Noise! Hearing Conservation & Noise Monitoring

Presented by

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Objectives

- Review hazards of noise exposure
- How to evaluate exposures and compare results to AL and PEL
- When and why implement a HCP
- HCP elements

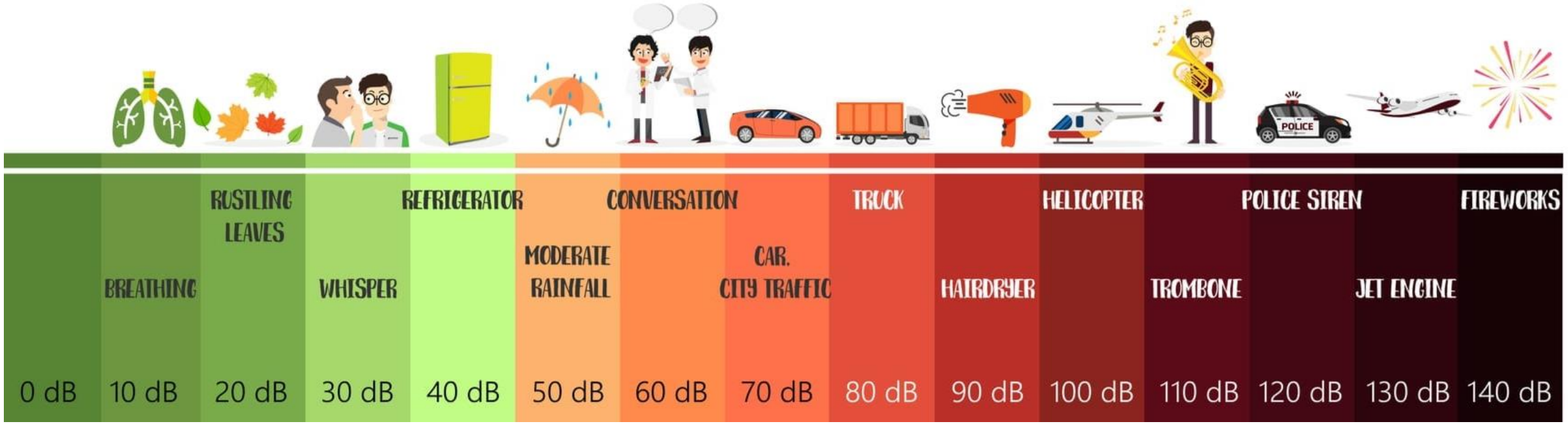
To get us started…have you ever had to record hearing loss on your OSHA 300 log?

- Yes
- No
- Hearing loss is recordable?

Is Noise Really a Big Deal?

Noise

- Definition: unwanted sound that is unpleasant, loud, or disruptive
- Measured in decibels (dB)
- Noise energy doubles every 3 dB
  - 83 dB has double the energy of 80 dB
- 85 dB is the generally accepted level that can cause hearing loss



Hazards of Noise Exposure

Hearing loss is an OSHA-recordable health effect! If you have an employee who is indicated with a threshold shift on their audiogram, it may be recordable.

What Causes Hearing Loss?

