

## HOW NOISE DAMAGES HEARING

- Because hearing loss is usually not painful and happens gradually, many of us don't fully understand how our hearing can be damaged by noise exposure. But how does this occur?
- The outside of the ear gathers sound and channels it into the ear canal. Once inside, the sound moves in waves and flows against the eardrum.
- The membrane of the eardrum vibrates against three delicate bones that carry the vibrations to the inner ear.
- The inner ear contains a coiled tube filled with fluid known as the cochlea. Inside the cochlea, fluid carries the vibrations over tiny hair structures called cilia.
- As noise-induced vibrations pass over the cilia, they sway and bend, transmitting signals to the brain which interprets them as sound.



Noise intensity is measured in decibels. Most experts agree that exposure to noise levels around 85 decibels can damage these tiny structures. As the noise level grows louder, the cilia get bent farther with more force. When exposed to this damaging level of noise, the delicate structures get damaged or destroyed causing hearing loss.

## THE MSHA HEARING CONSERVATION PROGRAM

- MSHA requires mine operators to develop a hearing conservation program when workplace sound levels average 85 decibels over an 8-hour time-weighted period.

## ENGINEERING & ADMINISTRATIVE CONTROLS

- A noise level that exceeds 90 decibels over an eight-hour period is referred to as the Permissible Exposure Limit.
- When noise levels exceed this limit, the mine operator will put in place all feasible engineering and administrative controls to reduce the level of noise exposure and notify the affected operator.
- When noise exposure levels reach 105 decibels per eight-hour period, dual hearing protection is required. This means earplugs and earmuffs must be worn at the same time to provide proper protection.

## MEDICAL SURVEILLANCE & EXPOSURE ASSESSMENT

- These tests are vital in the prevention of hearing loss. The first test, known as a baseline audiogram, will help establish a baseline for each miner that serves as a starting point for future evaluations.
- The miner must avoid high levels of noise, or wear hearing protection, for the 12-14 hours immediately preceding this initial test.

- During subsequent hearing tests, levels are compared to the baseline test.
- If hearing loss of at least 10 decibels as compared to the baseline audiogram is recorded, a standard threshold shift has occurred. This shift indicates a small level of hearing loss.
- When a standard threshold shift is detected, an examination of noise exposure and protection methods for the affected miner will occur. This includes retraining of the miner and an evaluation of the effectiveness of controls in place.

## **HEARING PROTECTION**

- Perhaps the most important part of this training includes the proper selection and use of hearing protection devices.
- Each type of hearing protection device has a noise reduction rating (NRR). This is a measure in decibels of how much outside noise is reduced before it reaches the inner ear.
- Hearing protection devices with higher noise reduction ratings offer more protection than those with lower ratings.

## **EARPLUGS**

- Earplugs are available in different sizes/types and may be disposable or reusable.
- Before inserting this type of plug, make sure your hands are clean. Then compress the foam by rolling it in your fingers. Pull on the top of the ear with your opposite hand and insert the plug into the opening of your ear canal. Keep your finger on the plug while it expands.
- You will know you have a good fit when placing a hand over your hear has no effect on the level of noise that you can hear.
- Reusable plugs can be made of silicone, rubber, or plastic. They should be cleaned with soap and warm water on a regular basis and stored properly when not in use.
- Because each person's ear canal is a different shape and size, earplugs come in many shapes and sizes. Find one that fits you and is comfortable.

## **EARMUFFS**

- Earmuffs are designed to cover the entire ear. The cups are usually filled with soft foam to provide a comfortable, secure fit and a low-pressure seal.

## **ADVANTAGES OF PROTECTIVE DEVICES**

- Each type of hearing protection device has certain advantages.
- Earplugs generally provide more protection than earmuffs and are less cumbersome. They don't interfere with other PPE. They are also inexpensive and easily replaced.
- Earmuffs are easy to use and to install properly. They eliminate the risk of ear infection form dirt getting into the ear canal and they are designed so that one size fits all.
- Of course, when the dual hearing protection level is reached at 105 decibels, earplugs and earmuffs must be worn together. This level of noise exceeds the capacity of earplugs or earmuffs alone.

## **CONCLUSION**

- Keep in mind that hearing protection should not stop when you leave work. Plenty of activities off the job involve dangerous noise levels.
- No one sill set up a hearing conservation for you at home; that responsibility is up to you.
- No one wants to experience a life with hearing loss. Do everything you can today to protect your hearing for tomorrow.

- Make sound decisions about protecting your hearing by participating in the hearing conservation program and always wearing your hearing protection when required. Take the necessary steps to reduce off-job noise hazards.

