

Industrial Hygiene

Setting Up an IH Sampling Plan

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ENSAFE

Goal of Industrial Hygiene Program

Ensure chemical and physical stressors are assessed and maintained at an acceptable level

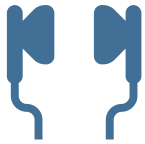


Occupational Health Hazards



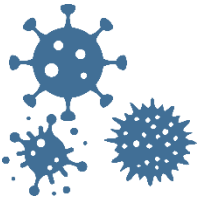
Chemical Hazards

- Consist of gases/vapors and particulates



Physical Hazards

- Consist of types of physical energy created by a work process or environment (noise, heat, UV/IR, magnetic fields, etc.)



Biological Hazards

- Consists of mold and bloodborne pathogens



Basic Principle of Toxicology

No Chemical Agent
is Entirely Safe

No Chemical Agent
is Entirely Harmful

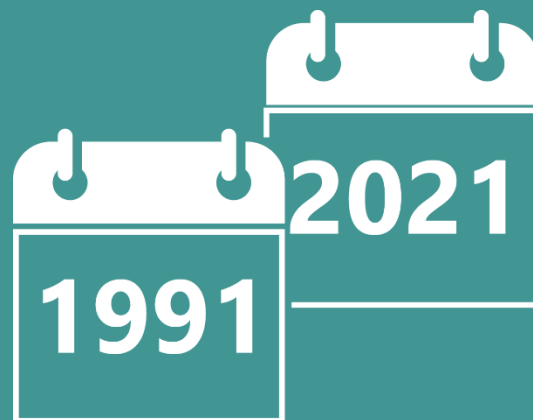


Dose-Response Relationship



Acute Exposure

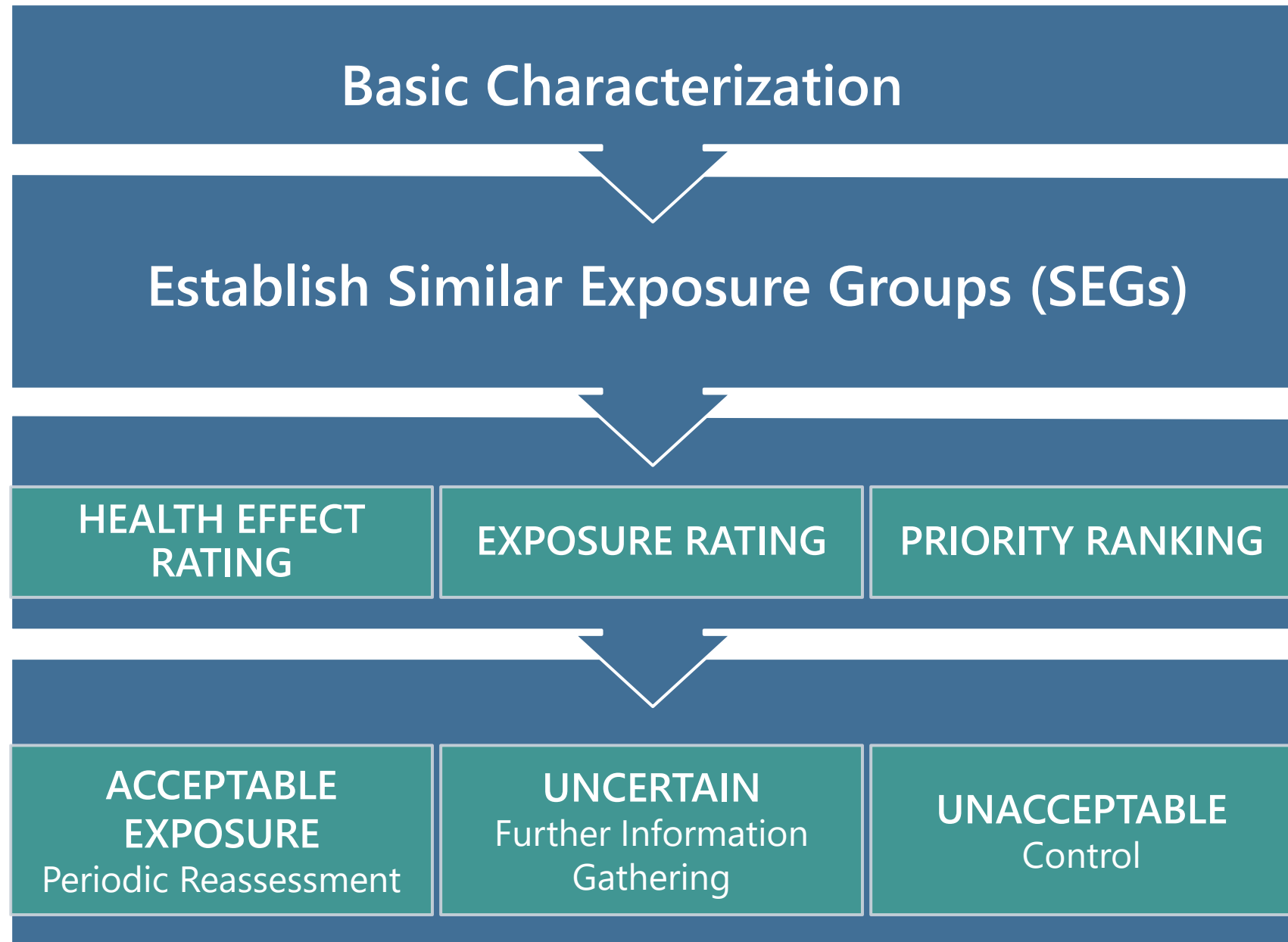
Single or multiple exposure occurring within a short period of time (usually 24 hours or less)



