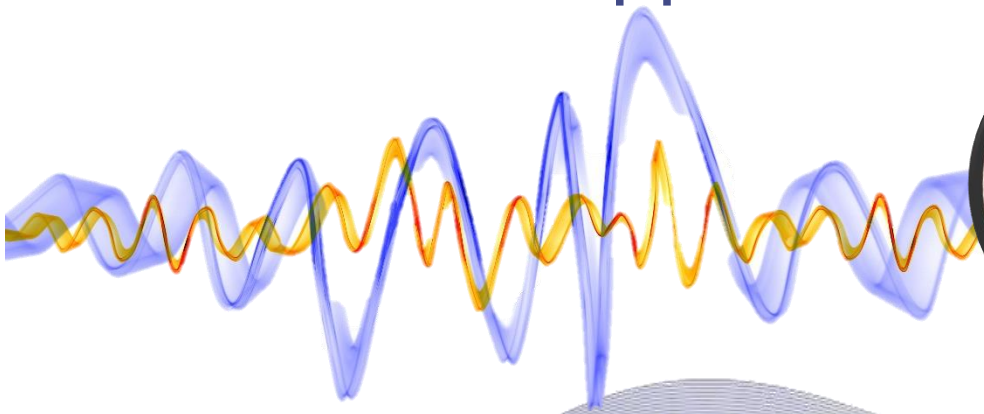
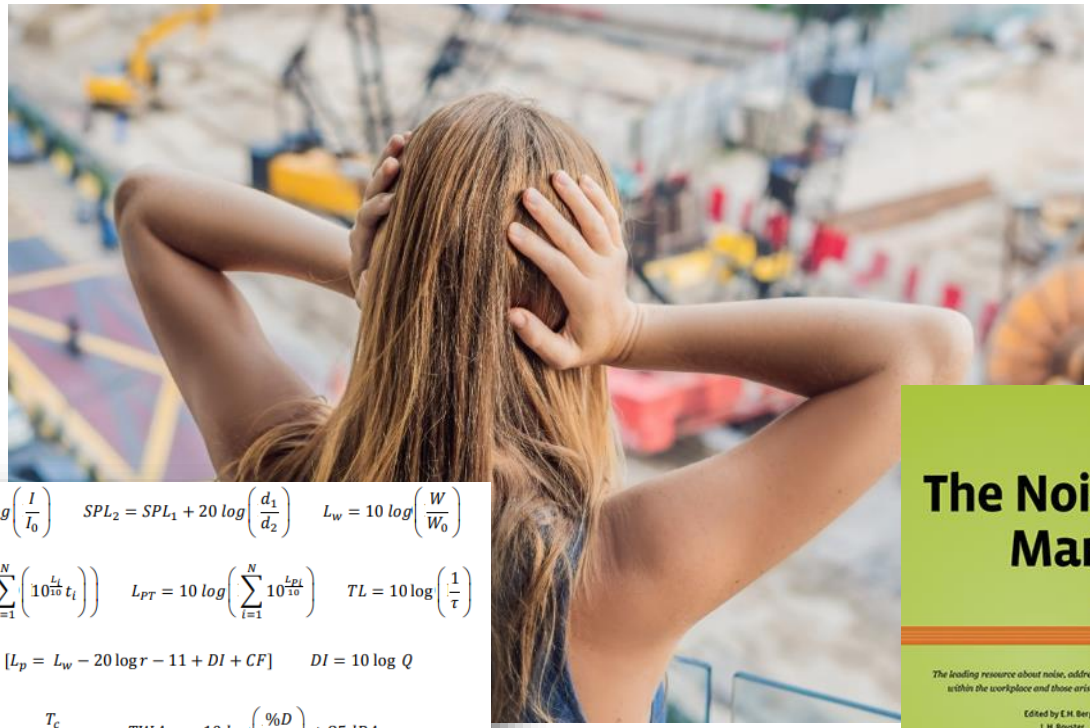
Measuring Occupational Noise

