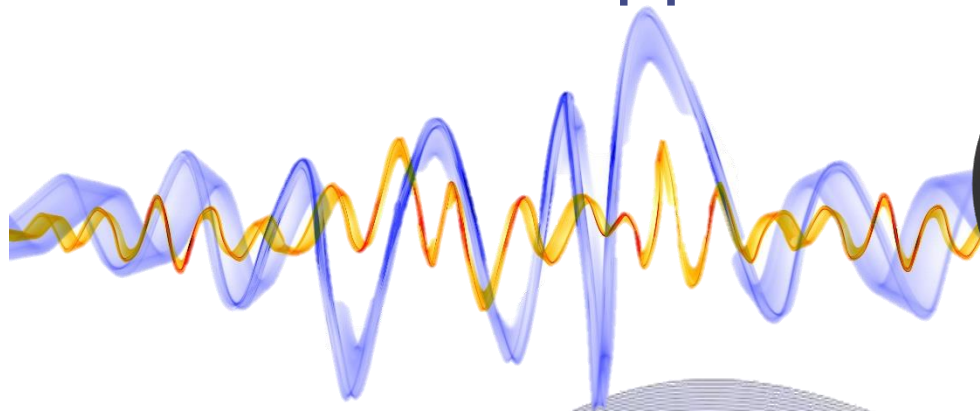
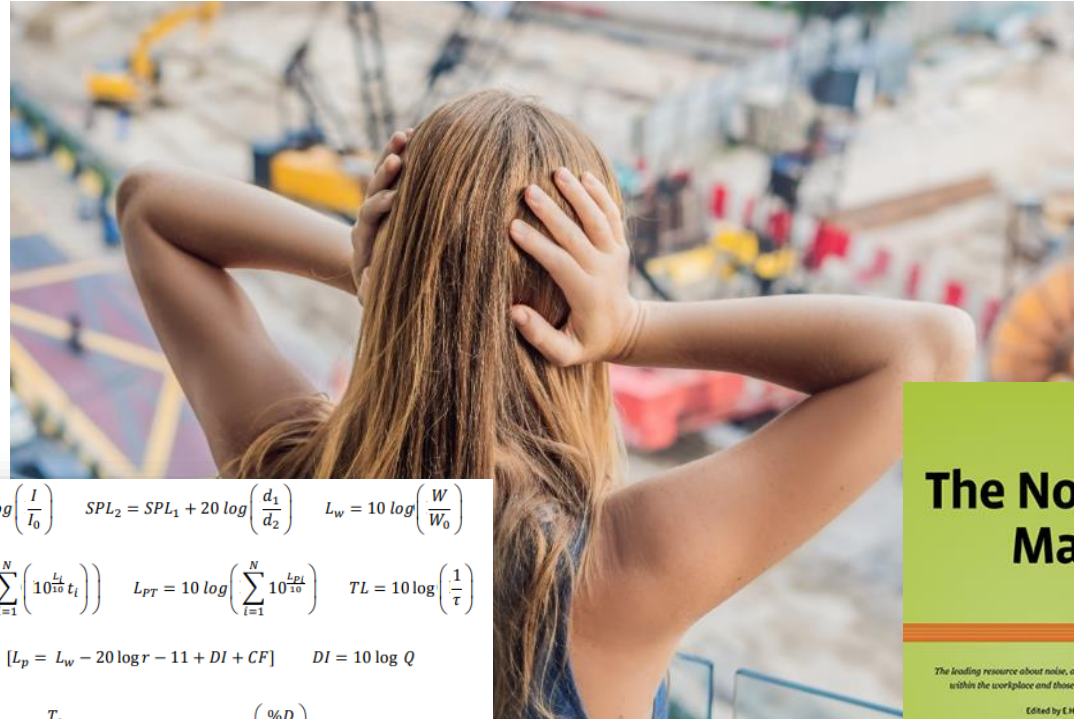


# Measuring Occupational Noise

An easier approach...



