

**WEAR YOUR HEARING
PROTECTION !**

MSHA Requirements for Hearing Protection

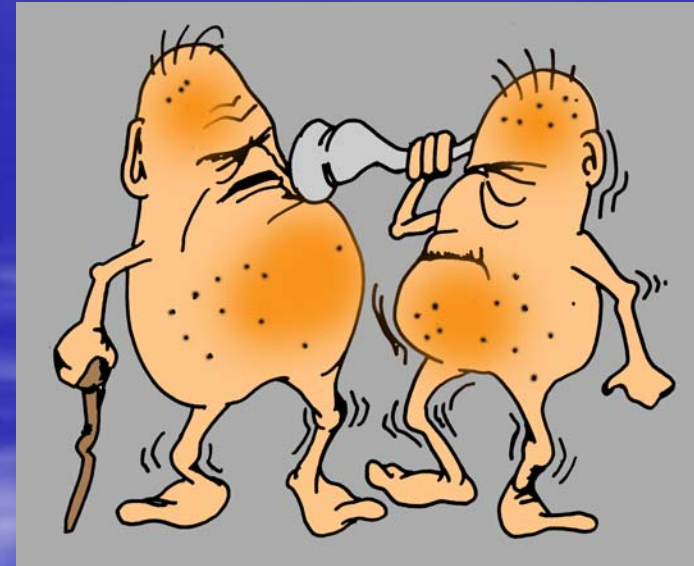
TWA_8 – Time-weighted average 8-hour sound level (dBA)

D – Noise Dose (%)

- Action Level ($TWA_8 \geq 85$ dBA or $D \geq 50\%$)
 - Operator must provide two plug types & two muff types of hearing protection
 - It is the miners option to wear hearing protection
- Permissible Exposure Level ($TWA_8 > 90$ dBA or $D > 100\%$)
 - Miner must wear one type of operator-provided hearing protection
- Dual Hearing Protection Level ($TWA_8 > 105$ dBA or $D > 800\%$)
 - Miner must wear both earplug and earmuff type of operator-provided hearing protection

Why Hearing Protection is Important to You

- Can reduce noise exposure and lessen the amount of noise-induced hearing loss (NIHL)
- May help to reduce tinnitus – ringing in the ears
- Can improve communication
 - Speech communication
 - Warning signals
- Can prevent job performance effects
 - Fatigue
 - Irritability
- Can prevent extra-auditory effects
 - Stress diseases
 - Sleeplessness



Types of Hearing Loss

- Noise-induced hearing loss - gradual permanent loss of hearing due to continuous high level noise exposure
- Sudden hearing loss – viral infections, acoustic trauma, & vascular
- Age-related hearing loss - gradual loss due to aging
- Congenital hearing loss - present at birth due to genetics
- Ototoxic hearing loss – caused by exposure to certain drugs & toxic agents
- Other disease-related types of hearing loss

All types can collectively contribute towards the severity of one's hearing loss

Noise-Induced Hearing Loss (NIHL)

- Occupational
 - Hearing loss due to occupational noise sources
 - Operation or presence of noisy equipment
 - Heavy equipment, stone saws, rock drills
- Non-occupational
 - Hearing loss due to non-occupational sources of noise
 - Recreational & other noisy activities
 - Woodworking tools, chain saws, un-muffled motorcycles, loud music, firearms
- Both occupational & non-occupational noise sources contribute to one's exposure and hearing loss



Effects of Hearing Loss

- Temporary threshold shift (TTS) – A temporary reduction in hearing due to fatigue of the ear caused by noise exposure
 - Between the end of the work shift and the beginning of the next shift the ear usually recovers from most of the TTS
 - Over time the TTS becomes permanent, and new amounts build upon the permanent loss
- Standard threshold shift (STS) – A change in hearing sensitivity for the worse
 - Cumulative effect of continuous high level noise exposure
 - “Acoustic trauma” – immediate hearing loss from exposure to an extremely loud event; can cause a TTS as well



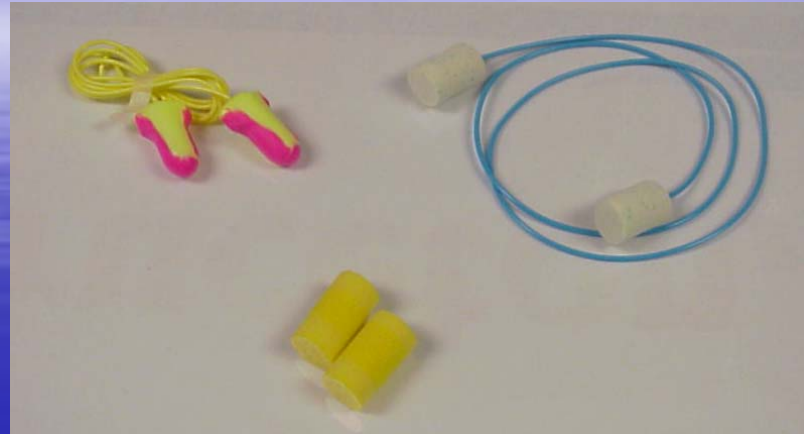
Hearing Protection Devices (HPD)

Noise-induced hearing loss is preventable with the proper use of engineering & administrative controls in addition to personal protective equipment

- Types of hearing protection devices
- Selection of hearing protection devices
- Proper use of hearing protection
- Maintenance of hearing protection devices
- Performance of hearing protection