Health Effects of Noise

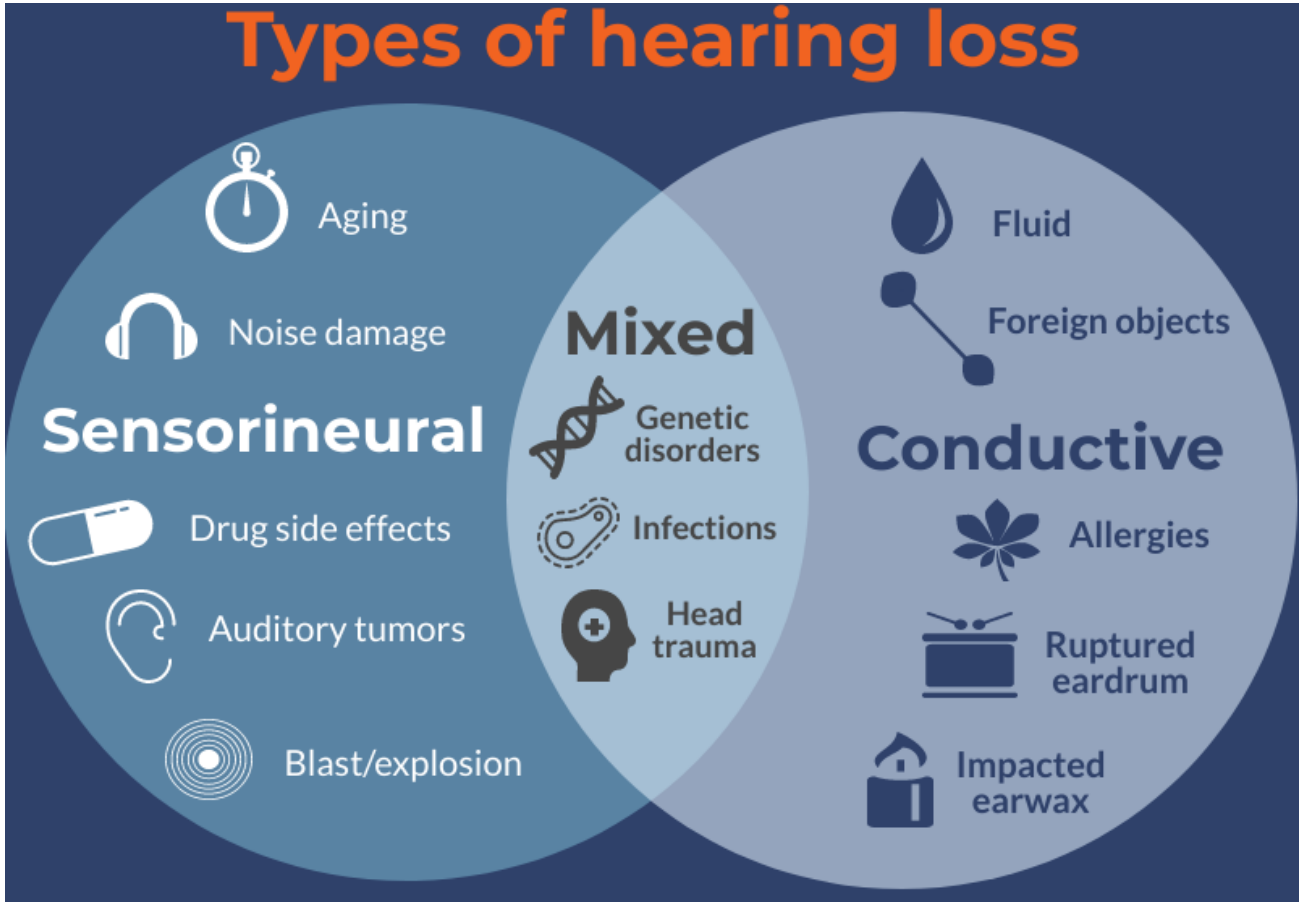
- Hearing loss
- Tinnitus
- Psychological effects
- Physiological effects
- Performance

Age-Related Hearing Loss (Presbycusis)

