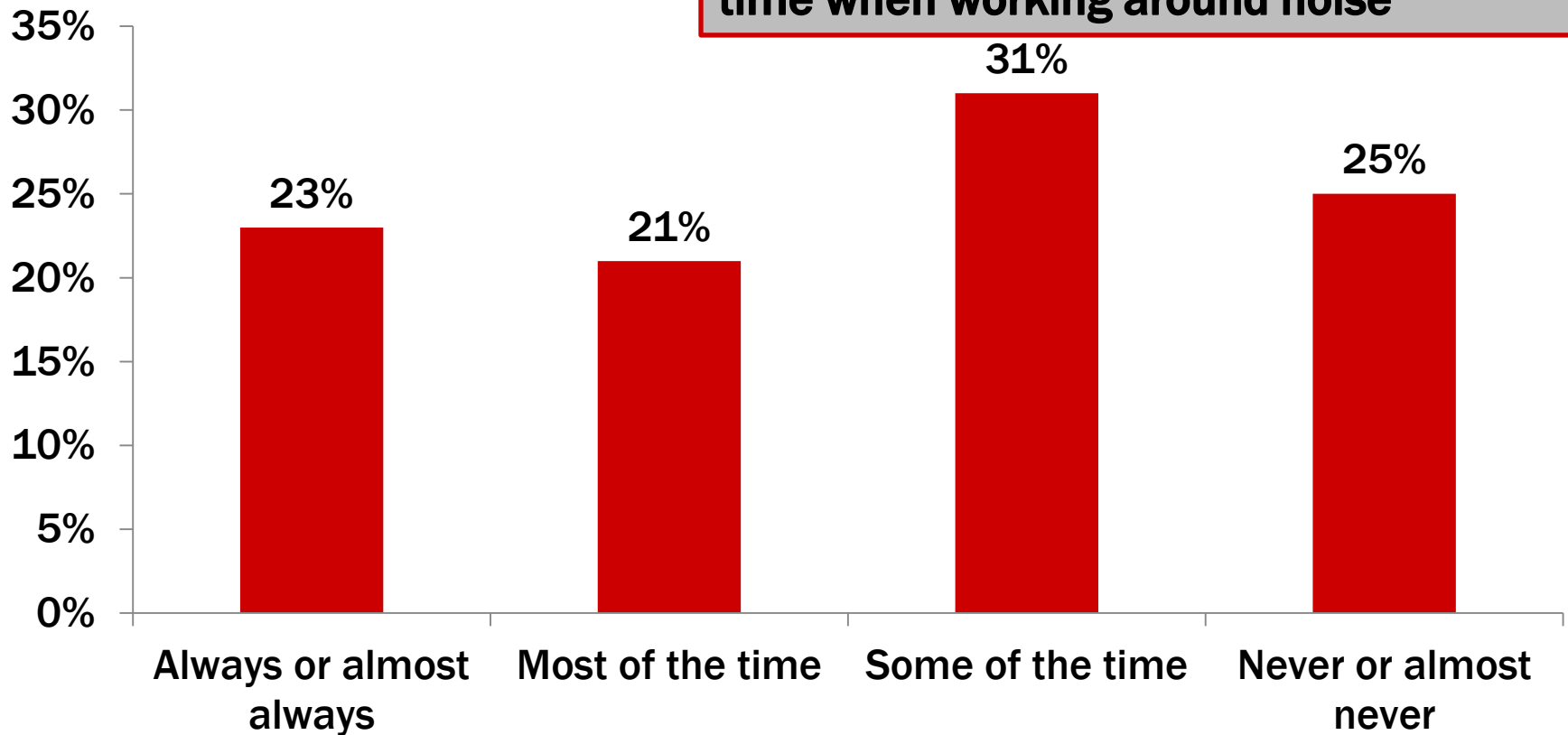


# NOISE ON THE JOBSITE – HOW OFTEN WORKERS NEED TO SHOUT TO BE HEARD



# 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!**

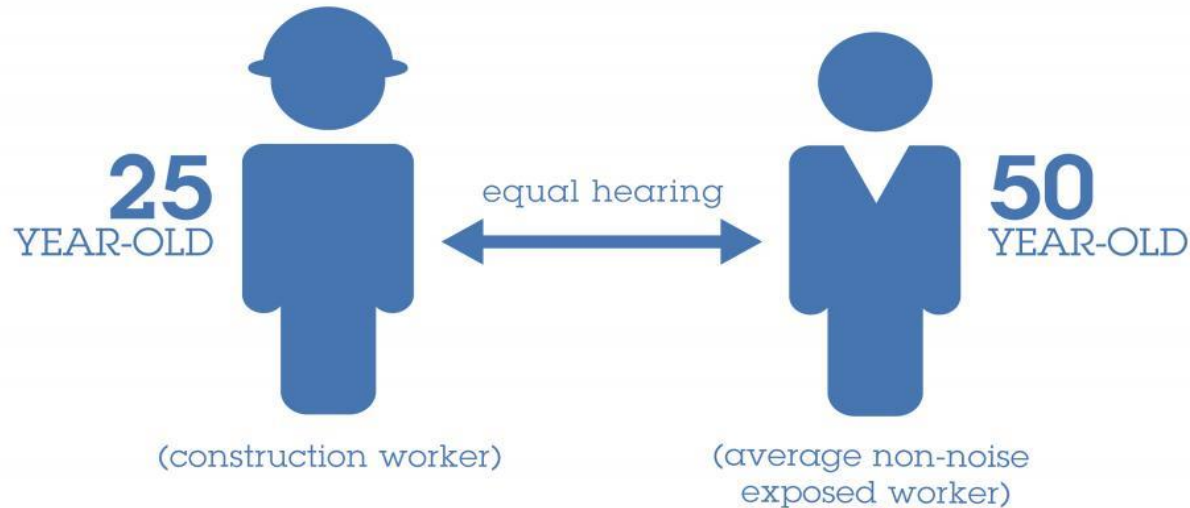


<http://www.cdc.gov/niosh/topics/buyquiet>



# 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.



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




# 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**

	<b>Exercises</b>				
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Word 1</b>					
<b>Word 2</b>					
<b>Word 3</b>					
<b>Word 4</b>					
<b>Word 5</b>					

	<b>Exercises</b>				
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Word 1</b>					
<b>Word 2</b>					
<b>Word 3</b>					
<b>Word 4</b>					
<b>Word 5</b>					



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

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	1	2	3	4	5
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	<b>Exercises</b>				
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Word 1</b>	<b>Star</b>	<b>Star</b>	<b>Star</b>	<b>Star</b>	<b>Dust</b>
<b>Word 2</b>	<b>Few</b>	<b>Few</b>	<b>Few</b>	<b>Few</b>	<b>Stiff</b>
<b>Word 3</b>	<b>Bathe</b>	<b>Bathe</b>	<b>Bathe</b>	<b>Bathe</b>	<b>Nest</b>
<b>Word 4</b>	<b>Cap</b>	<b>Cap</b>	<b>Cap</b>	<b>Cap</b>	<b>Then</b>
<b>Word 5</b>	<b>West</b>	<b>West</b>	<b>West</b>	<b>West</b>	<b>Camp</b>

# 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

APPROXIMATELY  
