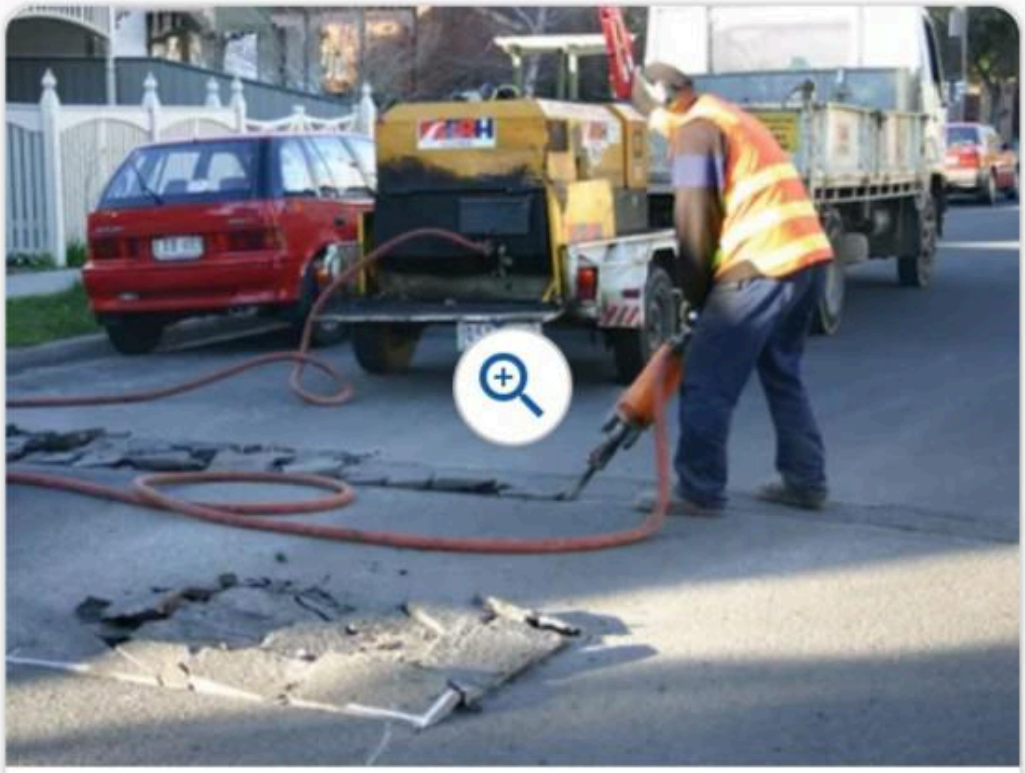
Noise pollution monitoring

noise pollution, unwanted or excessive sound that can have deleterious effects on human health, wildlife, and environmental quality. Noise pollution is commonly generated inside many industrial facilities and some other workplaces, but it also comes from highway, railway, and airplane traffic and from outdoor construction activities.



jackhammer

Category: Animals & Nature

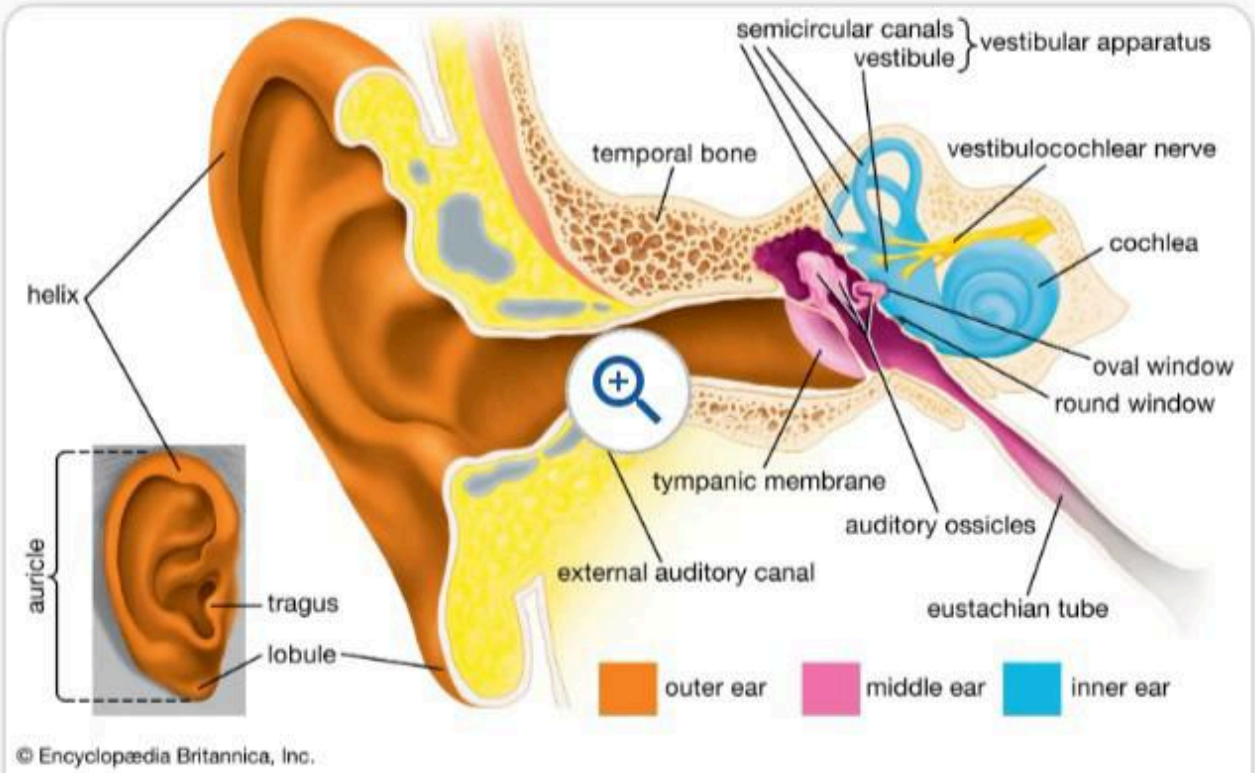
Related Topics: pollution • noise barrier • preferred noise criteria curve • noise criteria curve • environmental noise