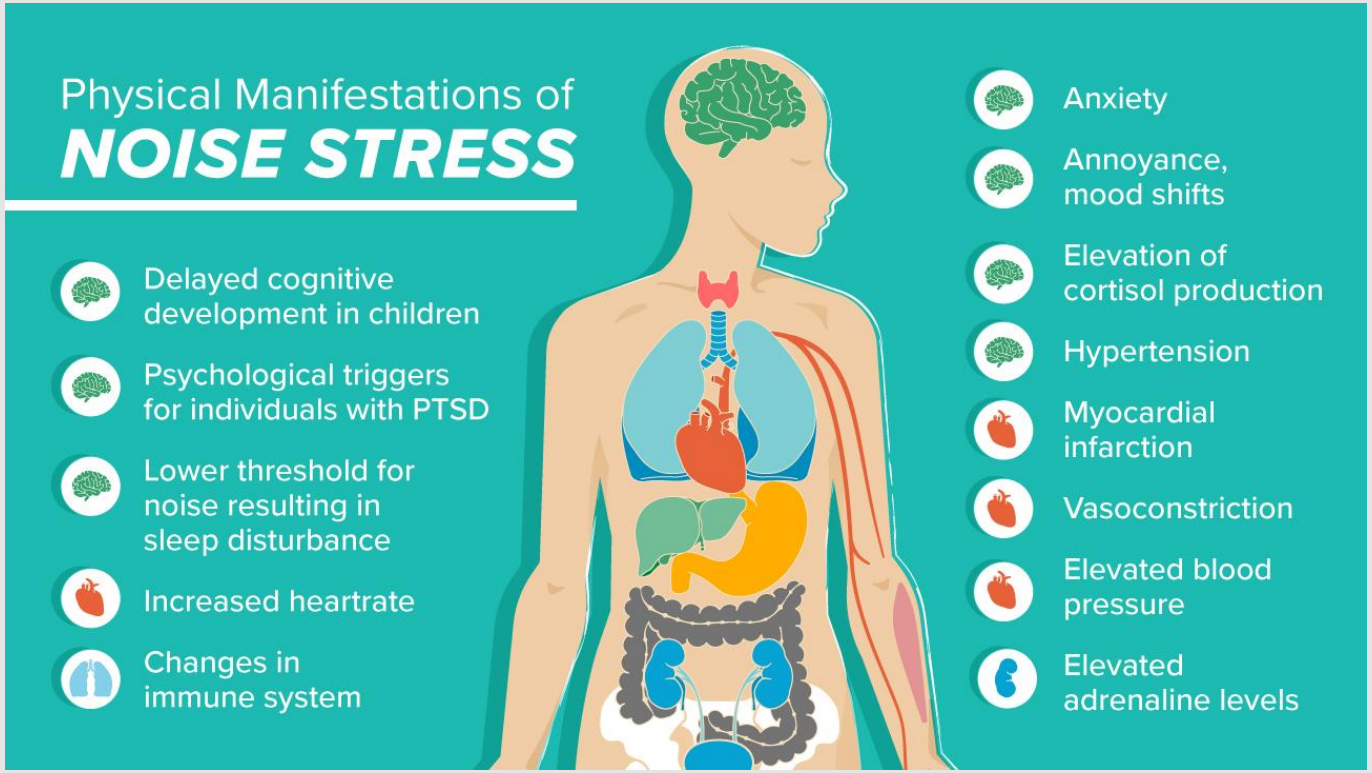
- Usually affects higher frequency sounds and speech perception
- Both ears are affected
- Age-related hearing loss is often compounded by noise and other health conditions

Types of Hearing Loss

- Conductive
  - Sound does not reach the inner ear because of an obstruction or trauma
  - Even across all frequencies
- Sensorineural*
  - Problem in either the inner ear or auditory nerve
  - Loss at specific frequencies
  - Temporary vs. standard threshold shifts
- Combined



More than Hearing Loss



- Noise-induced hearing loss
- Cardiovascular disease
- Cognitive impairment in children
- Sleep disturbance
- Tinnitus
- Annoyance

Source: WHO Burden of disease from environmental noise, https://apps.who.int/iris/bitstream/handle/10665/326424/9789289002295-eng.pdf, https://www.healthline.com/health-news/loud-noises-bad-for-your-health#3

Typical A-Weighted Sound Levels (DBA)

- Jackhammer 102-111
- Portable saw 88-102
- Pneumatic chip hammer 103-113
- Concrete joint cutter 99-102
- Hammer 87-95
- Bulldozer 93-96

- Motorcycle – 90
- Lawnmower, Leaf Blower 85 – 90
- Vacuum Cleaner – 75 - 85
- Hair dryer – 75 - 85
- Normal conversation – 60
- Whisper – 30

General rule of thumb: If you need to raise your voice for someone 3 feet away to hear, there is likely a noise problem.

