

# Hearing: A sense to be guarded

By Daniel E. Gleghorn, CSP



Bring information on operations which might cause noise-induced (or sensory) hearing loss injuries at your facility. Injury/accident investigations will give you information for your presentation. The job safety analysis should also give you information concerning the noise level of particular equipment or processes and types of hearing loss injuries. Consider bringing a chalkboard or flip chart to write the questions and answers.

Introduce the topic of hearing by telling the group that noise-induced (sensory) hearing loss is a permanent type of injury. It can affect you not only at work but in all aspects of your life. Losing your hearing is a gradual process and permanent. It is less noticeable than other types of workplace injuries.

The proper wearing of hearing protection where noise levels are high can lessen or eliminate hearing loss. In hearing conservation the main objective is to preserve our hearing by the elimination or reduction of noise.

Tell the group that they can find OSHA's permissible exposure limit (PEL) for noise in 29 CFR 1910.95.

1. The permissible exposure limit is 90 decibels (dBA) averaged over eight hours. Hearing protection is required when noise exceeds the PEL.
2. OSHA's action level is 85 dBA averaged over eight hours. Hearing conservation training is required with annual audiograms and hearing protection must be made available.

Explain the physiology of hearing.

1. Sound is collected in the outer ear and funneled to the eardrum.
2. When sound waves hit the eardrum, it vibrates and sends sound to the middle ear.
3. The middle ear amplifies the vibrations and sends them to the inner ear. The vibrations stimulate hair cells in the inner ear and create an electrical impulse.
4. This impulse travels to the brain along the auditory nerve, causing the sensation of sound.

Ask what types of equipment or jobs might cause hearing loss. Examples include:

- Circular saws;
- Chain saws;
- Firing guns;
- Air-powered ejection equipment;
- Air-operated equipment without mufflers;
- Metal stamping;
- Machining operations.

Ask if they know what noise level will be produced by a particular piece of equipment or a particular operation.

If you know what the noise level is for the pieces of equipment or process, give the class that level. If you do not know, tell the class you will check the level and let them know.

Tell them the types of hearing protection available.

- Ear muffs
- Ear plugs
- Ear canal caps

Ask how we can tell how much protection these devices provide.

There is a single number (required by law) on each hearing protector called the noise reduction rating (NRR). The higher the NRR number, the more effective the protection.

Explain the most common methods for determining how much noise a worker experiences when he or she is wearing hearing protection. Using an integrating sound level meter or noise dosimeter set to the A-weighting network:

- (A) Obtain the employee's A-weighted (time-weighted average or TWA) (noise exposure);
- (B) Subtract 7 dB from the hearing protector's NRR, and subtract the remainder from the A-weighted TWA to obtain the estimated A-weighted TWA under the ear protector.

Example: If the employee's TWA is 95 dBA and the NRR on the hearing protector is 25 dB:

- OSHA-allowed reduction — 25 dB - 7 dB = 18 dB;
- Noise employee experiences — 95 dBA - 18 dB = 77 dBA.

Each exposure and each protector must be calculated separately.

Demonstrate how to put on and wear different types of hearing protectors. Share the two types of hearing loss — conductive and sensory. Several medical disorders cause conductive hearing loss.

1. Middle ear infections
2. Perforation of the eardrum
3. Fixation of the ossicular chain (the bones in the middle ear freeze or quit working)
4. Otosclerosis (a growth of spongy bone in the inner ear)

These disorders can be treated medically or surgically.

Conclude by pointing out that sensory hearing loss is caused by damage to, or a malfunction of, the inner ear, auditory nerve, or the brain. This makes it more difficult to understand speech. This type of hearing loss is generally caused by excessive noise from equipment or processes. Prevention is the cure.

## References

### Books

- The Noise Manual, edited by Berger, Elliott H., et al., 5th ed. AIHA Press, 2000.

### Web sites

- General Estimates of Work-Related Noises (National Institute for Occupational Safety and Health): [www.cdc.gov/niosh/docs/2001-104](http://www.cdc.gov/niosh/docs/2001-104)
- Occupational Noise Exposure (Occupational Safety and Health Administration): [www.osha.gov/SLTC/noisehearingconservation/index.html](http://www.osha.gov/SLTC/noisehearingconservation/index.html)
- Noise and Hearing Loss Prevention (National Institute for Occupational Safety and Health): [www.cdc.gov/niosh/topics/noise](http://www.cdc.gov/niosh/topics/noise)
- E•A•R Hearing Conservation Web site: [www.e-a-r.com/hearingconservation/default.cfm](http://www.e-a-r.com/hearingconservation/default.cfm)
- Oregon OSHA's Quick Guide to Hearing Protection: [www.cbs.state.or.us/external/oshapdf/pubs/3349.pdf](http://www.cbs.state.or.us/external/oshapdf/pubs/3349.pdf)
- Hearing Disorders and Deafness (National Library of Medicine): [www.nlm.nih.gov/medlineplus/hearingdisordersanddeafness.html](http://www.nlm.nih.gov/medlineplus/hearingdisordersanddeafness.html)

### Videos

BWC's Division of Safety & Hygiene's video library has a number of videos on noise and hearing conservation. These are available for loan to Ohio employers. Order a catalog by calling 1-800-OHIOWC (ask for the video library), or visit our Web site, [ohiobwc.com](http://ohiobwc.com).

**Daniel S. Gleghorn**, a certified safety professional, has 34 years of experience in occupational safety and health. He is executive vice-president of American Safety & Health Management Consultants Inc.; and previously managed industrial health and safety issues for various subsidiaries of the Goodyear Tire & Rubber Co. Gleghorn was named All-Ohio Safety Professional of the Year for 1990; received similar honors from the Summit County Safety Council (1988) and the Akron Council of Engineering and Scientific Societies (1995).

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