An easier approach…



Considering the Challenges



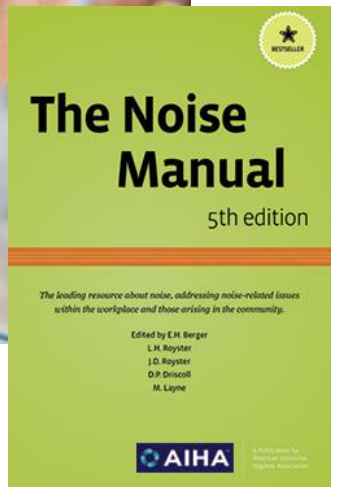
$$SPL\ or\ L_p = 20\ log\left(\frac{P}{P_0}\right) \quad L_I = 10\ log\left(\frac{I}{I_0}\right) \quad SPL_2 = SPL_1 + 20\ log\left(\frac{d_1}{d_2}\right) \quad L_w = 10\ log\left(\frac{W}{W_0}\right)$$

$$W_0 = 10^{-12} watts \quad L_{eq} = 10\log\left(\frac{1}{T}\sum_{i=1}^{N}\left(10^{\frac{L_i}{10}}t_i\right)\right) \quad L_{PT} = 10\ log\left(\sum_{i=1}^{N}10^{\frac{L_{PI}}{10}}\right) \quad TL = 10\log\left(\frac{1}{\tau}\right)$$

$$L_p = L_w - 20\log r - 0.5 + DI + CF \quad [L_p = L_w - 20\log r - 11 + DI + CF] \quad DI = 10\log Q$$

$$\%D = 100\left(\frac{C_1}{T_1} + \frac{C_2}{T_2} + \ldots + \frac{C_i}{T_i}\right) \quad T_p = \frac{T_c}{2^{(L_{AS} - L_c/ER)}} \quad TWA_{eq} = 10\ log\left(\frac{\%D}{100}\right) + 85dBA$$

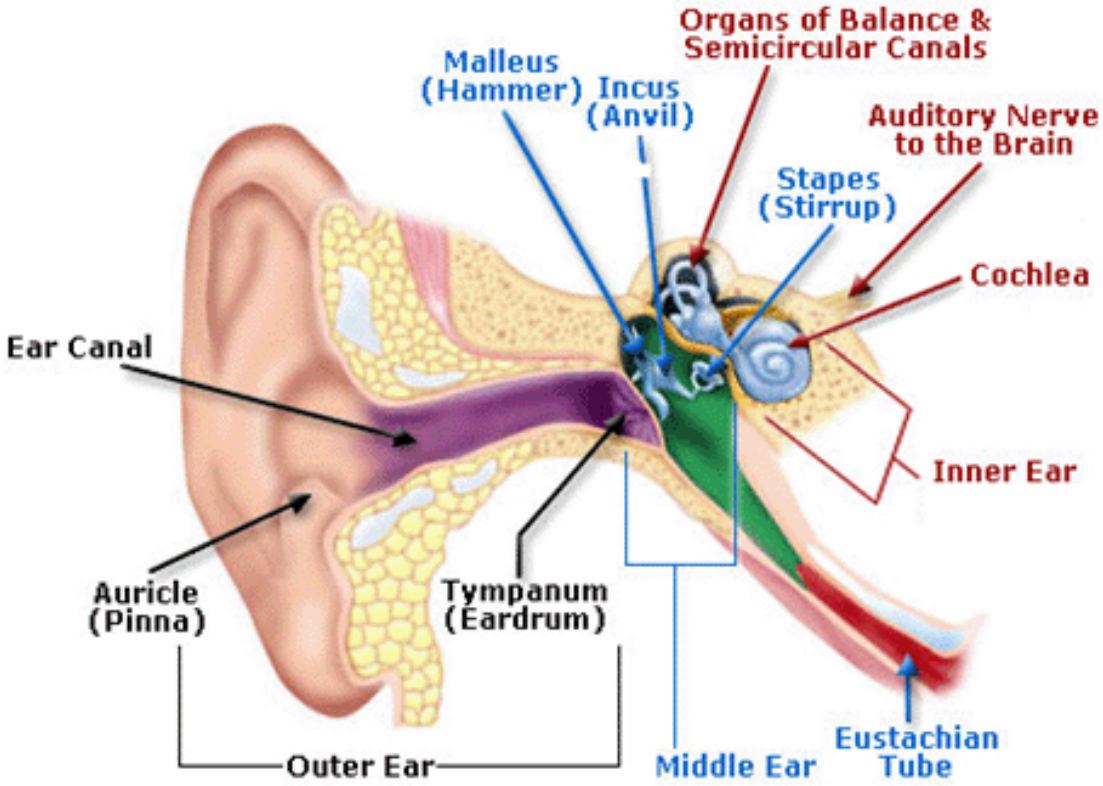
$$TWA = 16.61\ log\left(\frac{\%D}{100}\right) + 90dBA \quad f = \frac{(N)(RPM)}{60} \quad f = \frac{c}{\lambda} \quad f_2 = 2f_1 \quad f_c = \sqrt{f_1 f_2} \quad f_2 = \sqrt[3]{2}f_1$$