Ototoxins

- Can cause hearing loss regardless of noise exposure
- Chemicals that affect nerves
- Work synergistically with noise

Substance Class	**Chemicals**
Solvents	n-Hexane, Toluene, xylenes, styrene, TCE
Asphyxiants	Carbon monoxide, hydrogen cyanide, tobacco smoke
Metals	Mercury compounds, organic tin compounds, lead

Preventing NIHL in the Workplace

Noise Control

Source	Pathway	Worker
Selection, purchasing and rental of quiet equipment	Locating noisy equipment away from work areas	Move worker out of path
Mufflers	Increase worker distance from source	Training and education
Replacing defective parts	Sound barriers/curtains	Enclose
Tightening loose or vibrating parts		Hearing Protection
Preventive Maintenance		Rotation

Poll

When was the last time you conducted any kind of noise survey?

- In the last 12 months
- In the last 2-3 years
- More than 3 years ago
- Never

Workplace Noise Surveys

- Individual full exposure assessment
- Representative sampling
- Task-based exposure assessment modeling
- Area mapping

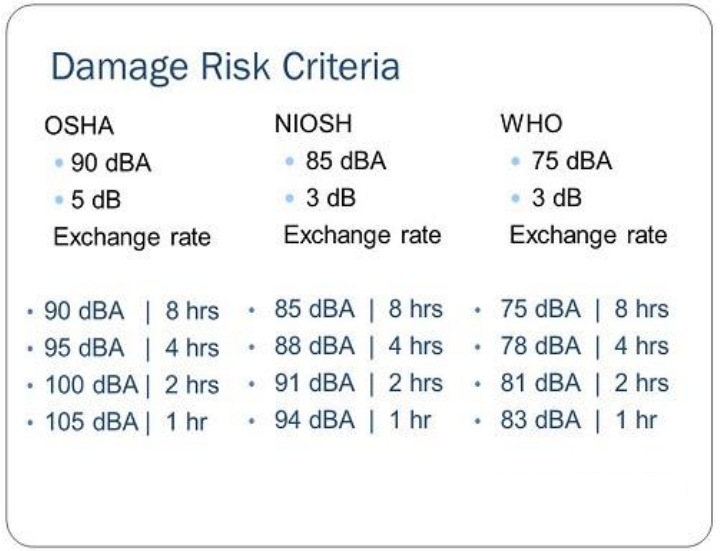
Sound Level Meters


QUEST
TECHNOLOGIES
USER 1 \DOSE
SLOW
65.5% DOSE
RTIME 00:00:31
LEVEL AVG DOSE SUMRY
Run/Pause
On/Off
Esc
NoisePro Series


D1:Setup 1
LAS 104.9 dB
LASmx 115.9 dB
LAVG 108.6 dB
TH-80.ER-5.CL-90.SLOW-A
the EDGE

