Noise Training

Occupational Noise Hearing Conservation

Statistics

- 11% of US population has hearing loss (34 million)
- Those with untreated hearing loss has unemployment rates double (15.6%) that of normal pop (7.8%)
- Two thirds of Americans 70 and older have hearing loss
- 80% of the hearing loss cases in 2007 were from construction, mining, and manufacturing

Construction Noise

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Construction Noise Issues

- Eight-hour work shifts may be uncommon in construction (10 to 12 hour days)
- Ten hour shifts? 6 to 7 days a week?
- There are other noise exposures outside of work (extended rest not achieved)
- Many construction employees have extracurricular activities with high noise:
  - Shooting, concerts, cutting lumber, motorcycles

Hobbies

- Guns
  - large caliber short barrel = 130 dBA
  - shotguns and high powered rifles = 140 dBA
- Riding motorcycles
  - 90 to 110 dBA
- Snowmobiles
  - 100 to 120 dBA
- Woodworking
  - electric drill = 95 dBA
  - power saw = 110 dBA
  - air tools = 120 dBA
  - belt sander = 93 dBA
  - miter saw = 103 dBA
- Headsets / earphones
  - 90 dBA
- Rock concerts
  - 140 dBA

What is Noise?

Noise is unwanted sound

Sound is:

- Physical energy
- Moves through the air like ripples in a pond
  - Directional
  - Bounces off walls and other non-absorbent objects

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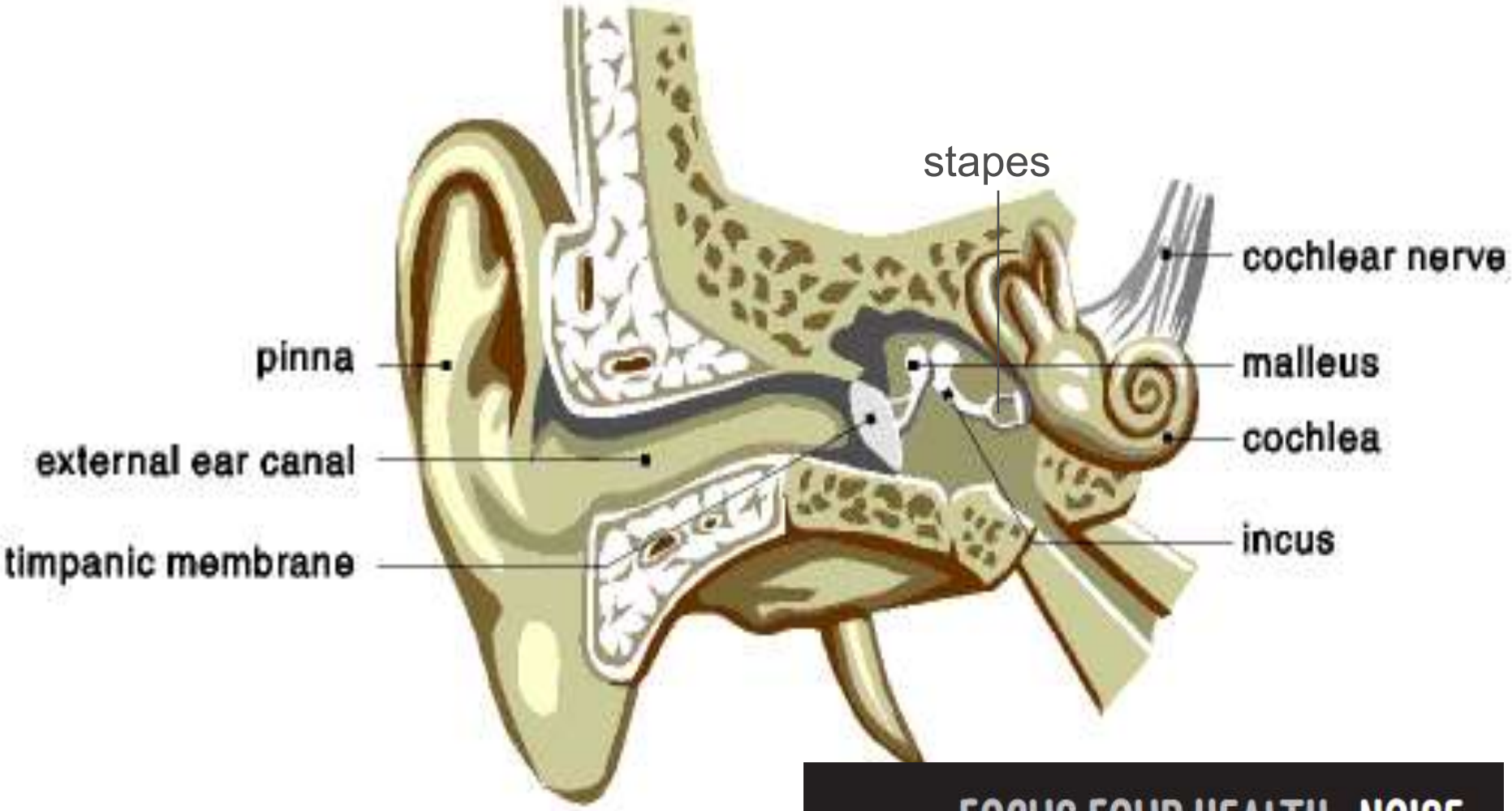
The Ear is a Delicate Tool