www.abih.org

What is Noise?

The Human Ear



https://www.osha.gov/dts/osta/otm/new_noise/

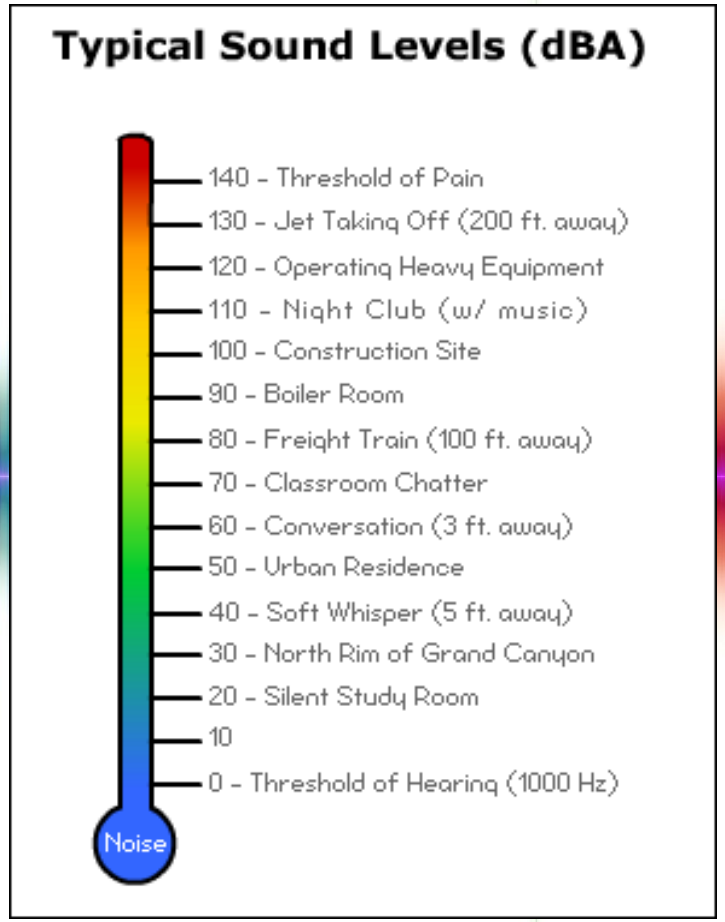
Why measure noise in the workplace?

- Hearing loss is one of the most common occupational illnesses.
- Workplace noise injuries show up over time.

Measuring Noise—The Steps

- Is noise exposure present?
- Collect initial information
- Noise screening levels
- Personal noise dosimetry

Noise Exposure Present?

