CONSTRUCTION NOISE & HEARING LOSS PREVENTION

Webinar
Gary Gustafson, Director, Environmental Hazard Training
Eileen Betit, Director, Research to Practice

April 26, 2017
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

1 in 4 need to shout often or all the time

- All of the time: 8%
- Often: 18%
- Sometimes: 43%
- Rarely: 25%
- Never: 7%
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
Reducing the risk of hearing loss

CHALLENGES

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

Training about hearing loss & prevention
TRINERS’ 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
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
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
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.

- **25 YEAR-OLD**
  - (construction worker)

- **50 YEAR-OLD**
  - (average non-noise exposed worker)

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
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Developed by and used with the permission of Dr. Robert M. Ghent and Brad K. Witt of Honeywell Safety Products, San Diego, CA.
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<td><strong>Word 2</strong></td>
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<td><strong>Word 3</strong></td>
<td>Bathe</td>
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<td><strong>Word 4</strong></td>
<td>Cap</td>
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<td><strong>Word 5</strong></td>
<td>West</td>
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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 and 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 on 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

- 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

<table>
<thead>
<tr>
<th>Duration per day in hours</th>
<th>NIOSH (recommended)</th>
<th>OSHA (Construction Standard)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>85</td>
<td>90</td>
</tr>
<tr>
<td>4</td>
<td>88</td>
<td>95</td>
</tr>
<tr>
<td>2</td>
<td>91</td>
<td>100</td>
</tr>
<tr>
<td>1</td>
<td>94</td>
<td>105</td>
</tr>
<tr>
<td>½</td>
<td>97</td>
<td>110</td>
</tr>
<tr>
<td>¼</td>
<td>100</td>
<td>115</td>
</tr>
</tbody>
</table>

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?

73% of the time construction workers are exposed over the NIOSH recommended exposure limit.

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

NOISE LEVELS BY DECIBELS

<table>
<thead>
<tr>
<th>Tool</th>
<th>Decibels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumatic Precision Drill</td>
<td>119</td>
</tr>
<tr>
<td>Hammer Drill</td>
<td>114</td>
</tr>
<tr>
<td>Chain Saw</td>
<td>110</td>
</tr>
<tr>
<td>Spray Painter</td>
<td>105</td>
</tr>
<tr>
<td>Hand Drill</td>
<td>98</td>
</tr>
</tbody>
</table>

NIOSH Recommended Exposure Limit 85

<table>
<thead>
<tr>
<th>Normal Conversation</th>
<th>Normal Conversation Limit</th>
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<tbody>
<tr>
<td>Whisper</td>
<td>60</td>
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<tr>
<td></td>
<td>30</td>
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</table>

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

Source: 3M Company website: https://www.3m.com/3Wen_US/company.go?site=3m-product~&id=N6-NoseP10-Dosimeter-Kit-NP-125-AC3,-AC300,
Calibrator#:05002183-829182-3771455-52903455

Noise Measurement Devices

PERSONAL DOSIMETER
Source: 3M Company website: https://www.3m.com/3Wen_US/company.go?site=3m-product~&id=N6-NoseP10-Dosimeter-Kit-NP-125-AC3,-AC300,
Calibrator#:05002183-829182-3771455-52903455

IN-EAR DOSIMETER

SOUND LEVEL METER

Sound Level Meter Apps

NIOSH SLM for iPhones

Sound Meter for Android
Ways To Control Construction Noise

Hierarchy of Controls

1. **Eliminate the Noise**
   - Physically remove the hazard

2. **Buy Quiet Equipment and Tools**
   - Replace the hazard

3. **Control the Noise Hazard**
   - Isolate people from the hazard

4. **Exposure Time Limits**
   - Change the way people work

5. **PPE**
   - Protect the worker with Personal Protective Equipment

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

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

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

http://www.cdc.gov/niosh/topics/buyquiet
Hearing Protection Devices (HPDs)