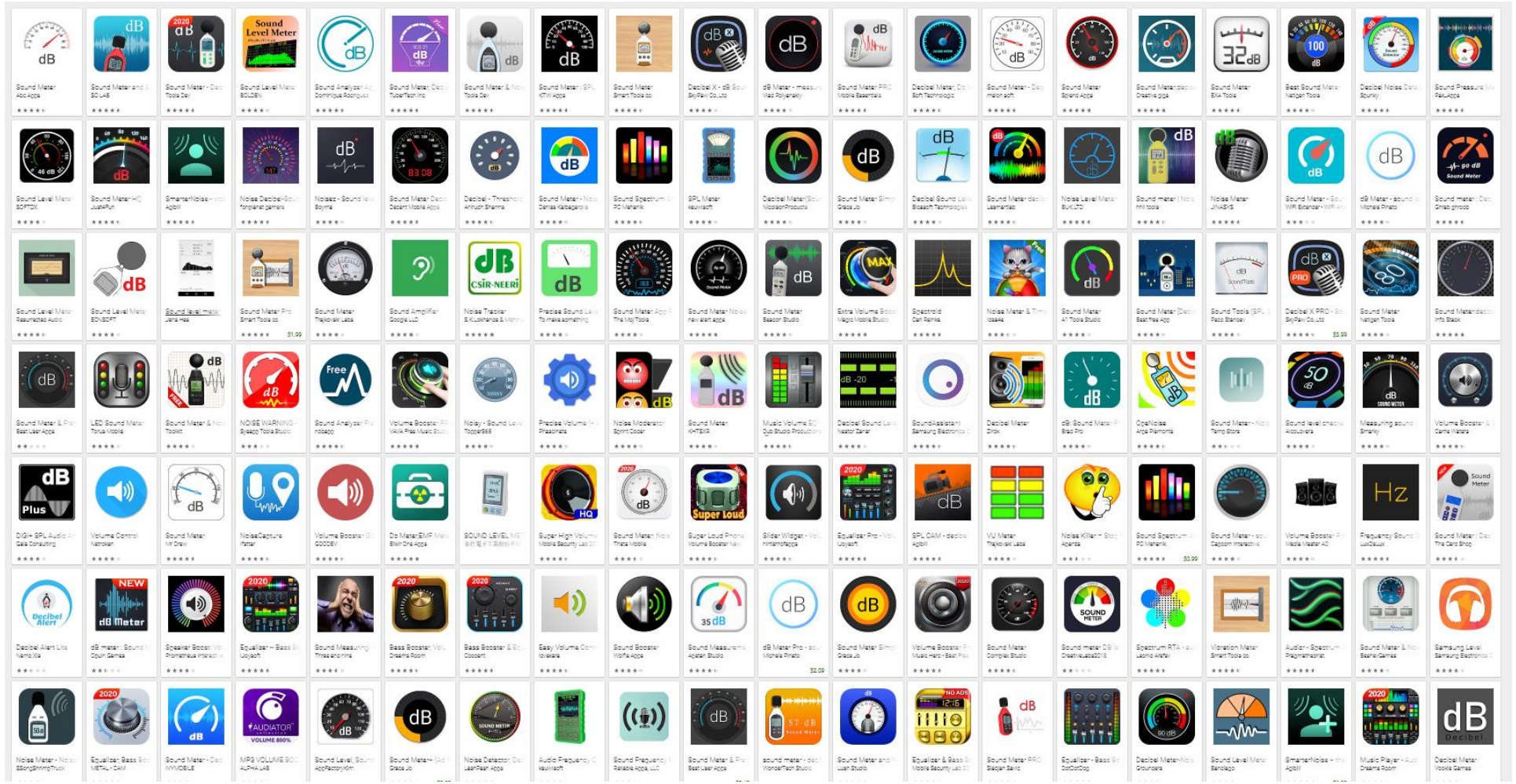
Comparing to what?

- Criterion level
  - 8-hr average sound pressure level
  - risk for hearing loss exists
- Threshold level
  - no damage below
- Exchange rate
  - damage model assumption
  - trade-off between exposure level and time



Picture: https://www.audiologyonline.com/articles/making-the-case-for-custom-12959

What about the Apps



Pros and Cons

- Most of them are free.
- We all have phones.
- It’s very easy to use.
- Wherever you go, whenever you need.

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- Accuracy?
- Consistency?
- How do different Apps compare?
- Not for compliance.

…

Is it Protective Enough?

- When the SPL is at 89 dB
  - OSHA PEL: assume no exposure, no time limit
  - NIOSH REL: around 3 hrs

Time to Reach 100% dose rate	OSHA PEL (5 decibel exchange rate)	NIOSH REL (3 decibel exchange rate)
8 hours	90 decibels	85 decibels
4 hours	95 decibels	88 decibels
2 hours	100 decibels	91 decibels
1 hour	105 decibels	94 decibels
30 minutes	110 decibels	97 decibels
15 minutes	115 decibels	100 decibels