Types of Hearing Protection Devices

- Earplugs

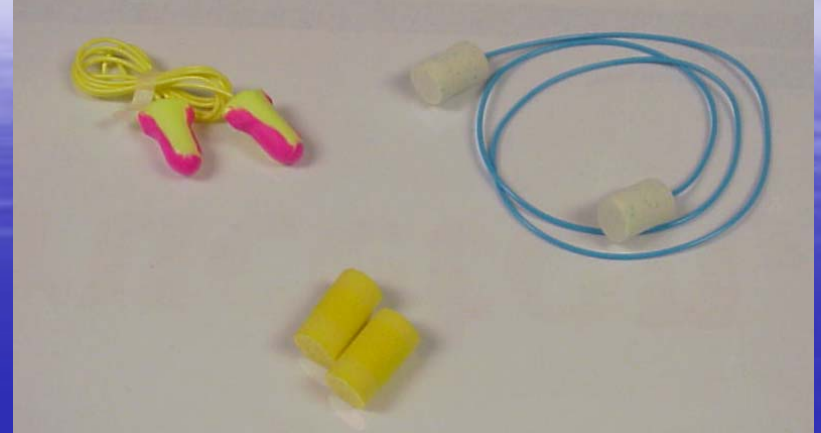


- Earmuffs



- “Dual Protection” - combination of earplugs and earmuffs

Selection of Hearing Protection Devices



■ Earplugs

– Pros

- More comfortable due to the lack of head-band pressure
- Cooler in hot weather
- Easier to wear in confined spaces

– Cons

- Variable attenuation due to proper fit and insertion practices
- Unsure fit - easily worked loose from routine motions (chewing & jaw movement)
- Difficult for communication in intermittent noise environments
 - Tedious to remove and reinsert
 - Hygiene – easy to get dirty
 - Easy to lose

Selection of Hearing Protection Devices



■ Earmuffs

– Pros

- Comfortable in colder environments
- More consistent attenuation than earplugs
- More suitable for communication with intermittent noise
- Some models are equipped with electronics for communication
- Not worked loose by repetitive motion such as chewing or jaw movement

– Cons

- Headband pressure can be uncomfortable
- Incompatible with other safety gear; safety glasses, hardhats
- Not very comfortable in hot weather
 - Perspiration can collect under the ear cup, causing annoying sounds in the ear canal

Proper Use of Hearing Protection

- Proper fit should be determined by an occupational hearing conservationist (OHC)
- Earmuffs don't fit all head sizes

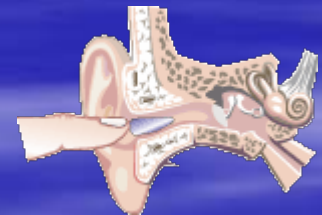


Proper Use of Hearing Protection

Earplugs must be properly inserted

source: <http://www.cdc.gov/niosh/mining/topics/hearingloss/earplug.htm>

- **1. Roll** the earplug up into a small, thin "snake" with your fingers. You can use one or both hands.
- **2. Pull** the top of your ear up and back with your opposite hand to straighten out your ear canal. The rolled-up earplug should slide right in.
- **3. Hold** the earplug in with your finger. Count to 20 or 30 out loud while waiting for the plug to expand and fill the ear canal. Your voice will sound muffled when the plug has made a good seal.
- **Check the fit** when you're all done. Most of the foam body of the earplug should be within the ear canal. Try cupping your hands tightly over your ears. If sounds are much more muffled with your hands in place, the earplug may not be sealing properly. Take the earplug out and try again.



Maintenance of Hearing Protection Devices

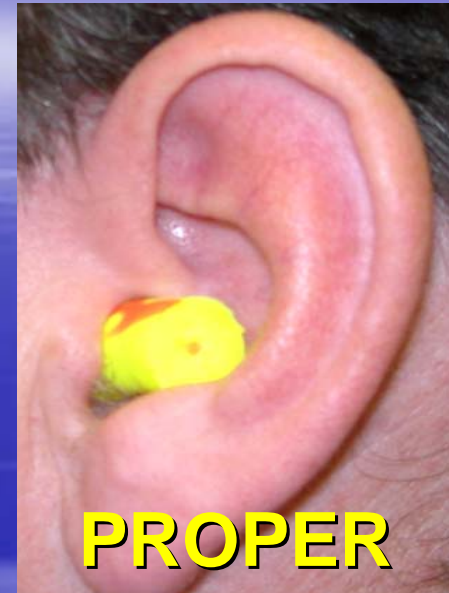
- Hygiene
 - Pre-molded earplugs should be washed
 - Disposable plugs should be discarded after each shift or if they become dirty
 - Earmuff cushions should be wiped off regularly
 - Hearing protection should not be used when you have an ear infection
- Replacement
 - Pre-molded plugs shrink and harden over time and should be replaced if this occurs
 - Earplugs should return to their original shape otherwise they should be discarded
 - Earmuffs should be checked to ensure a good seal is formed against the head
 - Headbands weaken with age or sometimes become sprung
 - Cushions eventually harden and fail
 - Ear cups can become brittle and crack with age

Performance of Hearing Protection

- Noise reduction rating (NRR)
 - Standardized measure of noise reduction provided by a hearing protector as measured in the laboratory
 - Not used to predict what the user will or will not hear
 - i.e., it's a relative measure similar to EPA gas mileage
 - Provides for a comparison when choosing a suitable protector for the intended use
- “Dual protection” – use of earplugs and earmuffs required when levels exceed 105 dBA
 - Do not add NRR values for double protection
 - Typically add 5 dB to the NRR of the more protective device

Wear Your Hearing Protection

- Hearing loss due to improper use of hearing protection often goes unnoticed
 - There are no visible effects, no bleeding, and often no pain
 - There is only a gradual, progressive loss of communication with family and friends, and a loss of sensitivity to the environment
- Noise-induced hearing loss is preventable
 - Proper use and selection of hearing protection is a must
 - Hearing protection in combination with noise controls is the best method of prevention



Wear Your Hearing Protection

- Miners' hearing is precious and we need to work together to preserve their quality of life

