Six Components of Hearing Conservation Program

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Industrial Hearing Testing
• NIOSH indicates that up to 30 million American workers are at risk of hazardous noise on the job.

• *That’s one in five workers.*
Who are you?

Are you in charge of the HCP?

Do you provide consultation to HCP?

Do you complete the OSHA log?

Do you have an in-house program?

Do you send your employees to a clinic?

Do you use a mobile testing service?
Hearing Conservation...

WHY?
If you’re in an environment where you have to shout to be heard, it’s a good idea to wear hearing protection.

Wearing hearing protection now can reduce your risk for hearing loss later.
Hearing Loss Due To Noise Exposure Is ...

Painless
Permanent
Progressive

... and very PREVENTABLE!
Components of A Hearing Conservation Program
Noise Level Evaluation
Audiometric Testing
Hearing Protection
Record Keeping
Training
Written Program
Noise Level Evaluation

HOW LOUD IS IT?

Engineering noise controls:

✓ Enclosures
✓ Absorption
✓ Barrier Walls
3 Types of Engineering Controls

Enclosures:

- Must have sufficient TL (transmission loss)
- Numerous improperly sealed openings makes difficult
- Structural vibration can become problematic
- Can be improved with lining interior with absorptive material
3 Types of Engineering Controls Continued…

Absorption:
• Sound absorbing materials rather than reflective

Barrier Walls:
• Occlude line of site between source and receiver
Action Level: 85 dBA
Permissible Exposure Level: 90 dBA
<table>
<thead>
<tr>
<th></th>
<th>EPA</th>
<th>NIOSH</th>
</tr>
</thead>
<tbody>
<tr>
<td>90dBA</td>
<td>22%</td>
<td>29%</td>
</tr>
<tr>
<td>85dBA</td>
<td>12%</td>
<td>15%</td>
</tr>
<tr>
<td>80dBA</td>
<td>5%</td>
<td>3%</td>
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</table>

22% MINIMUM LEGAL
12% TYPICAL
5% BEST PRACTICE
29% MINIMUM LEGAL
15% TYPICAL
3% BEST PRACTICE
## 5 dB Doubling Effect

<table>
<thead>
<tr>
<th>Duration</th>
<th>TWA/dBA</th>
<th>Dose</th>
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<tbody>
<tr>
<td>8 Hrs</td>
<td>85</td>
<td>50%</td>
</tr>
<tr>
<td>8 Hrs</td>
<td>90</td>
<td>100%</td>
</tr>
<tr>
<td>4 Hrs</td>
<td>95</td>
<td>100%</td>
</tr>
<tr>
<td>2 Hrs</td>
<td>100</td>
<td>100%</td>
</tr>
<tr>
<td>1 Hr</td>
<td>105</td>
<td>100%</td>
</tr>
<tr>
<td>½ Hr</td>
<td>110</td>
<td>100%</td>
</tr>
</tbody>
</table>
Bulldozer
Chainsaw

Exposures $\geq 85$ dB May Cause Hearing Loss
Hand Drill
Belt Sander

Exposures \geq 85 dB May Cause Hearing Loss
Impact Wrench
Hammer
Drill
Every 3dB is a doubling of the noise energy

100 dB + 100 dB = 103 dB
Hearing is Precious!

• Affects quality of life

• Directly related to our ability to communicate with loved ones

• Allows us to interact with society and nature.

• To work and to play safely
Occupational Noise isn’t our only concern.

NOISE LEVELS UP TO 900 TIMES HIGHER
VUVUZELAS

113 dBA at 2 meters!
How we hear

Acoustic energy

to mechanical energy

hydraulic energy

to electrical impulse
This is your ear.

This is your ear on noise.

Any questions?
Did you know that…?

- As many as 30,000,000 **PEOPLE** in USA exposed to high levels of noise
- **5.2 million** manufacturing jobs are > 85dB
- **1 million** workers already have hearing losses
- **0.5 million** have a moderate to severe loss

The EPA reports that there are over **9 million** exposed workers in the US at 85dB or higher
10 Million Americans have permanent, irreversible losses

44% of carpenters and 48% of plumbers.

49% of male, metal and non metal miners by age 50.