**1 IN 4 NOISE-EXPOSED CONSTRUCTION WORKERS  
SUFFER SOME LEVEL OF HEARING LOSS.<sup>1</sup>**

**3X↑↑** HEARING LOSS HAS BEEN  
LINKED TO THREE TIMES THE  
RISK OF FALLING.<sup>2</sup>

 Repeated noise exposure can  
cause permanent hearing loss!

 How much noise are you exposed to?  
Download the free **NIOSH SLM** app  
and find out!

 Download on the  
App Store





**Join the Campaign to Stop Construction Falls!**  
[www.stopconstructionfalls.com](http://www.stopconstructionfalls.com)

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 **PLAN. PROVIDE. TRAIN.**

Source: <sup>1</sup>Masterson, Elizabeth, et al. "Trends in Worker Hearing Loss by Industry Sector, 1981-2010". American Journal of Industrial Medicine 58:392-401 (2015).  
<sup>2</sup>Lin, Frank R. and Luigi Ferrucci. "Hearing Loss Linked to Three-Fold Risk of Falling". Johns Hopkins Medicine and National Institute of Aging <https://in.gov/vdPAdu>, Web. 20 March 2017.

# 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

## How Sound Is Measured

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- ❑ 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

## OSHA Noise Limits In Construction

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

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



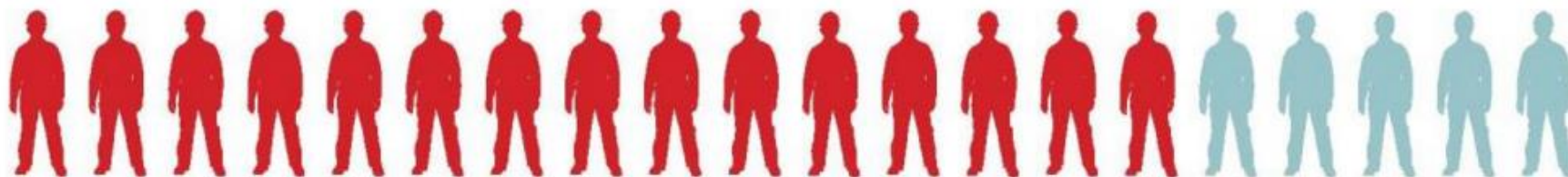
# How frequently are construction workers exposed to dangerous noise levels?