Inner Ear

- Cochlea
  - Inside are nerve cells called hair cells
    - Fragile
- Continuous noise
  - Above 90 dBA
    - As bad for hair cells as continuous foot traffic is to grass

Two Components of Noise

1. Frequency

- Perceived as “pitch”
- Measured in hertz(Hz)
- Human ear is sensitive in the 1,000 to 4,000 range
  - speech frequency ranges
- “A” scale mimics the human ear
  - Used for noise surveys
- Example: Dogs hear different pitches

2. Intensity

- Perceived as “loudness”
- Measured in decibels (dB)

Oregon OSHA

- You have the right to a safe and healthy workplace
- Employees have the right to report work-related injuries and illnesses free from retaliation

Oregon OSHA

Action Limit:

85 dBA

50% dose

Permissible Exposure Limit:

90 dBA

100 % dose

Oregon OSHA Requirements

1910.95 covers Construction and General Industry

Above 85 dBA:

- Noise Level Monitoring Program
- Written Hearing Conservation Program
- Audiograms within 180 days
- Hearing protection (HP) selection and training
- HP initial fit
- Recordkeeping
- 1910.95 available or posted
- HP required if there is a threshold shift

Above 90 dBA:

- The other stuff plus
- Feasible engineering, work practice, and/or administrative controls
- HP required to be worn

Exposure Limits

Duration Per Day	Sound Level dBA
8 hours	90 dBA
6 hours	92 dBA
4 hours	95 dBA
3 hours	97 dBA
2 hours	100 dBA
1 – ½ hour	102 dBA
1 hour	105 dBA
½ hour	110 dBA
¼ or less hour	115 dBA

ACGIH

- American Conference of Governmental Industrial Hygienists
- Provide research and study on health effects based only on research.
- Updated yearly
- Many OSHA rules are from the 1970s and have not kept current

OSHA vs. ACGIH
Major Differences in Noise

Oregon OSHA			ACGIH	
Noise Level	**Time permitted**		**Noise Level**	**Time permitted**
90 dBA	8 hours		85 dBA	8 hours
92 dBA	6 hours		91 dBA	2 hours
97 dBA	3 hours		97 dBA	30 minutes
100	2 hours		100	15 minutes
102	1.5 hours		103	7.5 minutes

Health Effects

- Noise causes inner ear hair cells to lay down
  - Temporary threshold shift
  - Permanent threshold shift (aka hearing loss)
- Hearing loss
- Tinnitus

In Addition to Hearing Loss….

Exposure to noise can cause….

- Increased fatigue
- Headaches
- Increase the heart rate and blood pressure
- Muscles to become tense
- Indigestion
- Impaired balance
- Difficulty in hearing audible warning devices

Chemicals Known to **Increase** Hearing Loss

- Ototoxicity
  - chemical-related(or drug) damage to the inner ear, resulting in damage to the organs responsible for hearing and balance
- Exposure to noise and these chemicals can **increase** hearing loss:
  - Carbon monoxide (CO)
  - Manganese
  - N-hexane
  - Lead
  - Stoddard solvent
  - Toluene
  - Styrene
  - Xylene
  - Others

Hierarchy of Controls

- Engineering controls
- Administrative
- PPE

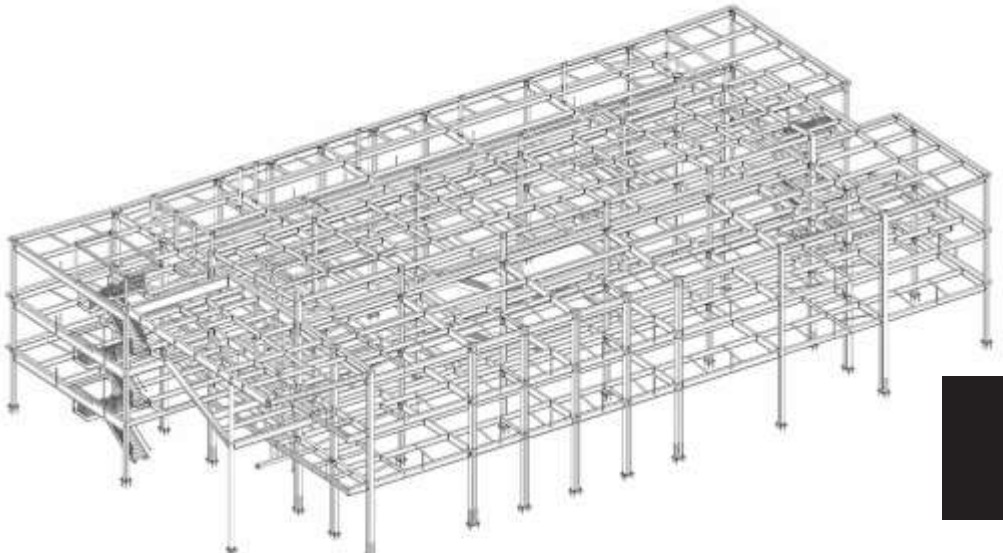
Hearing Loss Prevention Hierarchy of Controls