70% will have hearing impairment by age 60. (NIOSH)

90% of coal miners have hearing loss by age 52.
Audiometric Testing

- Annual
- At No Cost to the Employee
- CAOHC Certification
- Audiologist / Otolaryngologist
- Baseline Audiogram…When?
- Mobile Test Van Exception
Normal Audiogram
Flat Audiogram
Sloping Audiogram

Table:

<table>
<thead>
<tr>
<th></th>
<th>RIGHT</th>
<th></th>
<th>LEFT</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5</td>
<td>5</td>
<td>10</td>
<td>30</td>
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<tr>
<td></td>
<td>50</td>
<td>60</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

Graph:

- Normal
- Mild Loss
- Moderate Loss
- Moderately Severe Loss
- Severe Loss
- Profound Loss

Loudness of Normal Conversational Speech

Hearing Threshold Level in dB

0 10 20 30 40 50 60 70 80 90 100 110 120

125 250 500 750 1000 1500 2000 3000 4000 6000 8000 12000
Hearing Loss Among Male Carpenters as a Function of Age (4k “notch”)

Limit for normal hearing
How to calculate Standard Threshold Shift

• Start with original baseline
• Add thresholds of 2k, 3k, 4k and divide by 3
• Next current test - do the same
• Compare the current test average to the original baseline average.
• If this number differs by 10 or more, this is a STS
## Example of STS

<table>
<thead>
<tr>
<th></th>
<th>.5k</th>
<th>1K</th>
<th>2K</th>
<th>3K</th>
<th>4K</th>
<th>6K</th>
<th>STS Avg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Annual</td>
<td>0</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>5</td>
<td>15</td>
</tr>
</tbody>
</table>

$\triangle 10 \text{ dB}$
Example of TTS

<table>
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<th>.5k</th>
<th>1K</th>
<th>2K</th>
<th>3K</th>
<th>4K</th>
<th>6K</th>
<th>STS Avg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Previous</td>
<td>0</td>
<td>5</td>
<td>10</td>
<td>20</td>
<td>20</td>
<td>5</td>
<td>16.6 (STS)</td>
</tr>
<tr>
<td>Annual</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5 (TTS)</td>
</tr>
</tbody>
</table>
# Example of Non-OSHA Recordable PTS

<table>
<thead>
<tr>
<th></th>
<th>.5k</th>
<th>1K</th>
<th>2K</th>
<th>3K</th>
<th>4K</th>
<th>6K</th>
<th>STS Avg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Annual</td>
<td>0</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>5</td>
<td>15 (STS)</td>
</tr>
<tr>
<td>BL Rev</td>
<td>5</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>25</td>
<td>5</td>
<td>16.6 (PTS)</td>
</tr>
</tbody>
</table>

△11.6, but Hearing Level <25dB
Example of OSHA Recordable STS

<table>
<thead>
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<th>.5k</th>
<th>1K</th>
<th>2K</th>
<th>3K</th>
<th>4K</th>
<th>6K</th>
<th>STS Avg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Annual</td>
<td>0</td>
<td>5</td>
<td>25</td>
<td>25</td>
<td>30</td>
<td>5</td>
<td><strong>26.6</strong></td>
</tr>
</tbody>
</table>

△ 21.6 dB & Avg hearing level is 25+
Example of OSHA Recordable PTS

<table>
<thead>
<tr>
<th></th>
<th>.5k</th>
<th>1K</th>
<th>2K</th>
<th>3K</th>
<th>4K</th>
<th>6K</th>
<th>STS Avg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Annual</td>
<td>0</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>5</td>
<td>15 (STS)</td>
</tr>
<tr>
<td>BL Rev</td>
<td></td>
<td></td>
<td>5</td>
<td>5</td>
<td>20</td>
<td>25</td>
<td>35</td>
</tr>
</tbody>
</table>

\( \Delta 21.7 \) but Hearing Level >25dB
STS Follow-Up

Employee may obtain a Retest within 30 days

a. If shift is found to be temporary, no further follow-up is necessary.

b. If shift is found to be PERSISTENT, or a retest is NOT performed you must:

a. Notify In Writing

b. Retrain on proper fitting of hearing protection

c. Mandatory hearing protection > 85 dBA
TRAINING

- Annual
- Effects of Noise on Hearing
- Purposes of HPD’s
- Selection & Fitting
- Post a copy of CFR 1910.95
Engage All Stakeholders