Chronic Exposure

Long-duration, low-level exposure in which the amount of exposure exceeds the body's capacity for detoxification.

Qualitative Assessment

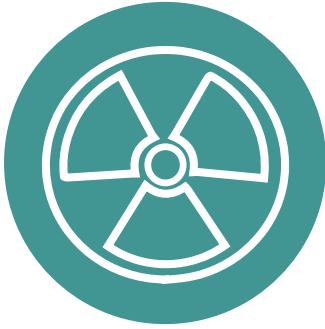






1

Raw materials
(review Safety
Data Sheets)



2

Contaminants
generated by
process



3

Incomplete
combustion of
fuel



4

Thermal
decomposition
by-products



5

Cleanup
tasks



6

Welding/
hot work

Evaluating Potential Exposures

Determine Sampling Frequency

1. Perform "Baseline" sampling
2. Frequency "Rules of Thumb"
 - If "non-detect" place on periodic sampling plan (suggest 3 years)*
 - *Must be confident that the "day of sampling" was representative
 - If > than 50% of exposure limit, sample annually**
 - If > than exposure limit, resample w/in 6 months**


**If a regulated compound, follow OSHA sampling requirements.

***For "highly toxic" compounds (carcinogens, etc.) consider sampling at higher frequency.

For large facilities w/ many SEGs, important to prioritize by Health Effect and Exposure Rating

Perform Sampling

1. Reference OSHA or NIOSH sampling methods
2. Select sampling media & equipment
3. Calibrate sampling equipment
4. Select sampling participants and place pumps
5. Monitor and document activities and conditions
6. End sampling and post calibrate
7. Prepare COC & submit to lab
8. Evaluate lab results
9. Prepare sampling report and notify employees