# NOISE



# 73%

of the time **CONSTRUCTION WORKERS** are exposed over the NIOSH recommended exposure limit



Source: The Construction Chart Book, p. 33, chart 33f, CPWR.

<http://www.cpwr.com/sites/default/files/publications/CB%20page%2033.pdf>

# Noise Levels

## NOISE LEVELS BY DECIBELS

Pneumatic Precision Drill	119
Hammer Drill	114
Chain Saw	110
Spray Painter	105
Hand Drill	98
<b>NIOSH Recommended Exposure Limit</b>	<b>85</b>
Normal Conversation	60
Whisper	30



Sources: NIOSH Noise Meter [http://www.cdc.gov/niosh/topics/noise/noisemeter\\_html/hp98.html](http://www.cdc.gov/niosh/topics/noise/noisemeter_html/hp98.html)  
 NIOSH Power Tools Data Base <http://www.cdc.gov/niosh-sound-vibration/>

NIOSH Power Tools Database: <https://www.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-Ki-NP-DLX-AC3-AC300-Calibrator?N=5002385+8709322+8711405+3293843541&rt=rud](https://www.3m.com/3M/en_US/company-us/all-3m-products/-/3M-NoisePro-Dosimeter-Ki-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-Ki-NP-DLX-AC3-AC300-Calibrator?N=5002385+8709322+8711405+3293843541&rt=rud](https://www.3m.com/3M/en_US/company-us/all-3m-products/-/3M-NoisePro-Dosimeter-Ki-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=8&iphoneapp>