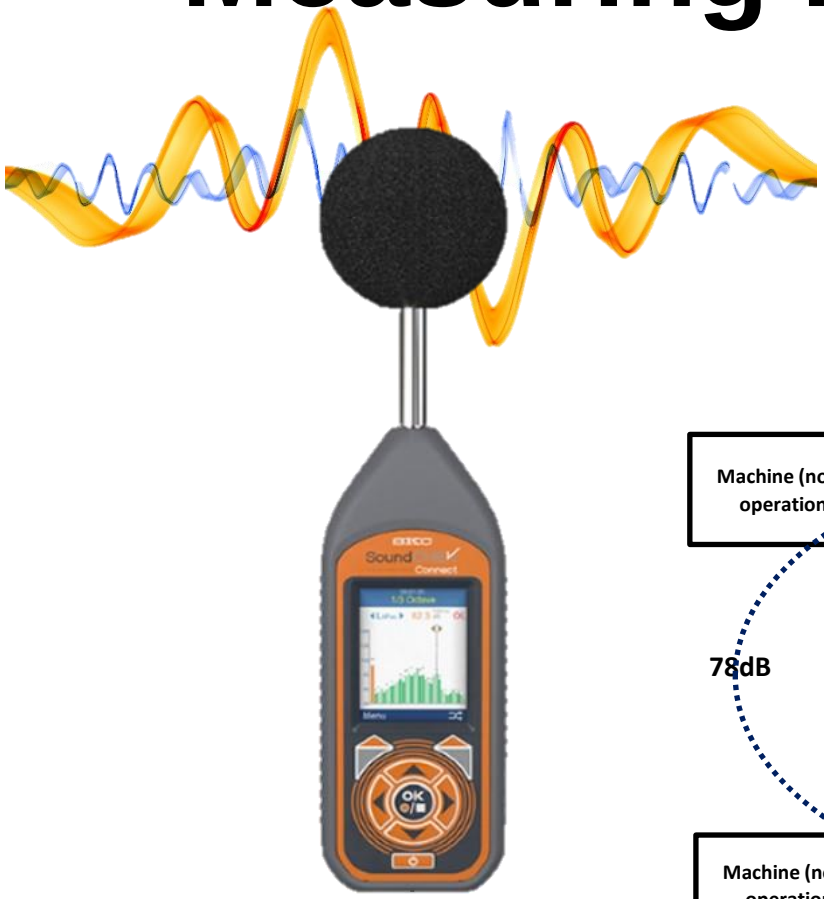


www.osha.gov/noise

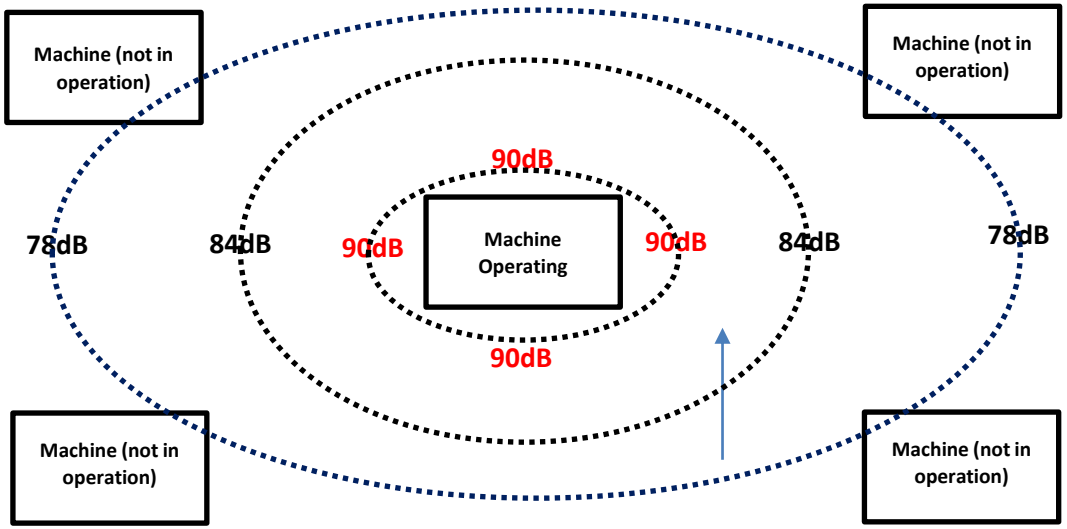
Collect Critical Information

- Applicable noise regulations
- Noise sources
- Job conditions
- Previous surveys