Air Sampling Worksheet				U. S. Department of Labor Occupational Safety and Health Administration			
1. Reporting ID: <u>888888</u>		2. Inspection Number: <u>113445789</u>		3. Sampling Number: <u>497330105</u>		4. Shipping Date: <u>06-15-07</u>	
4. Establishment Name: <u>J & N Caring</u>		5. Sampling Date: <u>06-14-07</u>		6. Shipping Date: <u>06-15-07</u>		7. CSHO ID: <u>Z1234</u>	
7. Person Performing Sampling (Signature): <u>[Signature]</u>		8. Print Last Name: <u>RIMA</u>		9. CSHO ID: <u>Z1234</u>		10. Employee (Name, Address, Telephone Number): <u>(123) 456-7899</u>	
11. Job Title: <u>Brain Squeeze Molder Machine Operator - 12 years</u>		12. Occupation Code: <u></u>		13. Exposure Information: <u>6 hr/day</u>		14. Duration: <u>3.5 Yrs/ea person</u>	
15. Weather Conditions: <u>Indoor</u>		16. Photo(s): <u>Y</u>		17. Pump Checks and Adjustments: <u>7:30 - ok, 8:30 - ok, 9:30 - ok, 10:30 - ok, 11:30 - ok, 12:30 - ok, 1:30 - ok, 2:30 - ok</u>		18. Job Description, Operation, Work Location(s), Ventilation, and Controls: <u>Operates brain squeeze molding machine. Fills and compacts sand into mold. Finished mold: placed on pouring line. There are fans but no exhaust ventilation.</u>	
19. Pump Number: <u>10337</u>		20. Lab Sample Number: <u>ER300</u>		21. Sample Substitution Number: <u>P</u>		22. Sample Type: <u>MCEF</u>	
23. Filter/Tube Number: <u>ER300</u>		24. Time On/Off: <u>6:30am</u>		25. Time On/Off: <u>12:30pm</u>		26. Total Time (in minutes): <u>360</u>	
27. Flow Rate: <u>2.13</u>		28. Volume (in liters): <u>766.8</u>		29. Net Sample Weight (in mg): <u>230</u>		30. Analyze Samples for: <u>Welding Fume (Lead & Cadmium)</u>	
31. Indicate Which Samples to Induce In TWA, Ceiling, etc. Calculations: <u>I</u>		32. Interferences and IH Comments to Lab: <u></u>		33. Supporting Samples: a. Blank: <u>ER302</u> b. Bulk: <u></u> c. Rec'd by Anal: <u></u> d. Anal. Completed: <u></u> e. Calc. Checked: <u></u> f. Sign: OK'd <u></u>		34. Chain of Custody: a. Seal Intact? <u>Y</u> b. Rec'd in Lab: <u>N</u> c. Rec'd by Anal: <u></u> d. Anal. Completed: <u></u> e. Calc. Checked: <u></u> f. Sign: OK'd <u></u>	
35. Case File Page: <u></u>		36. of: <u></u>		37. OSHA-91A (Rev. 1/84)			

Agencies Responsible for Exposure Limits

1



PELs

- Permissible Exposure Limits
- Legally Enforceable
- Many Outdated
- Federal

2



RELs

- Recommended Exposure Limits
- Recommendation Only (Except for IDLH)
- Not Comprehensive
- Federal

3

Organizational Supporter of



TLVs

- Threshold Limit Values
- Recommendation Only
- Most Up to Date
- Private Non-Profit
- Industry Standard

Type of Exposure Limits

TWA

Time Weighted
Average
Full-Shift (8-hour)
Exposure

STEL

Short Term
Exposure Limit
Task-Based
(15-minute)
Exposure

C
CEILING

Ceiling Limit
Never to Exceed
Instantaneous
(Not Averaged)

IDLH

Immediately
Dangerous to Life
and Health
Escape Impairing
Exposure (Only
NIOSH)

2021

TLVs® and BEIs®

Based on the Documentation of the

**Threshold Limit
Values**
for Chemical Substances
and Physical Agents

&

**Biological Exposure
Indices**



Signature Publications

ACGIH TLV

- Represents a TWA concentration that nearly all workers can be exposed to 8 hour/day, 5 days/week for their working career without suffering adverse health effects
- Not fine lines between safe and unsafe

