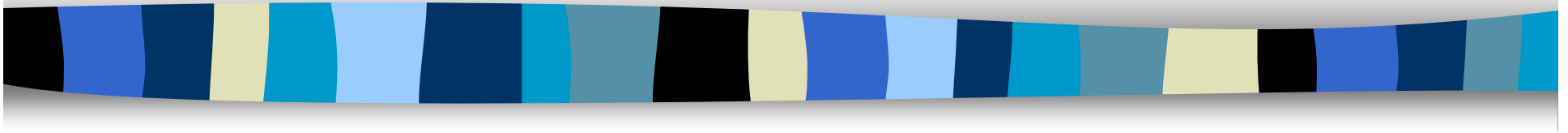


Hearing Conservation Training



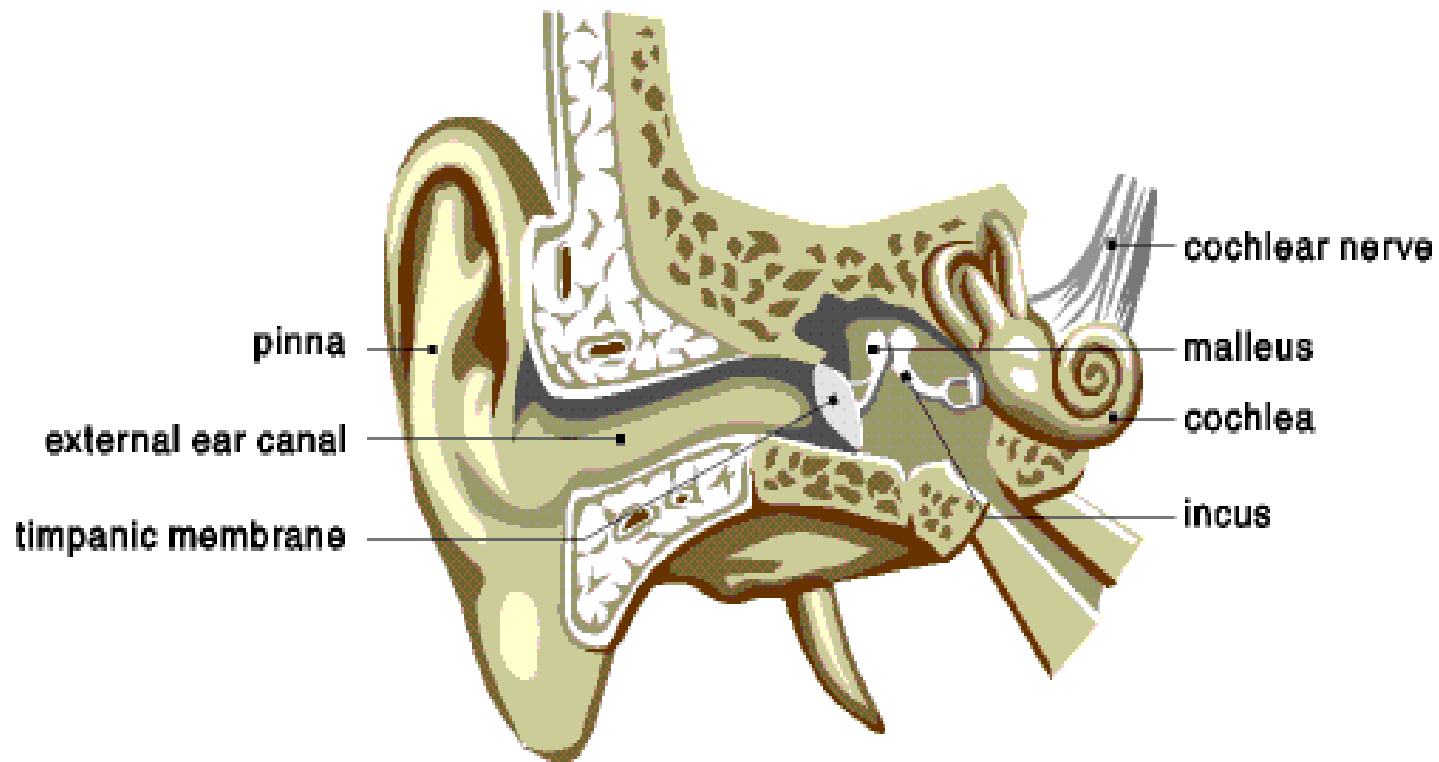
For At Risk Workers



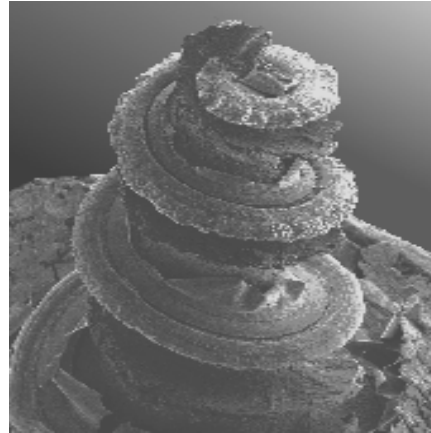
Is There a Problem?

