

## DURATION

The hair-like cells in your inner ear are affected by the intensity of noise - both immediately and cumulatively (over a period of time). When these cells get beat up from over exposure, they can't transmit sound energy properly to the auditory nerve.

When the ear's hair cells become damaged due to excess noise exposure, the auditory nerve is not sufficiently stimulated, the brain does not receive the appropriate sound signal, and we fail to hear correctly.

When hair cells are damaged by prolonged over-exposure to loud noise, they "die" and cannot be replaced, resulting in permanent hearing loss.

## TIME WEIGHTED AVERAGE

How long is too long?

OSHA set the limit at 85 dBs over a time weighted average of 8 hours. (8 TWA)

**IMPORTANT:** This was a negotiated level! Some hearing experts wanted it to be 80, while some industrialists wanted it to be 90.

OSHA did a "Solomon" type move and split the difference. *Who do you want to go with? Whose Asset Is It?*

## PROTECTING YOUR HEARING

On or off the job, you can protect your hearing by wearing the appropriate personal protective equipment recommended for your tasks. Ear muffs, plugs, and canal caps can all reduce the amount of noise you are exposed to. It also helps to know the decibel range or noise level of some common activities and situations to see if you may be exposing yourself to too much noise. Remember that even loud vacuum cleaners, dishwashers, and home power tools can create excessive noise, so protect your hearing wherever you are.

## HEARING PROTECTION

- ◆ Engineering Controls
- ◆ Work Practice Controls
- ◆ Personal Protective Equipment

Most of the hearing protection available has a rating of the level of attenuation, or how much protection is provided. Look for this number on the package or the device itself.

## Attenuation

- ◆ Muffs
- ◆ Pre-formed plugs
- ◆ Form Fitting – soft plugs



# Hearing Protection & Awareness Program



This brochure was designed as a supplement to the Hearing Protection & Awareness Training Program. For more information, contact the Manager of Environmental Health and Safety, (330) 672-1950, [dbaden@kent.edu](mailto:dbaden@kent.edu), (330) 672-9565 or [dehead@kent.edu](mailto:dehead@kent.edu)

**Environmental Health  
and Safety**

## NOISE AND SOUND

Noise is a mechanical/neural thing.

Does it happen if we don't hear it?

Philosophically, noises are annoyances while sounds are pleasurable. The difference of course depends on the individual.

Noises and sounds occur when an energy source causes an object to vibrate. The object's vibration transfers the energy into sound waves.

Sound waves are kind of like ripples in a pond - only they're 3-D.

## PITCH

How many "waves" or cycles per second.

How many times the waves to hit you.

The higher the pitch, the more you'll get hit.

The normal hearing range is 20 Hz, to 20,000 Hz.

Higher pitch = more danger

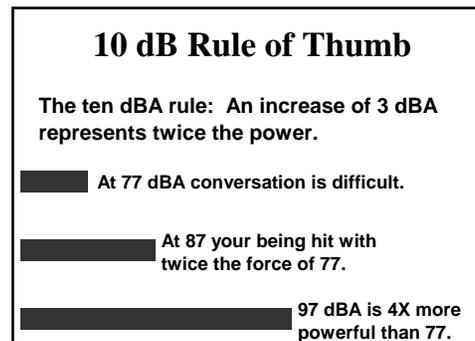
## INTENSITY

The intensity or power of noise is measured in units called decibels or dBA. (We can abbreviate this to dBs.) dBs are measured on a logarithmic scale.

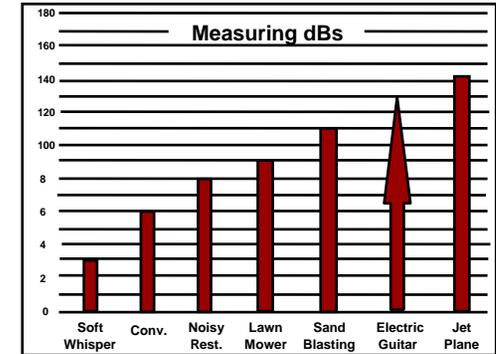
This was done to keep the numbers reasonable. It starts at 0, and goes to 140 (dynamic range). Think of these numbers as reference points of a ratio.

## MEASURING NOISE dBs

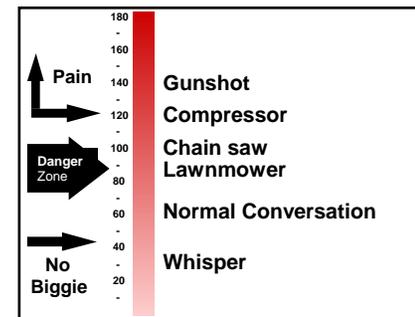
Excess noise is generally considered to be exposure to 85-90 decibels or more over an 8-hour period.



An increase in the intensity of a noise sounds smaller than it really is. We are not necessarily the best judges of the power of noise. Our brain actually



adjusts its interpretation of noise to increase our comfort level. This is called a Temporary Threshold Shift. It does NOT change the power of the sound waves knocking into your body. The mechanics and resulting damage still occur.



80 to 85 dBs can cause permanent damage over time.  
85 to 90 dBs is the action level. You WILL be damaged. PPE is legally required.