Chemical Specific Standards

1910.1001 – 1910.1096



Benzene
Asbestos
Coal Tar Pitch
Volatiles
Cotton Dust



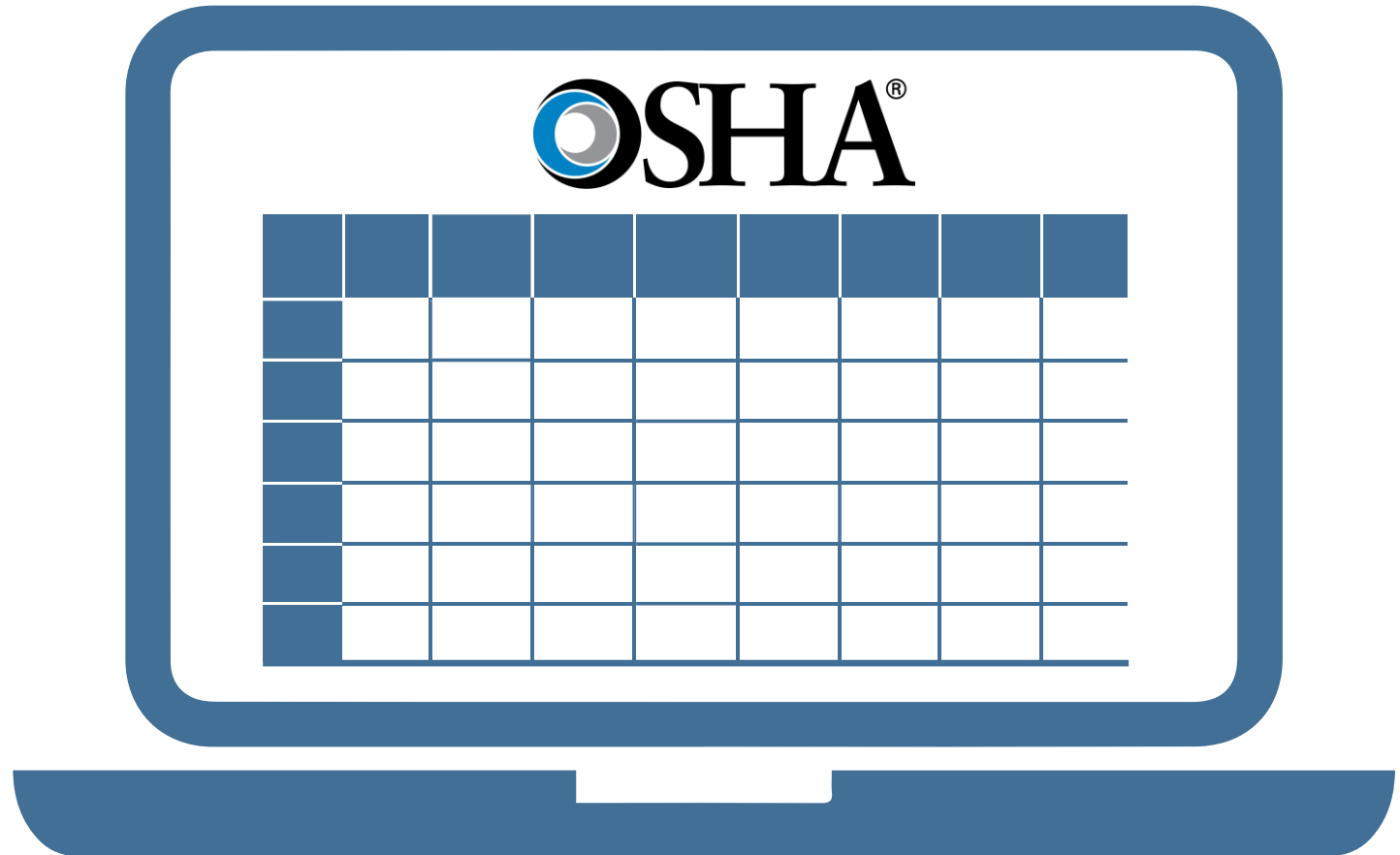
Arsenic
Lead
Chromium VI
Cadmium



Vinyl Chloride
Methylene
Chloride
Formaldehyde
Ethylene Oxide
1,3-Butadiene

IH Data

1. Keep reports as required by OSHA (1910.1020)
2. Maintain data in some form of database (e.g. Excel)
 - Allows sorting and filtering by SEG
 - Can perform statistical analysis and observe trends
 - Can easily find data if needed for OSHA or other requests