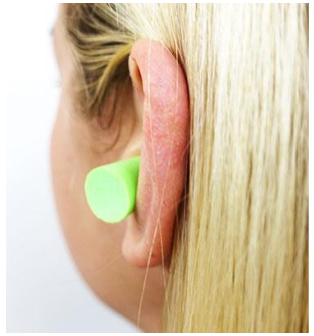
PPE: Choose the Right Ones

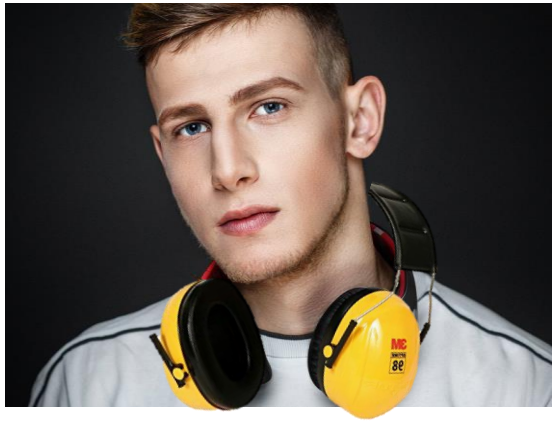
- Earplugs
  - pre-molded
  - custom molded
  - formable
  - semi-inserts
- Earmuffs
- Helmet

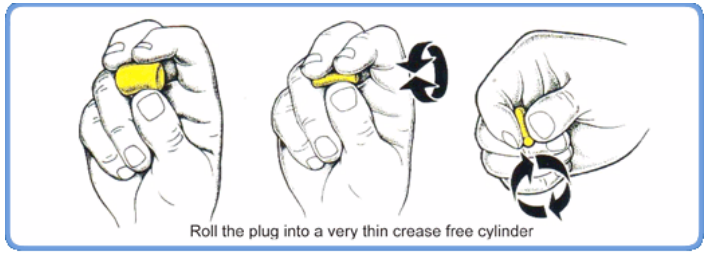
Understand the NRR

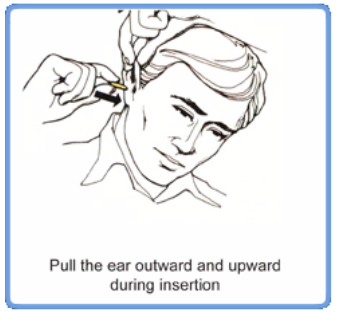
- **Noise Reduction Rating (NRR)**
  - determined in a laboratory setting
- **Effective NRR (ENRR)** = (NRR-7)/2
- NIOSH Recommended Derating
  - Earmuffs: 25% from manufacturer's NRR
  - Formable earplugs: 50% from manufacturer's NRR
  - All other earplugs: 70% from manufacturer’s NRR