# Considering the Challenges



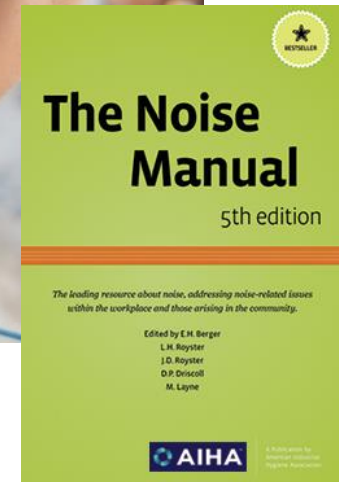
$$SPL \text{ or } L_p = 20 \log \left( \frac{P}{P_0} \right) \quad L_i = 10 \log \left( \frac{I}{I_0} \right) \quad SPL_2 = SPL_1 + 20 \log \left( \frac{d_1}{d_2} \right) \quad L_w = 10 \log \left( \frac{W}{W_0} \right)$$

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

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

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

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



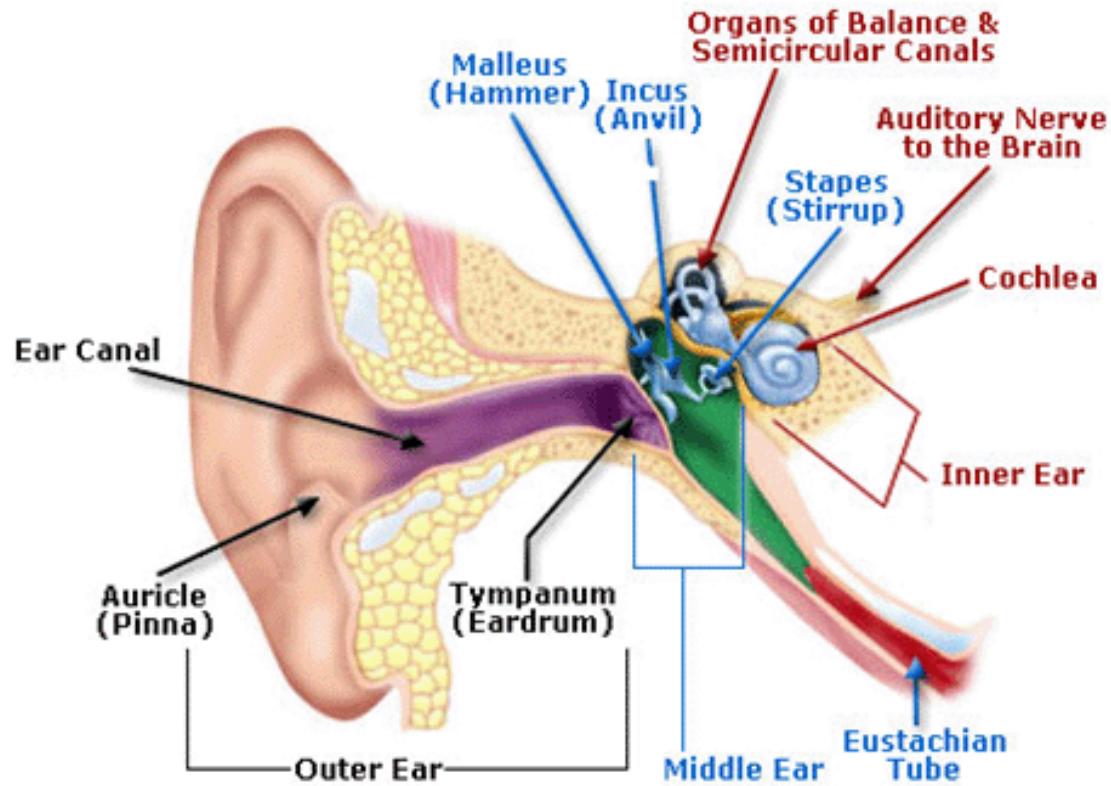
[www.abih.org](http://www.abih.org)



# What is Noise?



# The Human Ear



[https://www.osha.gov/dts/osta/otm/new\\_noise/](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.