“Engage persons having an investment in what will be learned ... and what will be done with the knowledge”
We can lead them to the information, but will they really absorb it?
When you have millions of gifts to deliver around the world in one night, you need the very best high noise communication system. That’s why Santa purchased Sensear. HoHoHo!!!
Hearing Protection Options

✓ Foam Plug
✓ Muff Type
✓ Custom Plugs
✓ Plain Cotton
TYPES OF HEARING PROTECTION

- Ear Plugs / NRR
- Ear Muffs / NRR
Noise Reduction Rating (NRR)

Labeled vs. actual Field Attenuation

29 dBA Attenuation – 7 = 22

Subtract 7 to calculate switching from the C weighted scale to A weighted scale.
Noise Reduction Rating (NRR)

Now divide adjusted NRR # by 50%

22 / 2 = 11 (Actual Attenuation)

Employee Exposure = 95 dBA

95 - 11 = 84 dBA Field Attenuation

CFR1910.95 Appendix B (there are 4 methods listed)
Make Hearing Protection Mandatory at 85dBA

- New Hires
- STS
- Save More Hearing. Halve Their Exposure
- Reduces Risk of Hearing loss From 25% to 8%
- Make this a policy of employment!
More accurate method is
“Subject Fit”
testing
Record Keeping

- Record Retention
- Maintain Record of Employee Exposures
- Access To Records
- Transfer of Records
- OSHA 300 Recordability criteria
Evaluate the effectiveness of HCP through Audiometric Data Base Analysis

<table>
<thead>
<tr>
<th>Summary</th>
<th>Number</th>
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<tbody>
<tr>
<td>Employees receiving baseline audiometric test</td>
<td>1</td>
</tr>
<tr>
<td>Employees receiving annual audiometric test for comparison</td>
<td>9</td>
</tr>
<tr>
<td>Employees refusing a threshold evaluation <strong>GROUP R</strong></td>
<td>0</td>
</tr>
<tr>
<td>Employees with unacceptable response to test <strong>GROUP U</strong></td>
<td>0</td>
</tr>
<tr>
<td>Total employees given opportunity for audiometric testing</td>
<td>10</td>
</tr>
</tbody>
</table>
### Threshold Shift Analysis

<table>
<thead>
<tr>
<th>Condition</th>
<th>Group</th>
<th>Left</th>
<th>Right</th>
<th>Both</th>
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<tbody>
<tr>
<td>Employees demonstrating a Standard Threshold Shift</td>
<td><strong>GROUP A</strong></td>
<td>0</td>
<td>1</td>
<td>2</td>
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<tr>
<td>Employees demonstrating a Persistent Threshold Shift</td>
<td><strong>GROUP B</strong></td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Employees demonstrating a Temporary Threshold Shift</td>
<td><strong>GROUP T</strong></td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Employees demonstrating Improved Thresholds</td>
<td><strong>GROUP N</strong></td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Evaluate the effectiveness of HCP through Audiometric Data Base Analysis
Summarize Results

- Look for trends in certain areas, depts.
- STS should not exceed >10% population
- Upon retest, show more TTS <5% pop
- Make HPD use and compliance part of the contract of employment
  - In writing
  - With disciplinary action
NOISE LEVEL EVALUATION

AUDIOMETRIC TESTING

TRAINING

HEARING PROTECTION

RECORD KEEPING

***WRITTEN PROGRAM***
Written Program

- Make a plan, follow the plan!
- This is where you can incorporate participation in safety programs is policy of employment.
- Fulfill the employee’s right to know
1. All employees assigned to AREA A will receive baseline audiogram within six months of first high noise exposure and mandatory hearing protection.

2. Audiograms will be given annually and compared to baseline to determine if a STS has occurred.

3. Mandatory Hearing Protection is required in the following areas… (name the required areas)
High noise area
Ear protection required
WARNING

Hearing protection required in this area.
Goals

- Measure the Noise
- Wear the Proper Hearing Protection
- Encourage Employees to focus on the importance of SAFETY and THEIR HEARING
It’s Really Pretty Simple…

Wear this now... Or wear this later!
PRACTICE SAFE HEARING.

Moldex
Ideas that wear well

800/421-0668 Ext. 512/550
HAPPY EASTER!!

WHAT?!