Measuring and perceiving loudness

Sound waves are vibrations of air molecules carried from a noise source to the ear. Sound is typically described in terms of the loudness (amplitude) and the pitch (frequency) of the wave. Loudness (also called sound pressure level, or SPL) is measured in logarithmic units called decibels (dB). The normal human ear can detect sounds that range between 0 dB (hearing threshold) and about 140 dB, with sounds between 120dB and 140 dB causing pain (pain threshold). The ambient SPL in a library is about 35 dB, while that

increase of 20 dB represents a 100-fold increase in intensity, a 30-dB increase represents a 1,000-fold increase in intensity, and so on. When sound intensity is doubled, on the other hand, the SPL increases by only 3 dB. For example, if a construction drill causes a noise level of about 90 dB, then two identical drills operating side by side will cause a noise level of 93 dB. On the other hand, when two sounds that differ by more than 15 dB in SPL are combined, the weaker sound is masked (or drowned out) by the louder sound. For example, if an 80-dB drill is operating next to a 95-dB dozer at a construction site, the combined SPL of those two sources will be measured as 95 dB; the less intense sound from the

Effects on humans and wildlife



human ear

Noise is more than a mere nuisance. At certain levels and durations of exposure, it can cause physical damage to the eardrum and the sensitive hair cells of the inner ear and result in temporary or permanent hearing loss, known as

exposure can raise blood pressure and pulse rates, cause irritability, anxiety, and mental fatigue, and interfere with sleep, recreation, and personal communication. Children living in areas with high levels of noise pollution may suffer from stress and other problems, such as impairments in memory and attention span. Noise pollution control is therefore important in the workplace and in the community.

Noise pollution also impacts wildlife. A wide range of animals, including insects, frogs, birds, and bats, rely on sound for a variety of reasons. Noise pollution can interfere with an animal's ability to attract a mate, communicate, navigate, find food, or avoid predators and thus can even be an existential threat to

vulnerable organisms. The problem of noise pollution is especially serious for marine animals, particularly those that rely on echolocation, such as certain whales and dolphins, and much of the world's oceans are polluted with chaotic sounds from ships, seismic tests, and oil drills. Some of the loudest and most detrimental sounds in the sea are from naval sonar devices, whose noise can travel hundreds of miles through the water and is associated with mass strandings of whales and dolphins.

Noise regulation and mitigation

Noise-control ordinances and laws enacted at the local, regional, and national levels can be effective in mitigating the adverse effects of noise pollution. Environmental and industrial noise is regulated in the United States under the Occupational Safety and Health Act of 1970 and the Noise Control Act of 1972. Under these acts, the Occupational Safety and Health Administration set up industrial noise criteria in order to provide limits on the intensity of sound exposure and on the time duration for which that intensity may be allowed.

If an individual is exposed to various levels of noise for different time intervals during the day, the total exposure or dose (D) of noise is obtained from the relation

$$D = (C_1/T_1) + (C_2/T_2) + (C_3/T_3) + \ldots,$$

where C is the actual time of exposure and T is the allowable time of exposure at any level. Using this formula, the maximum allowable daily noise dose will be 1, and any daily exposure over 1 is unacceptable.

Criteria for indoor noise are summarized in three sets of specifications that have been derived by collecting subjective judgments from a large sampling of

people in a variety of specific situations. These have developed into the noise criteria (NC) and preferred noise criteria (PNC) curves, which provide limits on the level of noise introduced into the environment. The NC curves, developed in 1957, aim to provide a comfortable working or living environment by specifying the maximum allowable level of noise in octave bands over the entire audio spectrum. The complete set of 11 curves specifies noise criteria for a broad range of situations. The PNC curves, developed in 1971, add limits on low-frequency rumble and high-frequency hiss; hence, they are preferred over the older NC standard. Summarized in the curves, these criteria provide design goals for noise levels for a variety of

technique for reducing personal noise levels is through the use of hearing protectors, which are held over the ears in the same manner as an earmuff. By using commercially available earmuff-type hearing protectors, a decrease in sound level can be attained ranging typically from about 10 dB at 100 Hz to more than 30 dB for frequencies above 1,000 Hz.

