HAZARD FACTSHEET

OCCUPATIONAL NOISE

National Transit Institute

Occupational Noise

According to the United States Occupational Safety & Health Administration (OSHA), approximately 30 million people across the country are exposed to hazardous noise while on the job. Transit workers are particularly susceptible, including train and bus operators, conductors, road car inspectors, bus and car maintainers or anyone who operates, services, or maintains vehicles, equipment, or facilities. Maintenance and repair workers use motors, grinders, saws, presses, and pneumatic equipment and some hand held power tools that all produce excessive noise. Those who work on board or close to passing rail or road vehicles are also exposed to high levels of noise. Working in tunnels or other enclosed spaces magnifies the intensity. Being exposed to high levels of noise, in either short bursts or for extended periods of time, can cause permanent, irreversible hearing damage.

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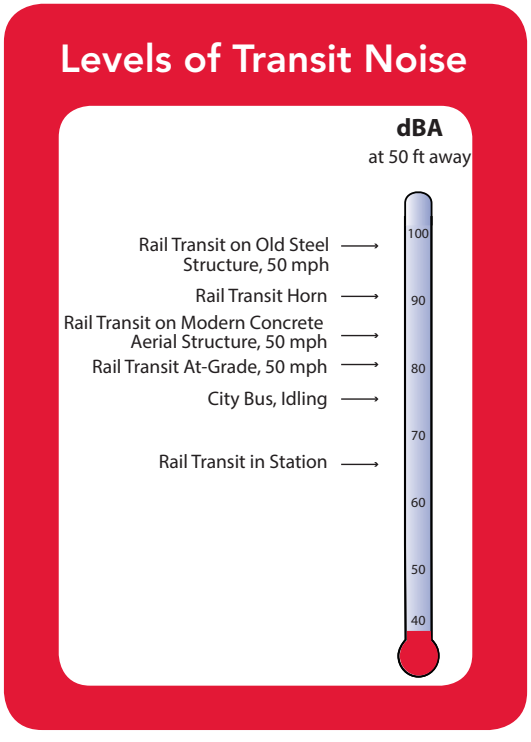
How Does Noise affect Hearing?

Noise is defined as unwanted sound. All sounds travel by pressure waves that move into the ear canal and cause the eardrum to vibrate. Tiny, delicate hair cells inside the ear convert the energy of the vibration into electrical signals that are sent to the brain and allow a person to hear and recognize a sound.

Exposure to very loud sounds damages and kills the hair cells in the eardrum. These do not grow back and can't be replaced or repaired. Over time, loss of the hair cells leads to noticeable hearing loss. The damage depends on two things: how loud the sound is and how long it lasts.

How is Noise Measured?

The intensity of a sound, or loudness is measured in decibels (dB), named after Alexander Graham Bell. Decibels are measured on a logarithmic scale, which means that a small change in the number of decibels actually results in a huge change in noise. The decibel scale goes from 0 dB, which is the faintest sound that can be heard, to over 180 db which is the sound of a rocket launch. According to the National Institute for Occupational Safety and Health (NIOSH), exposure to sound intensities of 85 dB and greater may result in hearing loss.



What are the Effects of Occupational Noise?

There are two types of hearing loss:

- **Temporary hearing loss** occurs when sound vibrations are blocked from reaching the inner ear. This may be due to wax buildup, an infection of the middle ear, or explosive sounds that damage the eardrum or middle ear. This type of hearing loss is reversible. The ear may recover on its own or it may be surgically corrected.
- **Permanent hearing loss** occurs when cells and nerves in the inner ear are damaged. Individuals don't realize they are experiencing hearing loss because it happens gradually. It cannot be corrected or reversed.

Warning Signs of Too Much Noise at Work

Noise may be a problem in your workplace if:

- You hear ringing or humming in your ears when you leave work.
- You have to shout to be heard by a coworker an arm's length away.
- You experience temporary hearing loss after your shift/when leaving work

How Can Noise Hazards be Reduced?

Noise hazards can be controlled by reducing noise at its source, along the path that it travels, or by the person hearing the noise. Noise at work can be managed through engineering controls, administrative controls, personal protective equipment (PPE), or a combination of these methods. Employers are required to implement engineering and administrative controls before issuing personal protective equipment.

Engineering Controls

Engineering controls reduce noise at its source.