Measuring Noise with a SLM



- Parameters Set up
- Calibration
- Noise Map



Measuring Personal Noise

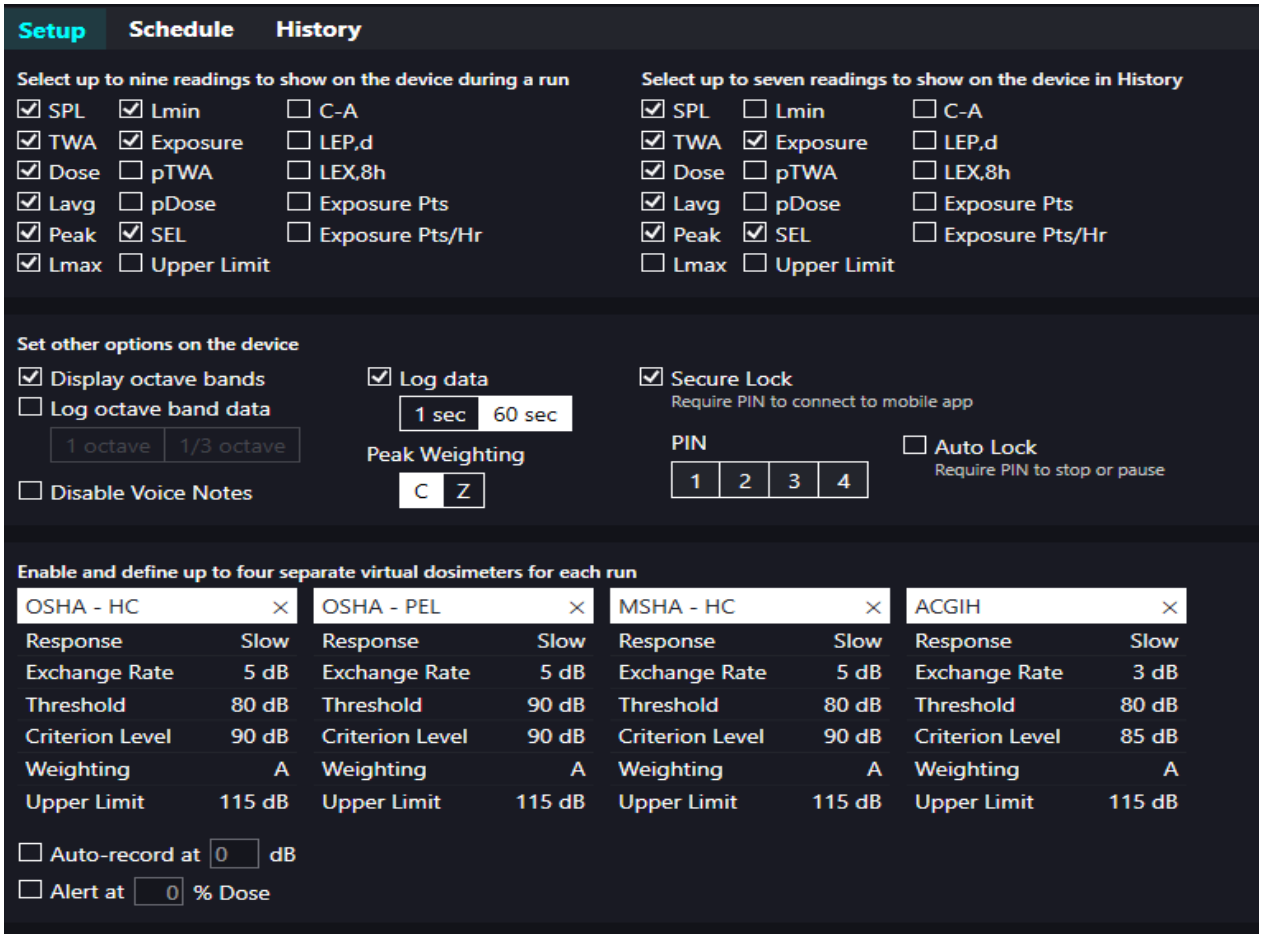
- Parameters and Setup
- Calibration

Noise Surveys…

As seen by an OEHS professional in the field

Which equipment do I use?