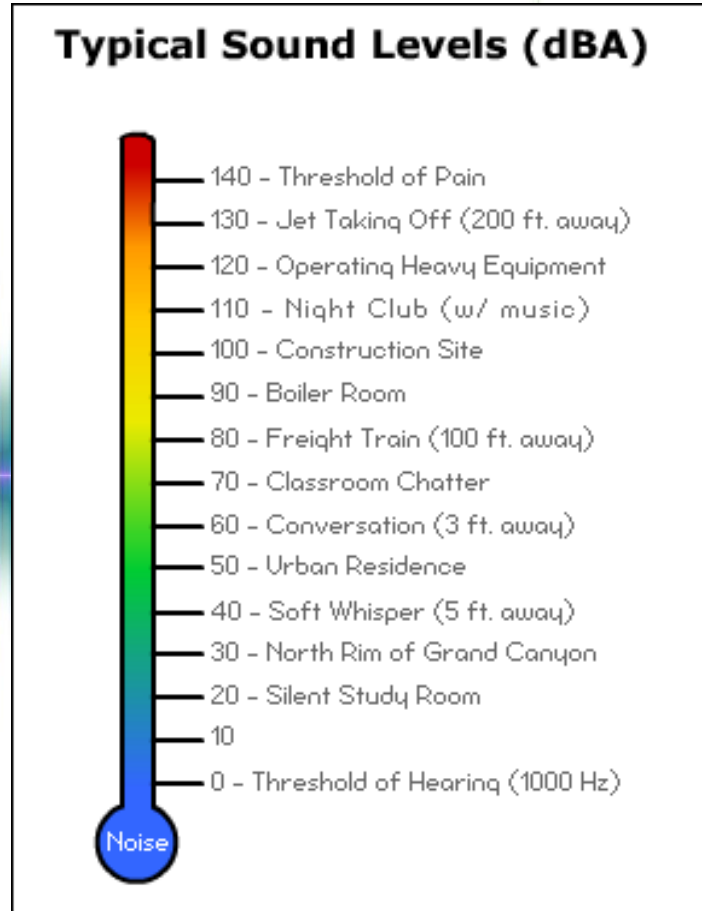


# Measuring Noise—The Steps

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



# Noise Exposure Present?



[www.osha.gov/noise](http://www.osha.gov/noise)



