Hearing Conservation
Course number: EIH 002

Approximately 30 million workers are exposed to hazardous noise on the job and an additional nine million are at risk for hearing loss from other agents such as solvents and metals.

Noise-induced hearing loss is one of the most common occupational diseases and the second most self-reported occupational illness or injury.

Hearing loss affects 25 million Americans (10% of U.S. population) 1 out of 4 over 65 years old has a hearing disorder and 1 out of 3 over 75 years old has a hearing disorder.

How we hear
Outer ear collects the sound and funnels to the middle ear. The middle ear transforms noise into mechanical vibrations. Vibrations (oscillations) enter inner ear where hair cells generate electrical nerve impulses and the brain interprets as sound/noise.

What is Sound?
- A form of energy transmitted as invisible waves that vary in pitch and intensity
- Sound is a vibration
- Transmitted through air, liquid, and solids

What is Noise?
- Not all sound is noise — Noise is sound that people do not like.
- Noise can be annoying and it can interfere with your ability to work by causing stress and disturbing your concentration.
- Noise can cause accidents by interfering with communication and warning signals.
- Noise can cause chronic health problems. Noise can also cause you to lose your hearing.
How does Noise affect me?
- Without appropriate protection, hearing loss can result
- Noise can also produce stress on your body:
  - blood vessels constrict in all organs except muscles and brain
  - increase output of adrenaline
- Some common industrial chemicals can increase effects of noise
  - Carbon monoxide, carbon disulfide, trichlorethylene damage nervous system and inner ear

Hearing Loss
Hearing loss from exposure to noise in the workplace is one of the most common of all industrial diseases. Workers can be exposed to high noise levels in workplaces as varied as construction industries, foundries and textile industries. Short-term exposure to excessive (too much) noise can cause temporary hearing loss, lasting from a few seconds to a few days. Exposure to noise over a long period of time can cause permanent hearing loss.
- Affects work, affects home
- Ears become less sensitive to high pitched sounds
- harder to hear p’s, s’s, and th’s
- voices become muffled, distorted
- like a radio with static (still not clear when turned up)
- Once lost, cannot get back
- Hearing aids only amplify sound (loudness)

Signs of Hearing Loss
- Shouting in conversation
- Increasing radio/TV volume (too loud for others)
- Asking people to repeat themselves
- Withdrawing from social contact
- Straining to hear
- Misunderstanding conversation
- Favoring one ear
- Ringing or buzzing in ear (tinnitus)

Types of Hearing Loss
- Presbycusis
  - Hearing loss due to natural aging process
  - Gradual decline
- Conductive Hearing Loss (reversible)
  - Outer and middle ear
  - Can result from blockage of wax, punctured
eardrum, birth defects, ear infections, or heredity
  - Can often be corrected medically or surgically

- Sensorineural Hearing Loss (irreversible)
  - "nerve" deafness - involves damage to the inner ear
  - Can result from excessive noise exposure
  - Occupational Noise-Induced Hearing Loss

- Temporary Threshold Shift
  - Temporary loss of hearing which warns you that your ears have been over exposed to noise
  - Can become Permanent Threshold Shift from repeated exposure

- Tinnitus
  - Ringing, buzzing or whistling in ear from high noise exposure
  - Can become permanent and constant annoyance

How do we provide protection to employees?
- Standards are set for occupational noise exposure
  - OSHA Permissible Exposure Limit (PEL)
    - PEL = 90 dBA TWA
    - HCP required at 85 dBA TWA
  - ACGIH Threshold Limit Value
    - TLV = 85 dBA TWA
  - NIOSH Recommended Exposure Limit (REL)
    - REL = 85 dBA TWA
    - HCP required at 82 dBA TWA

Hearing Conservation Program (HCP)
Use NIOSH recommendations, Annual noise monitoring, Engineering and administrative controls, Personal Protective Equipment (hearing protectors), Training, Annual audiometric testing and Recordkeeping.

Personal Protective Equipment-Hearing Protectors
- Wear hearing protectors with NRR to try to reduce exposure below 82 dBA TWA
- Ear Plugs
  - Some are disposable; some are reusable
- Ear Bands (canal caps)
- Ear Muffs
- Wear both earplugs and earmuff in high noise areas

PPE limitations
- Doesn’t eliminate the hazard
- Limitations vary based on type/style of PPE (If type or degree of hazards change, PPE may no longer be adequate)
- PPE designed for specific hazards, EACH does not protect you from ALL!
- PPE must fit properly and be worn properly
Noise Reduction Rating (NRR)
- NRR = Noise Reduction Rating
- Attenuation = amount of noise reduction a product provides
- Printed on box and/or small packages containing hearing protectors
- the higher the NRR the better the attenuation

PPE Use - Ear plugs
- Typically has highest NRR (26 - 32 dB)
- Insertion of ear plugs
  - Make sure hands are clean
  - Roll and compress
  - Reach around back of head
  - Pull outward and upward on ear
  - Insert plug
  - Hold in place until plug expands

PPE - Care and Maintenance
- Keep hearing protectors clean and free from materials that can irritate your ear.
- Wash reusable ear plugs and ear bands with mild soap and water
- Ear muff foam inserts and cushions can be cleaned with mild soap and water
- Replace worn ear muff cushions, bent headbands and flaking foam inserts
- Replace hearing protectors when damaged

Audiometric Testing
- Compares the acuteness of hearing from test to test
  - Baseline audiogram
  - Annual audiogram
- Follow-up required if standard threshold shift (STS) detected in audiogram
- Provisions for shift in hearing at specific frequencies
  - Re-test
  - Evaluate probable cause
  - Identify recommendations (i.e., noise monitoring)