A. **Identify the noise**
B. **Add distance**
C. **Limit the time**
D. **Modify the noise source or path**
E. **Hearing protection**

Engineering Controls: Video

Administrative Control: CAD / Site Layout

- Measure noisy areas
- Draw on area map the noise levels
- Limit employee activity in certain areas of the building



Administrative Control: Buy Quiet Program

When purchasing new equipment, consider the levels of noise to operator

Administrative Control: Labels

- Label equipment with noise level and PPE required

Administrative Control: Use a Sound Level Meter

Educate employees by downloading and using the free Sound Level Meter App

Sound Meter

Smart Tools co. Tools

Everyone

This app is compatible with all of your devices.

Administrative Control: Compressed Air Policy

- Limit or eliminate compressed air for cleaning

Recommend

Start a hearing conservation program

Audiometric Testing

- How well do you hear?
- Required annually for those employees enrolled in a hearing conservation program
  - Anyone with exposures above 85 dBA
  - Identifies anyone with a change in hearing year over year
  - Testing helps determine the effectiveness of an employers hearing conservation program

Administer Your Program

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Poor Audiometric Exam?

The following can result in a bad test result:

- Exposure to noise without hearing protection before the test (temporary threshold shift)
- Failure to follow the technicians instructions
- Fatigue
- Substance abuse
- Tinnitus

Review Your PPE

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Hearing Protection

- Ear plugs should not be reused
  (to avoid infection)
- Employer should have a selection
  of hearing protection devices
- Describe how to insert a ear plug

Hearing Protection

- Fit testing for ear plugs now available

Hearing Protection

- **Attenuation** is the reduction of noise by hearing protection
- Called the Noise Reduction Rating (NRR)
  - Typically between 12 and 33 NRR
- The manufacturer indicates the amount of attenuation
  - Testing of NRR done in the laboratory

Noise Reduction Rating

- The Noise Reduction Rating (NRR) ranges from 5 to 33
  - Amount of dB that can be subtracted from the exposure
- Example: Exposure is 95 dB and NRR is 29. The exposure with protection would be 64 dB.
- **WELL, AT LEAST IN THE LABRATORY!**

Calculate Noise To The Ear

Appendix B to 1910.95

Requires employers to determine employee TWA exposure with the use of hearing protectors. A method approved by OSHA that is typically used in industry:

1. Determine the employee's noise exposure in dBA, then calculate the noise reduction.
2. Subtract 7 dBA from the noise reduction rating (NRR) of the hearing protector.
3. Subtract this difference from the TWA noise exposure. This remainder equals the TWA under the hearing protector.

Example

An employee is exposed to a TWA of 88 dBA. The NRR of an ear plug is 32 dB. Calculate the TWA under the protector.

1. Employee exposure = 88 dBA
2. 32 dB - 7 dB = 25 dB
3. 88 dBA - 25 dB = 63 dBA

NRR's Rule of Thumb

- Take the NRR and divide the number by 2 (50%)
- for example……
  - Earplug with NRR of 30 dB has a real attenuation of 15 dB
- Goal
  - Select protection to reduce your exposure <85 dB
- Backhoe = 93 dB
  - Earplug with a NRR of 20 so attenuation is about 10
    - 93 - 10 = 83 dB

NRR Myth

- Bigger is not necessary better
  - Large NRR may not be appropriate if:
    - Noise is >80 dB and < 90 dB range
      - Need a 10 or 15 dB of noise reduction
    - Communication is a necessity
      - Flat and moderate attenuation passive devices

Measure Noise

Perform noise dosimetry to determine the dose (time weighted average) noise exposure:

- Workers' compensation
- Oregon OSHA Consultative Services
- Industrial hygiene consultant
- Rent/buy equipment

The Construction Noise Reality

- There is noise in construction
- Ear protection is given
- Wearing it is infrequently enforced

- Construction shift patterns, durations, and extracurricular activities may contribute to hearing loss
- Wear hearing protection if noise levels exceed 85dBA

AGC Oregon Columbia Chapter
ASSOCIATED GENERAL CONTRACTORS

Oregon OSHA

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Post Test (True/False)

1. The loudness of noise is called the “decibels”.
2. Only the noise exposure at work counts towards hearing loss.
3. Exposure to noise above 85 decibels contributes to hearing loss.
4. Hearing loss is reversible.
5. It is best to control noise at it’s source.