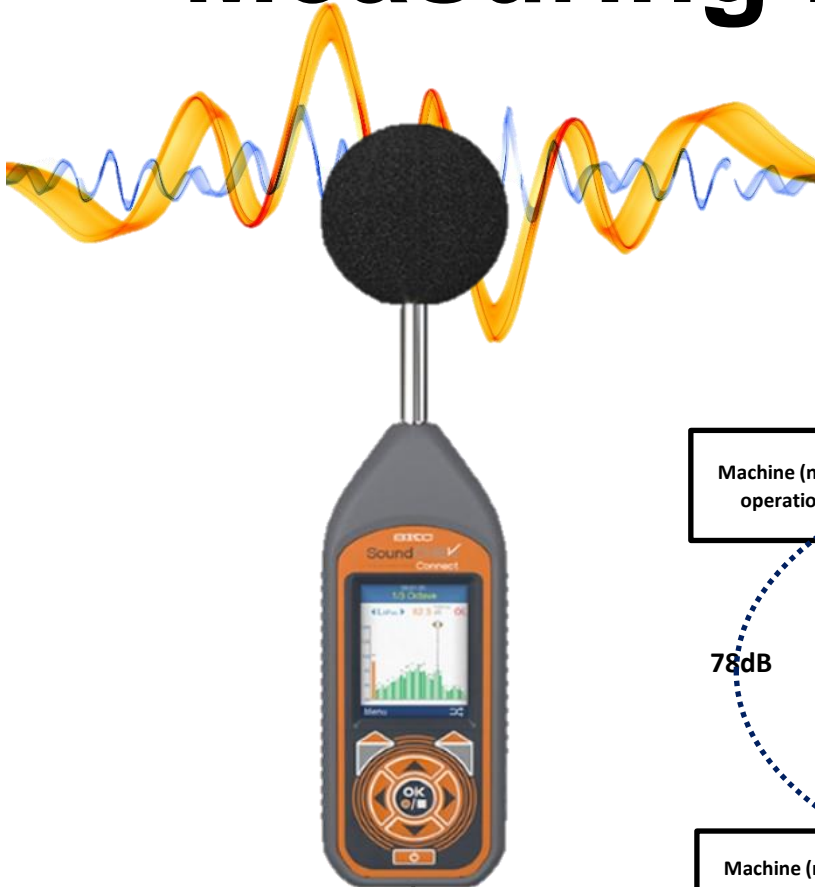
# Collect Critical Information

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

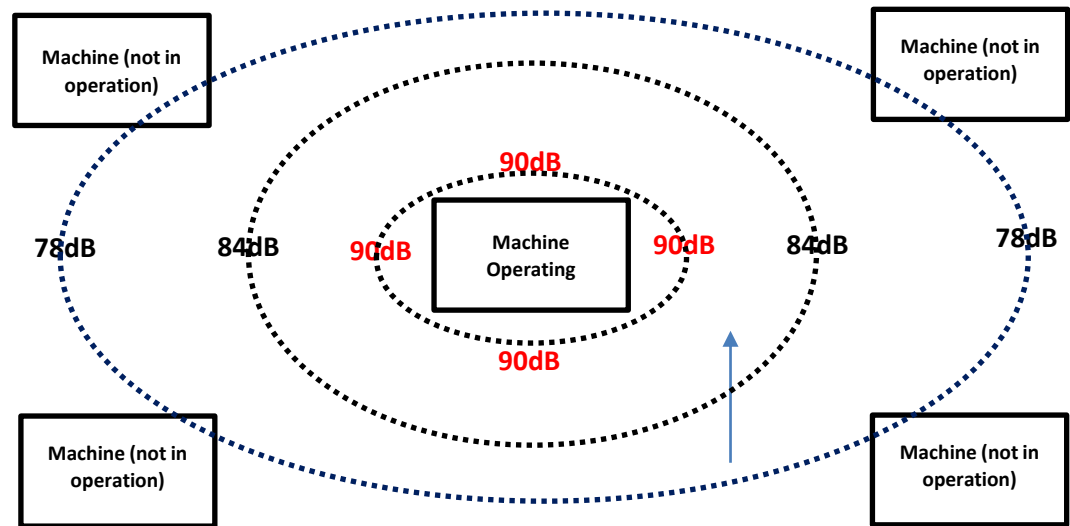




# Measuring Noise with a SLM



- 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

Setup
Schedule
History

Select up to nine readings to show on the device during a run

SPL    Lmin    C-A

TWA    Exposure    LEP,d

Dose    pTWA    LEX,8h

Lavg    pDose    Exposure Pts

Peak    SEL    Exposure Pts/Hr

Lmax    Upper Limit

Select up to seven readings to show on the device in History

SPL    Lmin    C-A

TWA    Exposure    LEP,d

Dose    pTWA    LEX,8h

Lavg    pDose    Exposure Pts

Peak    SEL    Exposure Pts/Hr

Lmax    Upper Limit

Set other options on the device

Display octave bands    Log data    Secure Lock  
Require PIN to connect to mobile app

Log octave band data  

Disable Voice Notes   **Peak Weighting**  

   Auto Lock  
Require PIN to stop or pause

Enable and define up to four separate virtual dosimeters for each run

OSHA - HC	OSHA - PEL	MSHA - HC	ACGIH
Response: Slow	Response: Slow	Response: Slow	Response: Slow
Exchange Rate: 5 dB	Exchange Rate: 5 dB	Exchange Rate: 5 dB	Exchange Rate: 3 dB
Threshold: 80 dB	Threshold: 90 dB	Threshold: 80 dB	Threshold: 80 dB
Criterion Level: 90 dB	Criterion Level: 90 dB	Criterion Level: 90 dB	Criterion Level: 85 dB
Weighting: A	Weighting: A	Weighting: A	Weighting: A
Upper Limit: 115 dB	Upper Limit: 115 dB	Upper Limit: 115 dB	Upper Limit: 115 dB

