Hearing Conservation Training

For At Risk Workers
Is There a Problem?

- More than 30 million Americans are exposed to hazardous sound levels on a regular basis
- 10 million have suffered irreversible noise induced hearing loss
- Rate of hearing loss is increasing in the U.S.
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
What is Noise?

- Noise is a physical energy that moves through the air like ripples in a pond
  - noise is directional
  - noise will bounce off walls and other objects
Two Components of Noise

- **Frequency**
  - perceived as “pitch”
  - measured in hertz (Hz)
  - human ear most sensitive in the 1,000 to 4,000 range
    - speech frequency ranges

- **Intensity**
  - perceived as “loudness”
  - measured in decibels (dB)
  - “A” scale mimics the human ear
    - used for noise surveys
How is noise measured?

- Sound level meter
- Noise dosimeter
- Decibel dB

Logarithmic scale
  - a 6 decibel increase is double the loudness

Examples of Noise
  - 20 dBA whispered voice
  - 74 dBA average TV
  - 110 dBA leafblower
Noisy Hobbies

- Guns
  - 130 – 140 dBA

- riding motorcycles
  - 90 dBA

- snowmobiles
  - 120 dBA

- Woodworking
  - electric drill = 95 dBA
  - power saw = 110 dBA
  - air tools = 120 dBA
  - belt sander = 93 dBA

- walkman headsets
  - 90 dBA

- rock concerts
  - 140 dBA
Noise in your workplace

- pneumatic hand held grinder 101 dBA
- air hammer 105 - 130 dBA
- pavement breaker 114 dBA
- power actuated nail gun 94 - 117 dBA
- portable saw 105 dBA
- air wrench 107 dBA
- Hydraulic post driver 123 dBA
- arc welder 116 dBA
- traffic line grinder 91-101 dBA
- loader - 88 - 91 dBA
- paver 86 - 96 dBA
- snowplow 87 - 97 dBA
- 10 yard truck 76 - 85 dBA
Communication in noisy environments

- Hard to hear someone talking in noisy environments
  - the speaker needs to be louder than background noise
- CB’s & radios or cell phones will need to be turned up
  - if you have a hearing loss, it will be harder to distinguish speech in this environment
How do you know you are exposed to damaging noise

- Feel the need to shout in order to be heard 3 feet away
  - sound levels probably approaching 85 dBA
- If immediately after a period of high noise exposure
  - ringing, buzzing or whistling is noticed
- Equipment is tagged or marked as noise hazardous
How much noise can you be exposed to?

- **OSHA rules**
  - 90 dBA averaged over an 8 hr shift
    - requires the use of controls first and then the use of PPE to reduce your exposure
      - earplugs must be used whenever noise is 90 dB +
  - 85 dBA averaged over an 8 hr shift
    - requires your employer to enroll you in a hearing conservation program
      - training
      - hearing tests & follow up
      - Make available and recommend the use of HPDs
What is a TWA?

- This is a daily “dose” of noise not a single exposure to a noisy piece of equipment
- Your daily dose of noise (TWA) is a function of:
  - how loud the equipment is (intensity)
  - how close you are to the noise
  - how long you are exposed to the noise
5 main causes of hearing loss

- Heredity
- Infections
- Acoustic trauma
- Prescription drugs
- Presbycusis
Tinnitus

- Hearing loss may not be silent ....
  - Persistent (often or all the time)
    • Ringing, roaring, clicking or hissing sound
  - 12 million Americans have Tinnitus
  - should be evaluated by a Dr.
  - smoking, alcohol & loud noise can make it worse
  - use earplugs whenever exposed to noise
In addition to hearing loss....

- Exposure to noise can....
  - Cause increased fatigue
  - Headaches
  - Increase the heart rate and blood pressure
  - Cause muscles to become tense
  - Cause indigestion
  - Can lead to impaired balance
  - Make it more difficult to hear audible warning devices
Noise induced hearing loss

- Entirely preventable
  - “People would pay more attention to hearing loss if it caused a lot of physical pain”
How do you know how well you hear - Hearing Testing

- Required annually for those employees enrolled in a hearing conservation program
  - identifies anyone with a change in hearing
    - this is just a “screening test” and should not be used to diagnose the type or extent of hearing loss
  - testing helps determine the effectiveness of an employers hearing conservation program
Audiograms

Computer generated “tape” showing normal hearing

Computer generated graph of normal hearing

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NAME OF EMPLOYEE
TEST DATE
OTHER ID INFO

RIGHT EAR
  500 HZ -> 5 dB
  1000 HZ -> 10
  2000 HZ -> 5
  3000 HZ -> 15
  4000 HZ -> 35
  6000 HZ -> 25

LEFT EAR
  500 HZ -> 10 dB
  1000 HZ -> 5
  etc. etc. etc.
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Degrees of Hearing Loss

- Normal       10 - 25 dB
- Mild         30 - 45 dB
- Moderate     50 - 65 dB
- Severe       70 - 85 dB
- Profound     90 dB
Example of hearing loss

- Have you had a STS?
  - an average shift of greater than or equal to 10 dB at 2000, 3000, 4000 Hz
  - calculated by
    - comparing your baseline audiogram with your present audiogram
  - Can apply age corrections given in OSHA standard

*** Note: A confirmed STS must be recorded on your OSHA 300 log
Did you do poorly on your last hearing test?

- The following can result in a bad test result
  - exposure to noise without hearing protection before the test
  - failure to follow the technicians instructions
  - fatigue
  - substance abuse
  - Tinnitus
  - pseudohypacusis (faking it)
How to Prevent Further Hearing Loss at Work

- Identify noise hazardous equipment
- Put distance between you and the noise source
- Limit the amount of time you are exposed
- Modify the noise source so it is quieter
- Use hearing protection when around loud noise
PREVENTION: Identify noise hazardous equipment

- Measure noise sources at your job site to determine what poses a risk to hearing
  - include any equipment that produces 85 dB or greater in your inventory
PREVENTION: Identify noise hazardous equipment

- Label or ID any equipment that exposes the operator to 90 dBA or more
- Always use hearing protection when working with labeled equipment
PREVENTION: Put distance between you and the noise

- Walk away from the noise source
  - Doubling your distance from the sound source decreases intensity by 6 dB
    - a 50% reduction in intensity!