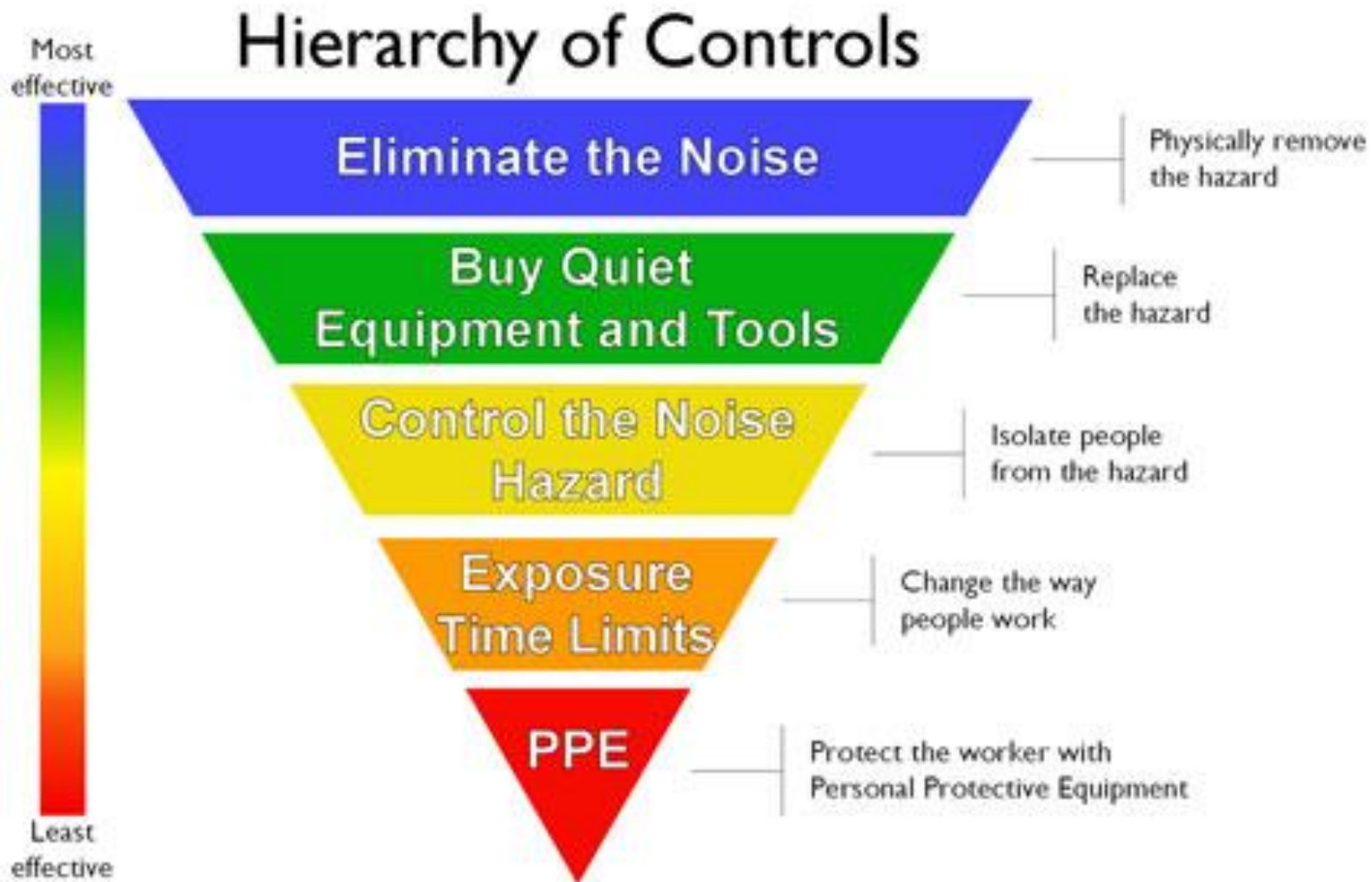
### Sound Meter for Android

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





# Ways To Control Construction Noise



# 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

Repeated exposures to noise above 85 decibels  
OR one exposure above 140 decibels can lead  
to irreversible hearing loss

**BUY QUIET**



Buying a tool just 3 decibels lower will cut  
the noise energy reaching your ear in half!



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

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# Hearing Protection Devices (HPDs)<sup>32</sup>



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](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:

$$(NRR - 7)/2 = \text{NRR reduction}$$

$$\text{Exposure level} - \text{NRR reduction} = \text{level of protection}$$

$$(33-7)/2 = 13 \quad 95\text{dBA} - 13 = 82 \text{ dBA (level of protection)}$$



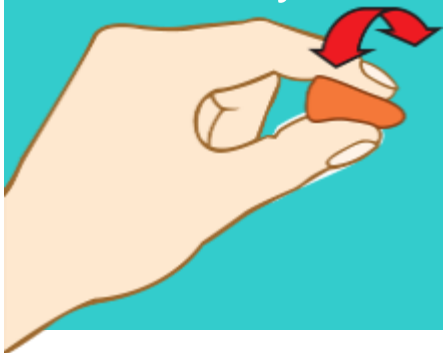
# Hearing Protection Won't Work if it Doesn't Fit



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

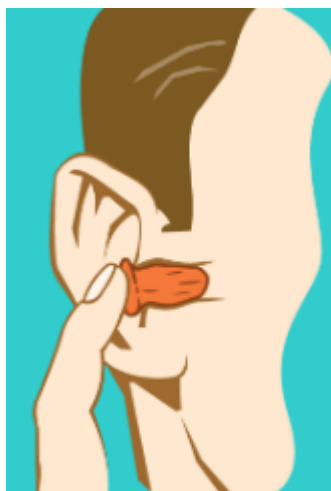
1. Roll entire earplug into a crease-free cylinder



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



# 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







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



● about ● news & events ● publications

## 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

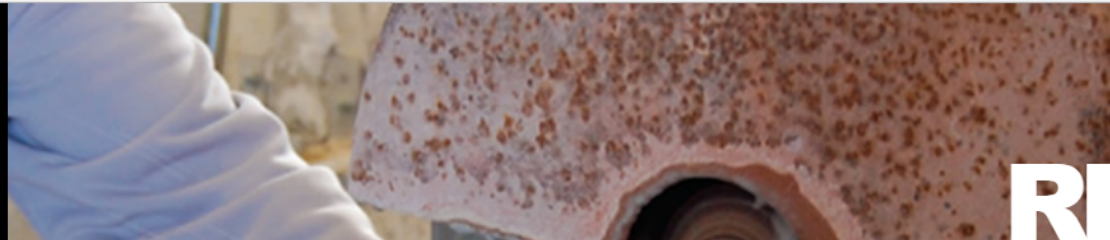
safety culture & safety climate

foundations for safety leadership (fsl):

methylene chloride

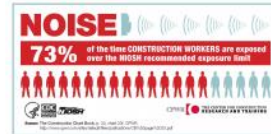
rf radiation awareness

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:**

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