- 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

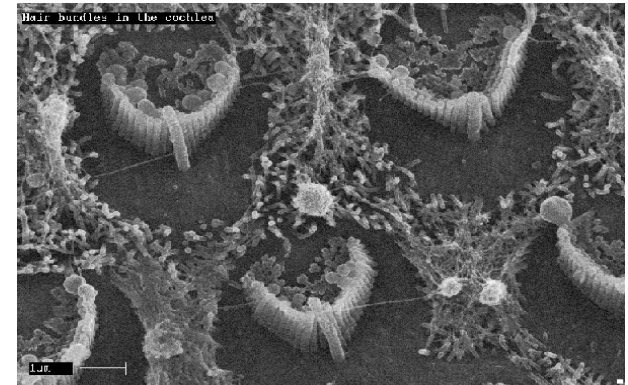


■ Cochlea

- 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



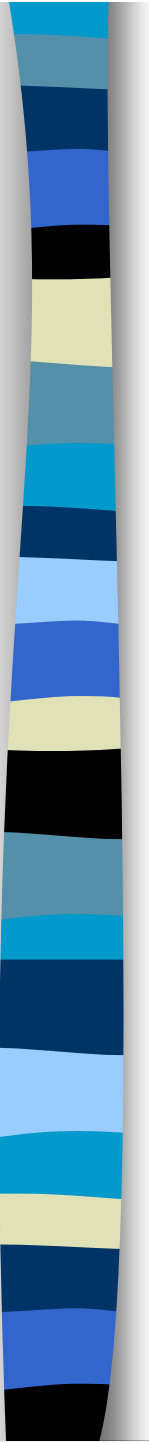
Noise in your workplace

- 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



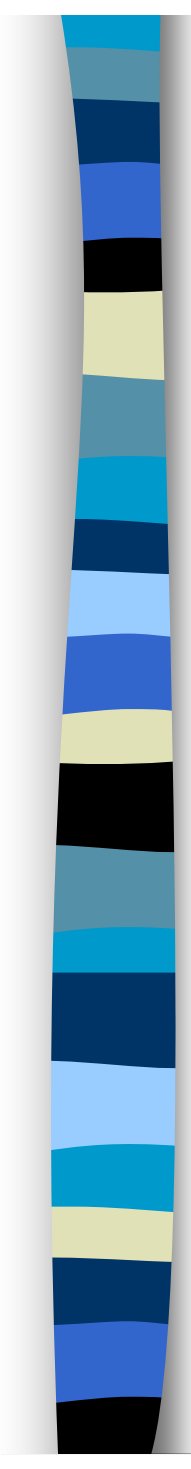
In addition to hearing loss....

- 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”*



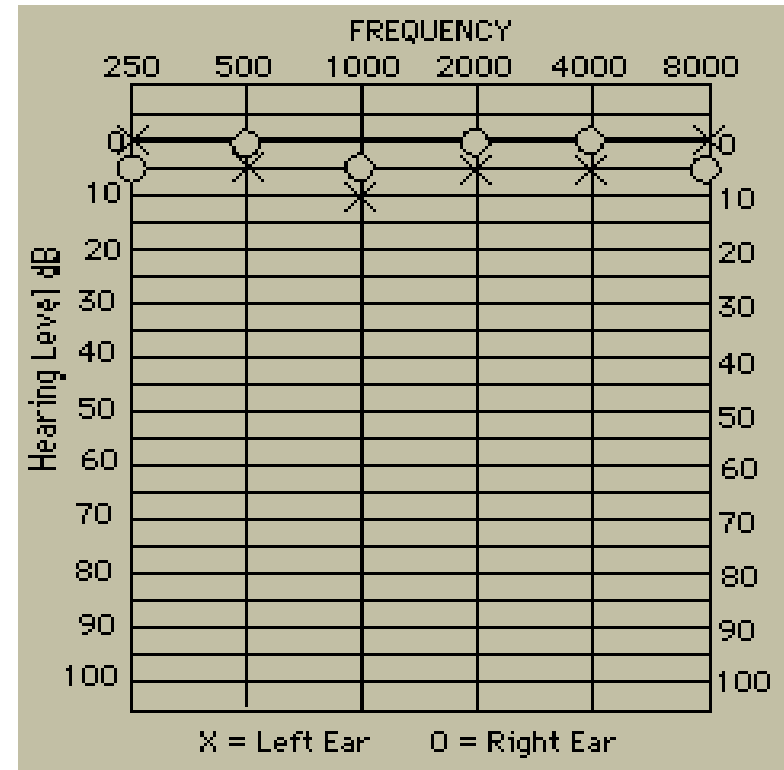
How do you know how well you hear - Hearing Testing