Auto-record at  dB

Alert at  % Dose

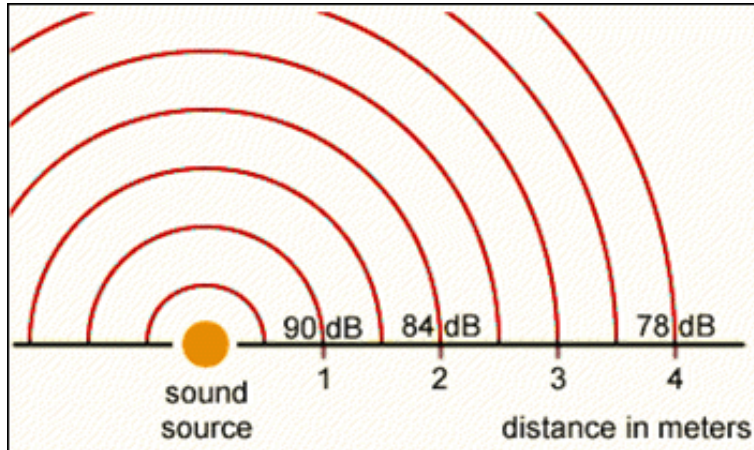


# Noise Equipment Calibration



[https://www.osha.gov/dts/osta/otm/new\\_noise/](https://www.osha.gov/dts/osta/otm/new_noise/)

# Does my data make sense?



[https://www.osha.gov/dts/osta/otm/new\\_noise/](https://www.osha.gov/dts/osta/otm/new_noise/)



# Calculating Noise TWAs

- Calculating Dose and TWA

## 1910.95 App A

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

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)

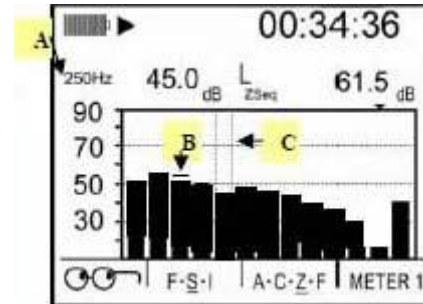
Dose or percent noise exposure	TWA
10 .....	73.4
15 .....	76.3

[https://www.osha.gov/dts/osta/otm/new\\_noise/](https://www.osha.gov/dts/osta/otm/new_noise/)





# Octave Band Analyzer?



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

The table shows the following data:

Frequency (Hz)	Amplitude (dB)
16 Hz	55.1
31.5 Hz	57.9
63 Hz	53.5
125 Hz	42.6
250 Hz	43.0
500 Hz	45.1
1 kHz	41.7
2 kHz	38.9
4 kHz	34.2
8 kHz	29.9
16 kHz	22.4

The table also shows a time display of 03:30:30 and a meter reading of 1.

[https://www.osha.gov/dts/osta/otm/new\\_noise/](https://www.osha.gov/dts/osta/otm/new_noise/)