- Enclosing noisy machinery, fans, or motors, or moving them away from workers
- Controlling vibration by damping or by tightening, lubricating, or isolating vibrating parts
- Replacing loud machines with quiet machines
- Installing sound barriers or sound-absorbing materials

Administrative Controls

Administrative controls manage the path or duration of noise.

- Operating the noisiest machines at times when fewer people are around to be exposed
- Putting limits on the amount of time a person spends at the source of the noise
- Providing quiet areas where workers can get relief from the noise
- Increasing the distance between the noise source and the worker

Personal Protective Equipment

Hearing protective devices (HPDs) may be used as a last resort, if engineering or administrative controls are ineffective or not feasible. Examples include earmuffs and earplugs. HPDs are required to be labeled with a noise reduction ratio (NRR). The NRR is the manufacturer's claim of how much noise reduction, in dB, a hearing protective devic

What Are the Legal Requirements and Professional Guidelines for Limiting Noise Hazards?

The Federal OSHA Occupational Noise Standard (29 CFR 1910.95) applies to transit workers employed by private companies. Standards set by state OSHA plans apply to many transit workers employed by government-owned transit systems or by public authorities.

Federal and state occupational noise standards require:
Adherence to Permissible Exposure Limits (PELs) on Noise Exposure OSHA's PEL for noise exposure is 90 dB averaged over an 8-hour work shift. For every 5 dB increase above 90, the number of permissible hours of exposure is cut in half. NIOSH recommends less exposure than the PELs allow. The American Conference of Governmental Industrial Hygienists (ACGIH), a private professional organization, has TLVs for noise similar to the NIOSH recommendations below. TLVs are recommended limits for maximum exposures to hazards over an 8-hour work shift.

Reliance on Engineering and Administrative Controls to Reduce Noise

Use of hearing protective devices (earplugs, earmuffs) is permitted only if engineering and administrative controls fail to reduce sound levels within the prescribed levels.

Monitoring of Noise Levels

Noise levels need to be monitored when noise levels are known or suspected to be at or above 85 dB or hearing protective devices are not sufficient to lower exposure to 90 dB. Workers have the right to observe monitoring procedures and to be notified of monitoring results. If engineering and administrative controls cannot reduce noise exposure below 85 dB the employer may be required to supply hearing protective devices.

In addition to hearing loss, exposure to excessive noise levels at work can also result in:

- Increased stress levels that may raise blood pressure and contribute to heart disease. High noise levels can also cause insomnia, fatigue, irritability, and decreased job performance.
- Increased risk of accidents because high noise levels make it more difficult to hear other workers, to hear warnings or approaching vehicles, or to be heard by other workers.

Audiometric Testing and Evaluations

Hearing tests are required to be conducted by a licensed or certified practitioner within six months of an employee being exposed at or above 85 dB and annually thereafter. Individuals tested must be notified in writing of any abnormal results and referred for further audiological evaluation as necessary.

Photo by: Sound Transit

Hearing Protective Devices (HPDs)

If engineering and administrative controls cannot reduce noise exposure below 85 dB the employer may be required to supply hearing protective devices. Employers must provide employees exposed to noise levels between 85 dB and 90 dB with earplugs or earmuffs if an employee requests such protection or if an employee suffers loss of hearing in either ear of 10 dB or more at predetermined frequencies. Hearing protective devices are required for all employees exposed to 90 dB or more averaged over eight hours.

Records

Records of noise exposure must be retained for two years. Audiometric test records must be retained for the duration of the worker's employment. Records must be made available to the employee upon request.

Annual Training

Employees exposed at or above 85 dB averaged over eight hours must be trained on noise hazards. Training must cover the hazards of exposure to excessive noise levels, reasons for, and proper selection, fitting, and maintenance of hearing protective devices, and an explanation of audiometric testing.

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What are the Signs of Hearing Loss

- You have a hard time hearing people in groups or meetings or if there is background noise.
- People sound as if they are mumbling.
- You have to ask people to repeat what they say.
- You have trouble understanding others on the telephone.
- You have ringing or noises in one or both ears.
- You have trouble hearing back-up alarm signals or the ringing of a cell phone.

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NTI's Hazard Factsheets provide transit workers and management with information to help recognize and resolve health and safety hazards. NTI offers a variety of other workplace health and safety training and educational resources.