Instrument Setup

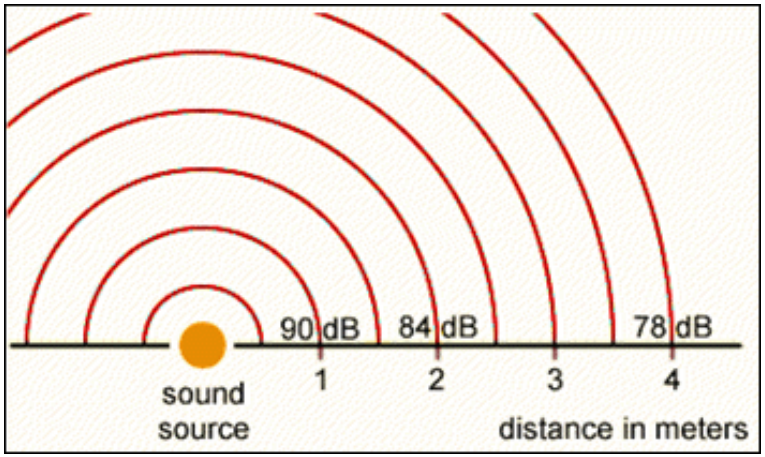


www.skcinc.com

Noise Equipment Calibration

https://www.osha.gov/dts/osta/otm/new_noise/

Does my data make sense?



https://www.osha.gov/dts/osta/otm/new_noise/

Calculating Noise TWAs

- Calculating Dose and TWA

  1910.95 App A

$$D = 100 (C(1)/T(1) + C(2)/T(2) + \ldots + C(n)/T(n))$$

C(n) =total time of exposure at a specific noise level
T(n) =reference duration for that level as given by Table G-16a.

TABLE G-16A

A-weighted sound level, L (decibel)	Reference duration, T (hour)
80	32
81	27.9

$$TWA = 16.61 \log(10) (D/100) + 90$$

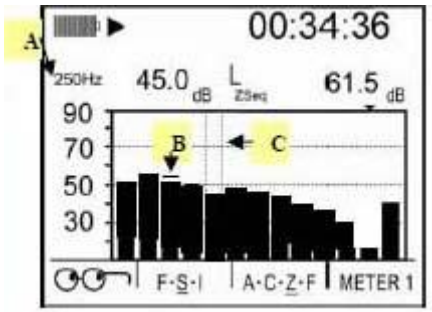
TWA= 8-hour time-weighted average sound level
D = accumulated dose in percent exposure

TABLE A-1 - CONVERSION FROM "PERCENT NOISE EXPOSURE" OR "DOSE" TO "8-HOUR TIME-WEIGHTED AVERAGE SOUND LEVEL" (TWA)

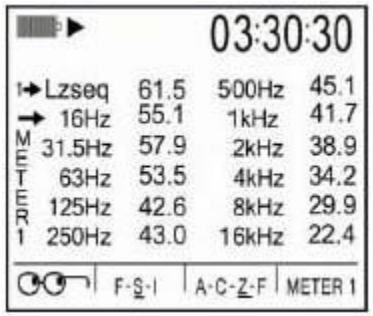
Dose or percent noise exposure	TWA
10	73.4
15	76.3

https://www.osha.gov/dts/osta/otm/new_noise/

Octave Band Analyzer?



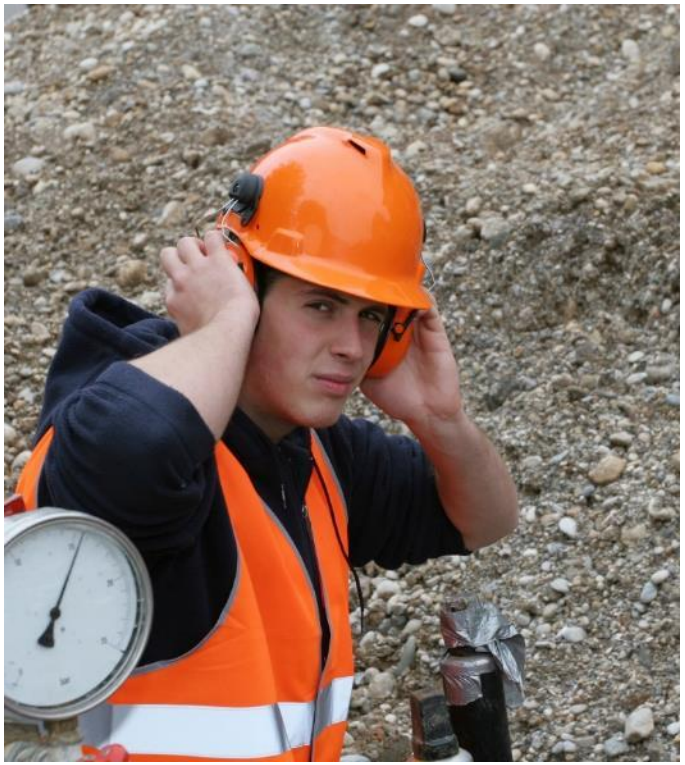
A) selected frequency band (250 Hz ini example),
(B) selected frequency in curve, (C) amplitude (dB) in band.