Source: 3M Company -
Types of Hearing Protection

- 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

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

Care and Maintenance

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

<table>
<thead>
<tr>
<th>Type</th>
<th>Noise Reduction</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foam Plugs/Moldable</td>
<td>High</td>
<td>Readily Available</td>
<td>- Hygiene issues</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Take time to fit</td>
</tr>
<tr>
<td>Reusable (Pre-formed Plugs)</td>
<td>Mid</td>
<td>Quick Fit</td>
<td>- Costly to replace</td>
</tr>
<tr>
<td>Banded/Semi-aural</td>
<td>Low</td>
<td>Quick Fit</td>
<td>- Uncomfortable</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>If the band is hit it transfers sound to the ear</td>
</tr>
<tr>
<td>Earmuffs</td>
<td>High</td>
<td>Quick Fit</td>
<td>- Hot, heavy, cumbersome</td>
</tr>
<tr>
<td>Custom</td>
<td>Low to Mid</td>
<td>Quick Fit</td>
<td>- Costly</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>- Replace in 3-5 yrs</td>
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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:
  
  \[
  \frac{\text{NRR} - 7}{2} = \text{NRR reduction}
  \]

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

  \[
  \frac{33 - 7}{2} = 13 \\
  95\text{dBA} - 13 = 82\text{dBA (level of protection)}
  \]

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)
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)
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?
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
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

Hazard Alert: Noise and Hearing Loss

**What?**
You’re in danger—lose your hearing from working:
- About 20 to 30 million Americans suffer from hearing loss.
- Noise-induced hearing loss is the most common preventable occupational injury.

**When you work around noise...**

1. **Ask for controls.**
   - Most employers must control or eliminate noise hazards that cause hearing loss.
   - Use equipment that reduces noise to a safe level.
   - Use controls such as industrial hearing conservation programs, proper ventilation, and noise barriers.

2. **Wear hearing protection.**
   - According to OSHA, employees must use hearing protectors with protection levels above 85 decibels.

**What to do if you lose your hearing?**
- First, call a doctor.
- Then, notify your supervisor.
- If you are in an industrial setting, notify your employer.

**Sound Level Chart**

<table>
<thead>
<tr>
<th>Noise Level</th>
<th>Typical Example</th>
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<tbody>
<tr>
<td>85 decibels</td>
<td>Continuous noise from a vacuum cleaner</td>
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<tr>
<td>90 decibels</td>
<td>Continuous noise from a passing train</td>
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<tr>
<td>100 decibels</td>
<td>Continuous noise from a jackhammer</td>
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<tr>
<td>110 decibels</td>
<td>Continuous noise from a jackhammer</td>
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</tbody>
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**Chronic Noise Exposure**

- Continuous noise exposure over time can cause permanent hearing loss.
- Prevent hearing loss by using hearing protection devices.

**Choosing the Right Hearing Protection**

- Personal fit is important for effective hearing protection.
- Choose hearing protectors that provide at least 10-15 dB of noise reduction.
- Consider using a combination of hearing protectors, such as earmuffs and earplugs.

**Steps for Inserting Ear Plugs**

1. Roll the earplug up into a small, thin “snaker” 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 sit right in.
3. Insert the earplug and roll it into your ear canal and hold it firmly and tight.

**What to do if you lose your hearing?**
- First, call a doctor.
- Then, notify your supervisor.
- If you are in an industrial setting, notify your employer.

**Hearing Protection Devices**

- **Headphones:** Used for music or other audio input.
- **Earplugs:** Used for noise reduction.
- **Earmuffs:** Used for noise reduction.

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

- Your employer must provide hearing protection, the correct fit, and the noise protection needed. Common types include disposable ear plugs, pre-formed, flexible, and custom-made earplugs, and earplugs. They help protect your hearing if used correctly.

**Earplug Insertion Techniques**

1. Roll the earplug into a thin “snaker” with your fingers.
2. Pull the top of your ear up and back with your opposite hand to straighten out your ear canal.
3. Insert the earplug and roll it into your ear canal and hold it firmly and tight.

**What type of hearing protection should I use?**

- Choose noise-cancelling headphones or earplugs for noise reduction.

**CPWR**

- Construction Health and Safety Program.
- National Center for Construction Health and Safety Research.
- CPWR’s Hearing Protection Program provides guidelines for choosing and using hearing protection devices.

**Handout 4.1: Handout 4.1: Construction Noise & Hearing Loss Prevention Training Program**
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 job site. 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 as a portion of the OSHA 30-hour health hazard training requirement.
  - Instructor Manual
  - Presentation

- **In-Class & Hands-On Refresher Exercises.** A series of short (3-10 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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