- Move the source away from people

- Move noise sources away from
  - reflective surfaces (concrete or brick walls)
    - estimated to reduce levels by 3 dB
  - corners
    - estimated to reduce levels by 6 dB
PREVENTION: Limit the amount of time you are exposed

- Schedule noise activities for fewest workers needed for the job
- Take breaks away from the noise hazardous area
- Limit the amount of time employees are exposed to noise
PREVENTION: Modify the noise source

- Noise Control - Maintain Equipment
  – Reasons machines get noisier over time
    • worn components
    • loose parts
    • poor lubrication
    • imbalances
    • obstructed airways
    • blunt cutting surfaces
    • damaged/removed silencing equipment
PREVENTION: Modify the noise source

- Control types - barriers or pads
  - Prevents sound from travelling on a path
    - portable welding-type noise barrier
    - cover metal surfaces with a coating, cloth, pad or blanket to reduce impact noise
    - clamping material while cutting with a circular saw
PREVENTION: Modify the noise source

- Enclosures on equipment cabs
  - Keep driver from equipment noise
    - open bulldozer is on average 6 dB higher than a closed bulldozer
    - Glassed in cranes are on average 10 dB lower than non-enclosed

Keep your windows rolled up!!
PREVENTION: Modify the noise source

- Purchasing & Contracting
  - Purchase quieter equipment
    - specify in contracts for new equipment that low noise & vibration levels are desired
  - Specify in contracts with prime or subcontractors that low noise practices will be incorporated into the job when feasible
PREVENTION: Modify the noise source

- Retrofit old Equipment
  - Modify existing equipment
    • you may need the assistance of a trained mechanic or a noise engineer
  - Purchase noise reducing components like mufflers & silencers
  - Install quieter components
    • Jackhammer/chipper: rubber chucks, seal lines
PREVENTION: Use hearing protection

- It is common for less than 50% of the employees who should be wearing hearing protection actually wear them in most industries.

- If you have a hearing impairment it is critical you use them whenever you are exposed to noise – both on and off the job site!
HPD used - earplugs

- Earplugs
  - pre formed (latex)
  - hand formed (polyurethane or PVC)
HPD used - canal caps & ear muffs

- Canal Caps

- Ear Muffs
Noise Reduction Rating

- All hearing protection devices have a NRR assigned
- NRR’s do not accurately reflect attenuation in the real world
- Field testing indicates......
  - NRR is approximately 50% of what is listed for earplugs
  - NRR is approximately 75% of what is listed for earmuffs
NRR’s - Good Rule of Thumb

- Take the NRR on the package and divide the number by 2
- for example......
  - earplug with NRR of 30 dB most likely has a working attenuation of 15 dB

- Goal
  - select protection that will reduce your exposure below 85 dBA

- Backhoe = 93 dBA
  - earplug with a NRR of 20 so attenuation is about 10
    - 93 - 10 = 83 dBA
NRR the myth

- Bigger is not necessary better
  - Large NRR may not be appropriate if
    - noise levels are in the high 80 dB to low 90 dB range
      - what is needed is not an NRR of 30 dB but a well-fitted and comfortable device that can provide an actual delivered 10 or 15 dB of noise reduction
    - if the need to speak and be understood is needed in the noise environment
      - flat and moderate attenuation passive devices can be used
Flat Attenuating Devices

- Good for
  - noise exposures averaging 85 - 95 dBA as a TWA
  - environments where the spoken word needs to be heard
  - those employees with a hearing impairment

EAR UltraTech

Bilsom NST 817
Hearing aids are not hearing protection

- Hearing aids do not block out enough sound for most occupational exposures to noise
- When hearing aid users are exposed to harmful levels of noise they should
  - remove their hearing aids and use hearing protection or
  - turn off their hearing aids and put ear muffs on over them
OSHA Requirements for Hearing Conservation Program (HCP)

- Noise Monitoring
  - If high noise is suspected
    - area will be monitored or;
    - Employees will be monitored
  - Employees notified results
    - can observe the monitoring if they wish.
OSHA Requirements for HCP

- Audiometric testing
  - Testing equipment must meet certain standards.
  - Required for 85 dBA TWA or greater
  - Baseline (must be 14 hours no noise exposure or hearing protectors)
    - Must let employees know this
  - Annual audiogram comparison
  - If shift – retest within 30 days
OSHA Requirements for HCP

- Audiometric testing
  - May need further evaluation with MD or audiologist.

- Training
  - Employees must be trained according to the standards

- Access to information
  - Copy of the noise standard (1910.95) must be posted in the workplace – if HCP
OSHA Requirements for HCP

- Recordkeeping – must keep
  - Exposure measurements
  - Audiometric tests
The bottom line......

- Your ears are a delicate tool – take care of them...

- IDENTIFY EQUIPMENT
- MOVE AWAY
- LIMIT EXPOSURE TIME
- MODIFY THE SOURCE
- PROTECT YOUR EARS