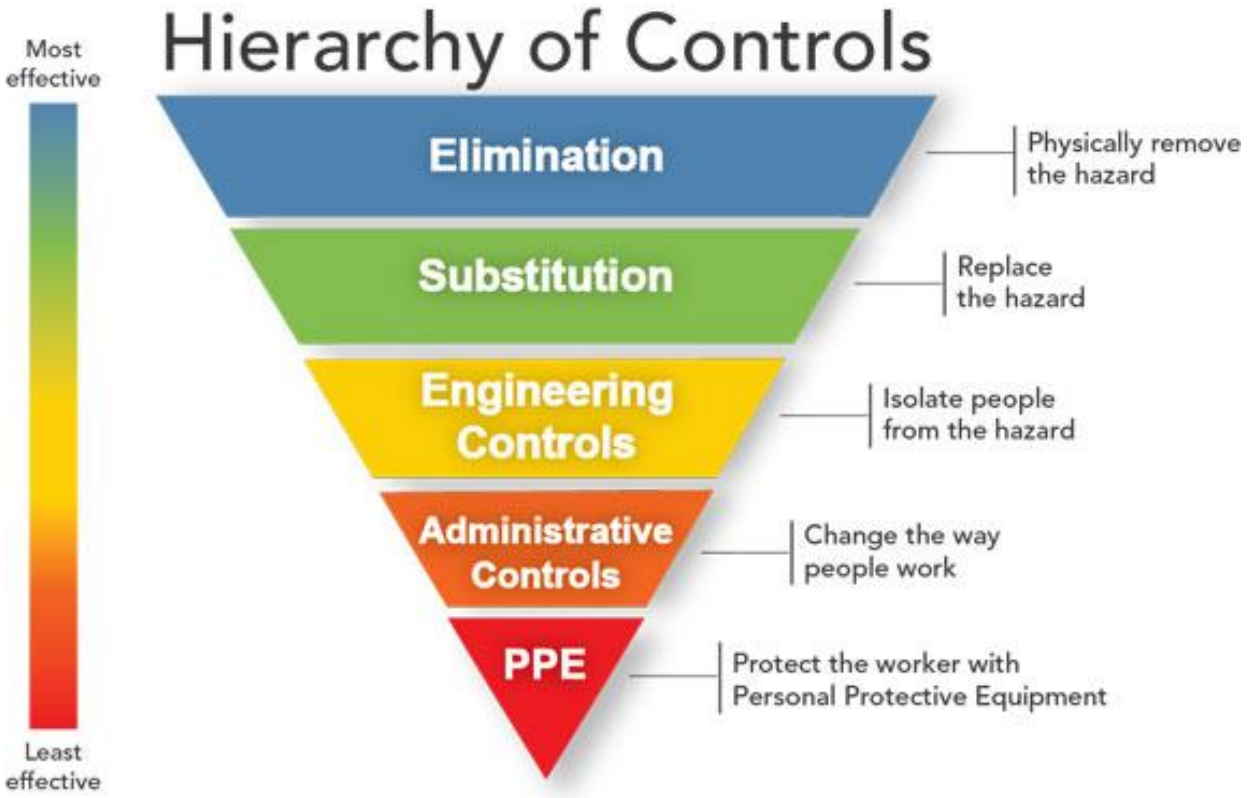
https://www.osha.gov/dts/osta/otm/new_noise/

Workers' Concerns

- Am I being recorded?
- Placement of the dosimeter
- Dosimeter underneath PPE
- Curious about the instrument
- Unusual situations



What to Do with the Data



https://www.cdc.gov/niosh/topics/hierarchy/default.html

Personal Protective Equipment

NRR

- 7

2

It's nothing to dread…

Noise measurement is easier than you think!

THANK YOU FOR YOUR ATTENTION!

Questions?
skctech@skcinc.com

Visit our resources:

- skcinc.com
- skcinc.com/knowledgecenter
- youtube.com/SKCInc1