- 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

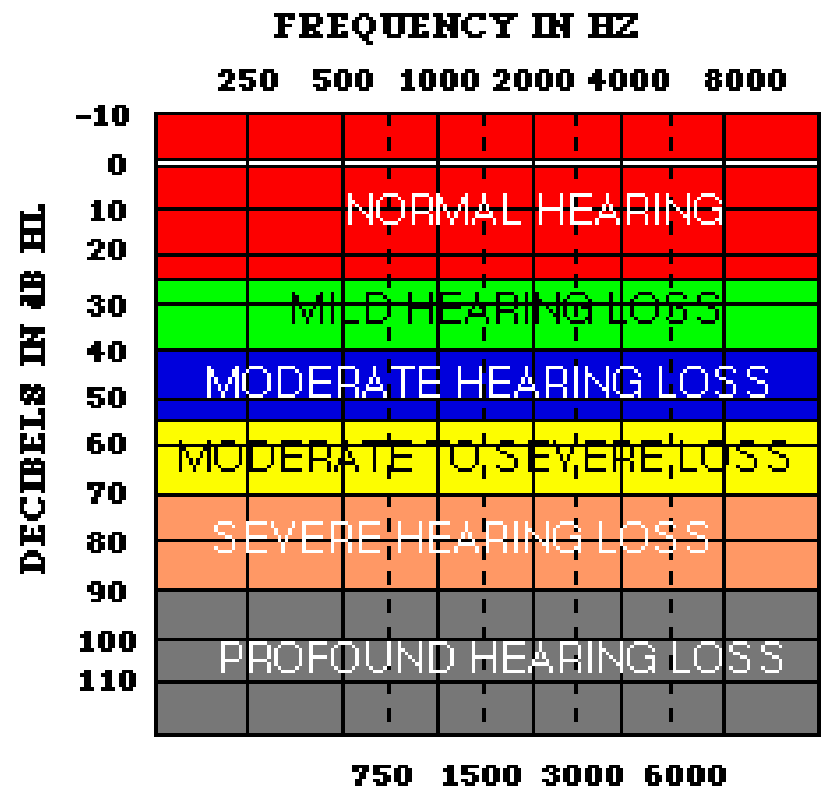
NAME OF EMPLOYEE
TEST DATE
OTHER ID INFO
RIGHT EAR
500 HZ -> 5 dB
1000 HZ -> 10
2000 HZ -> 5
3000 HZ -> 15
4000 HZ -> 35
6000 HZ -> 25
LEFT EAR
500 HZ -> 10 dB
1000 HZ -> 5
etc. etc. etc.



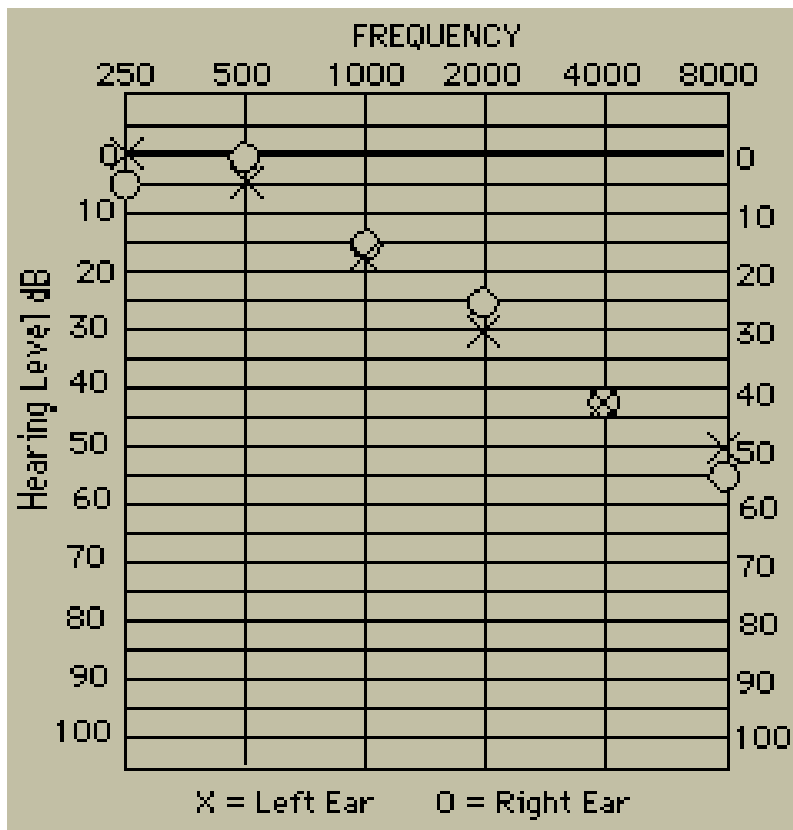
computer generated graph of normal hearing

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

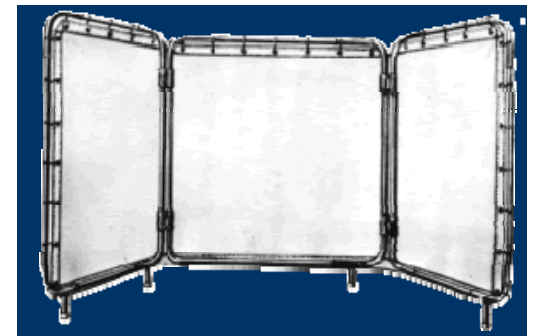


PREVENTION: Modify the noise source

- 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...