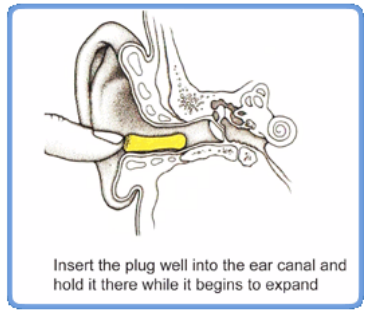
PPE: Use Them Correctly

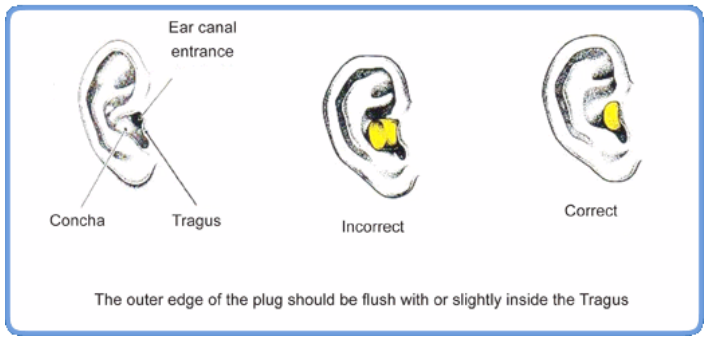












Dual Protection

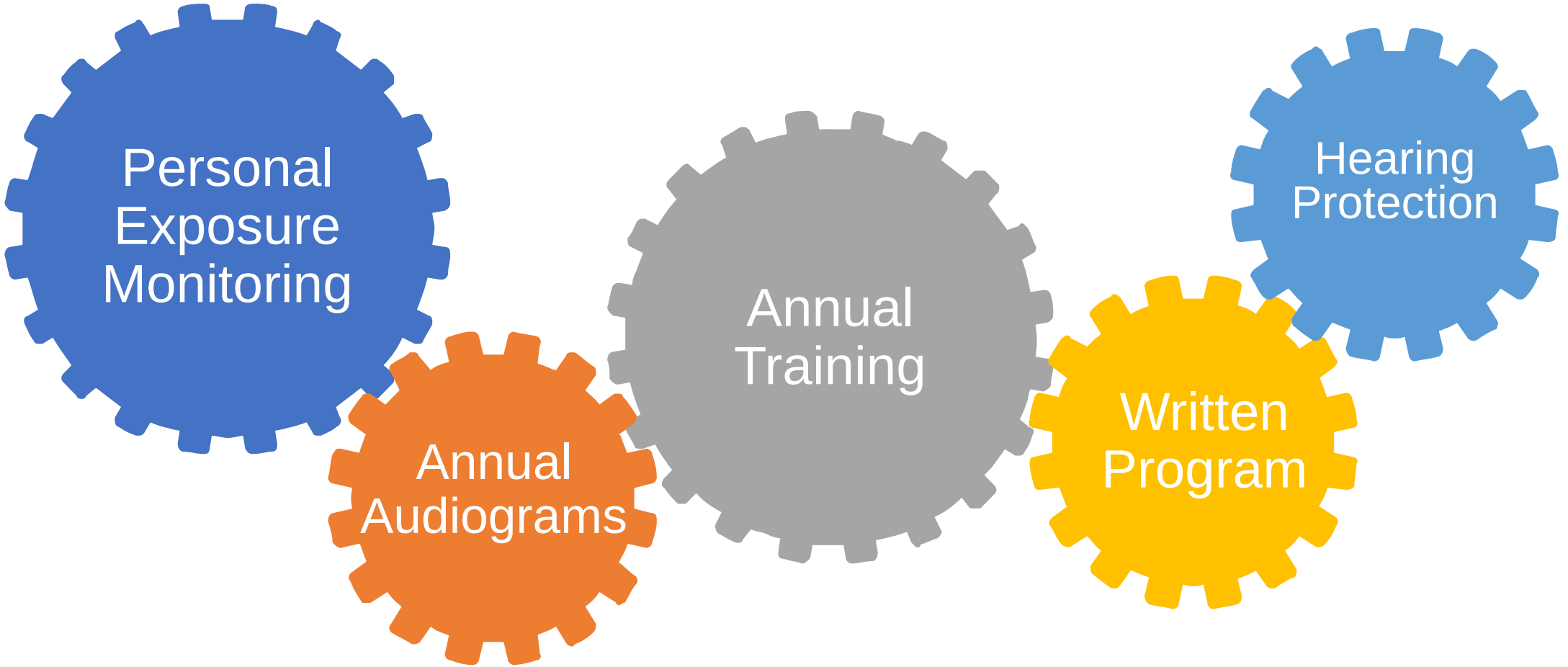
When both muffs and plugs are worn:

- Determine effective NRR using the equation of previous page of the higher of the two NRRs.
- Then add 5 dB to the field-adjusted NRR to account for the use of the second hearing protector.

Example: Muffs NRR = 21 & Plugs NRR = 34

- Take Effective NRR of the Plugs + 5
- Overall Effective NRR = 13.5 (plugs) + 5 (muffs)
- = 18.5 dB

OSHA's Hearing Conservation Program Elements



Overcoming Barriers to Preventing Hearing Loss

- HPDs are uncomfortable
- I have already lost my hearing, why should I wear hearing protection?
- I can’t hear/talk with coworkers
- I can’t hear warning signals
- My machine sounds different to me when I wear HPDs
- Can earplugs cause infections?
- I’m not in loud areas long enough
- My co workers don’t wear them

Regional Emphasis Program

- OSHA Region V
- Emphasis on noise exposures and work-related hearing loss in manufacturing
- Scheduled inspections for manufacturing industries
  - NAICS codes starting with 32 and 33
  - Inspections will begin in September
- Reviewing OSHA 300 logs

Action Items

1. Conduct and document sound mapping
2. Determine need to do dosimeter testing
3. Evaluate hearing conservation program elements
4. Review SDS for potential ototoxicants
5. Make sure your OSHA 300 logs are up to date

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QUESTIONS?