Outdoor noise limits are also important for human comfort. Standard house construction will provide some shielding from external sounds if the house meets minimum standards of construction and if the outside noise level falls within acceptable limits. These limits are generally specified for particular periods of the day—for

dirt film frame overlay

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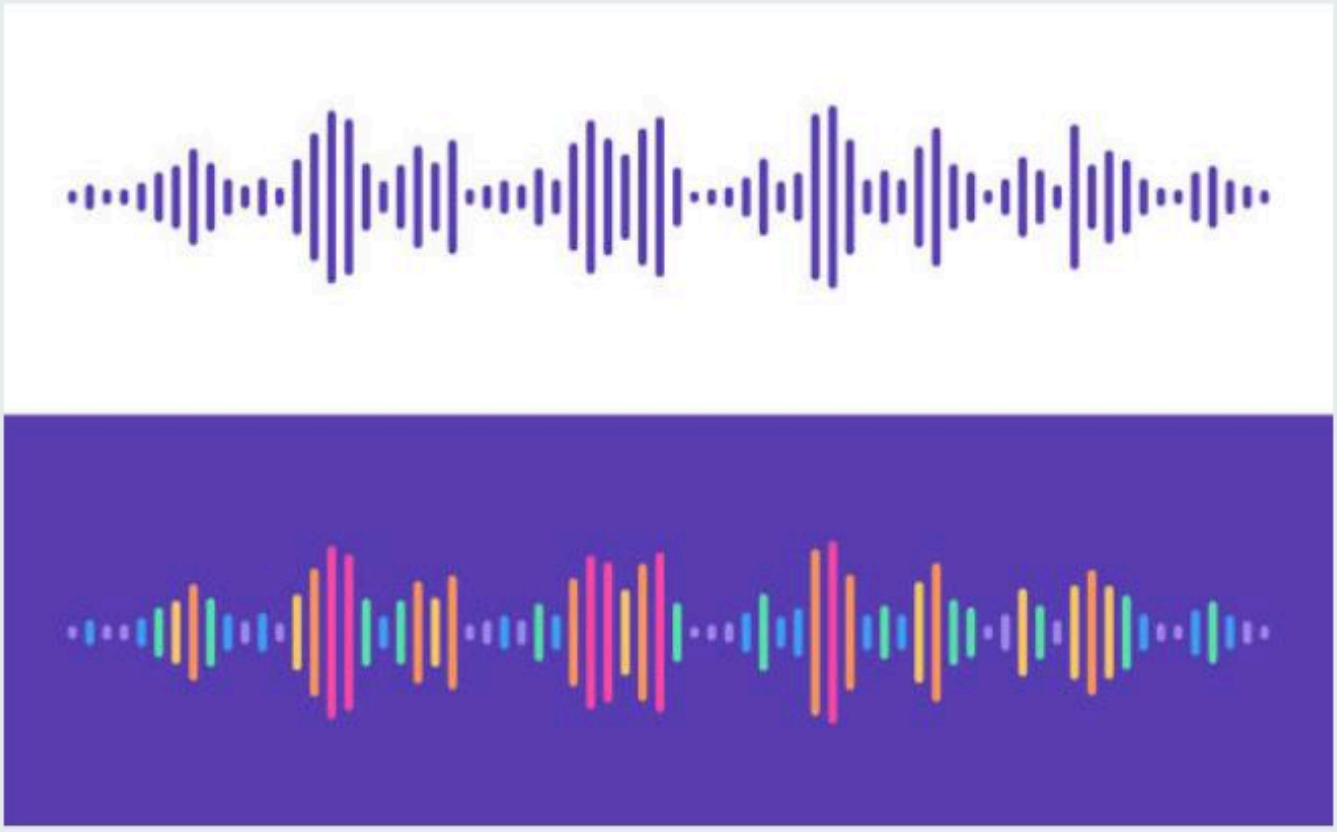

Audio Levels Lines

Audio levels lines rainbow talking music sound editin...

Assorted Various Contrast Black Noise Halft...

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How do you monitor noise pollution?

The most common instruments used for measuring noise are **the sound level meter (SLM), the integrating sound level meter (ISLM), and the noise dosimeter**. It is important that you understand the calibration, operation and reading the instrument you use.

How is noise pollution monitored?

Noise is Monitored **Using a Sound Level Meter (SLM)**

A sound level meter (SLM) can measure sound at different frequencies (called octave band analysis) and record sound clips to determine the source of noise pollution.

What are the five points to control noise pollution?

Noise Pollution can be controlled by designing quieter machines, using acoustic enclosures, and vibration isolators, increasing the distance of the transmission, and using noise-canceling headphones, earplugs, and more.