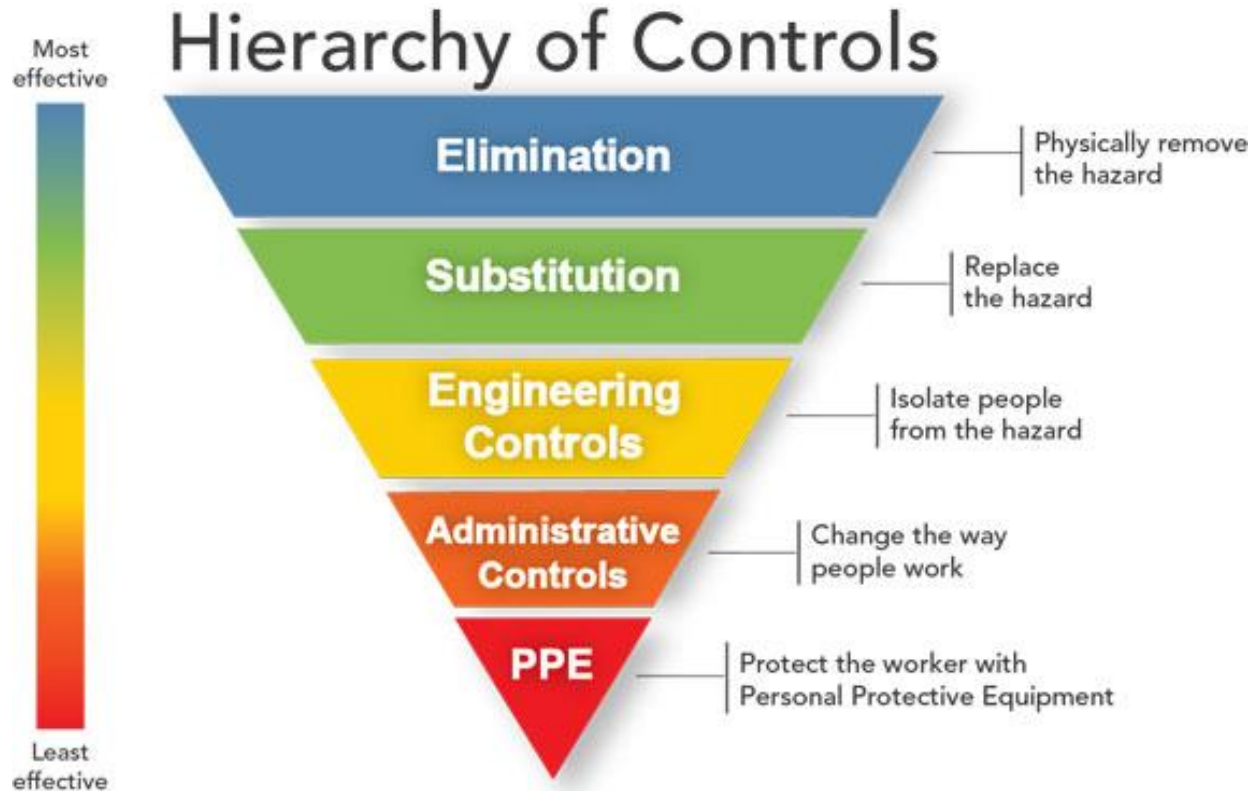


# Workers' Concerns

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



# What to Do with the Data

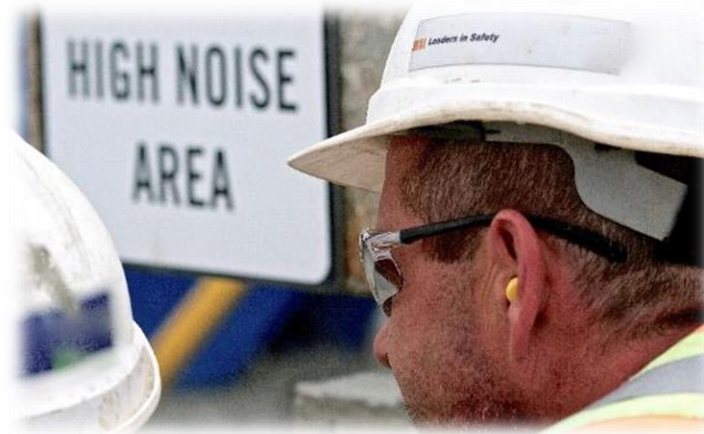


<https://www.cdc.gov/niosh/topics/hierarchy/default.html>



# 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](mailto:skctech@skcinc.com)

Visit our resources:

- [skcinc.com](http://skcinc.com)
- [skcinc.com/knowledgecenter](http://skcinc.com/knowledgecenter)
- [youtube.com/SKCInc1](http://youtube.com/SKCInc1)