Ventilation 1910.94



creative thinking. custom solutions

Local exhaust ventilation



Occupational Noise – 1910.95

noise monitoring

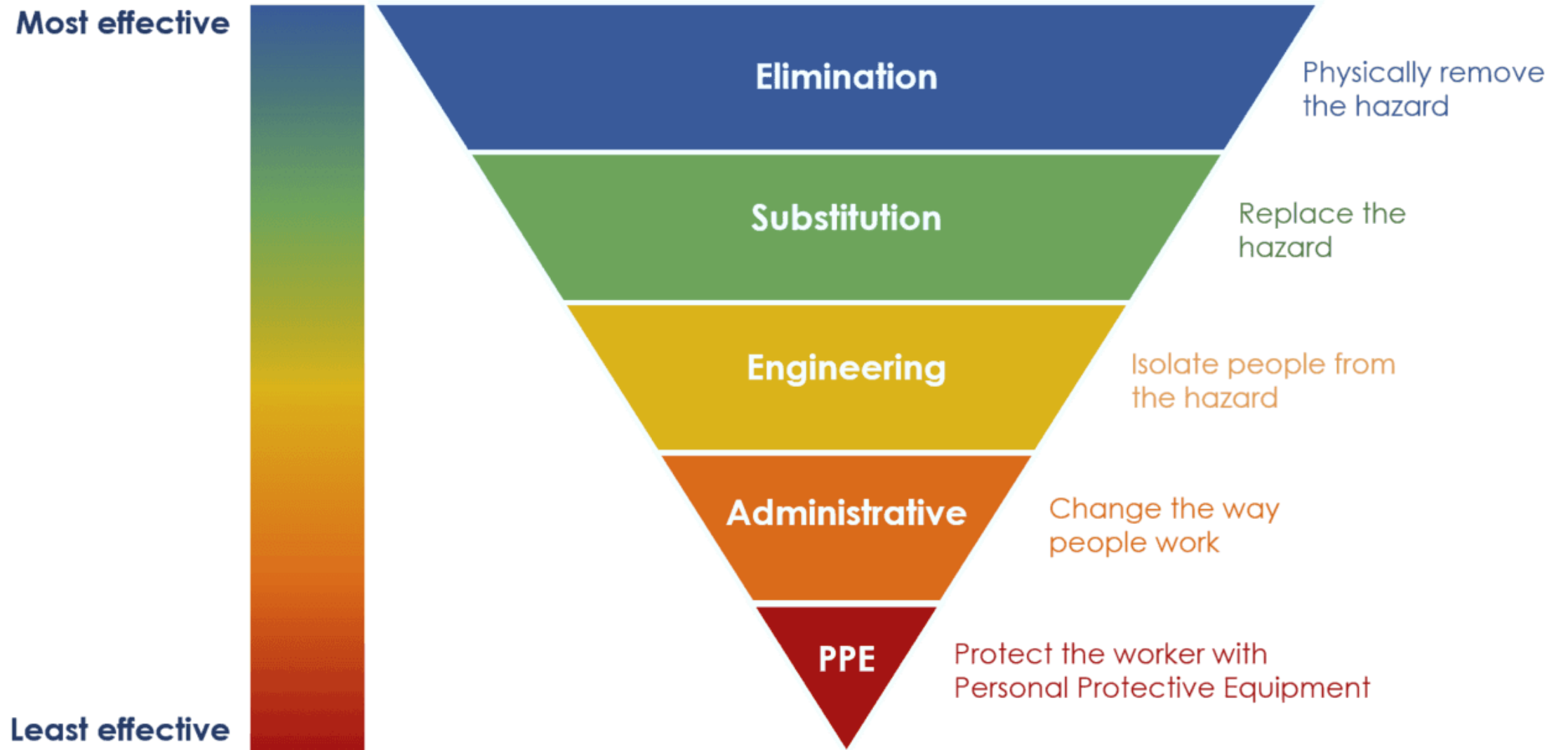
Sound
Level
Survey

Noise
Dosimetry

Octave
Band
Analysis



Hierarchy of Controls



Respiratory Protection 1910.134

Selection of respirators



Key Steps to an Effective IH Process



1

Recognition & Anticipation

- Identify potential chemical and physical stressors

2

Evaluate Potential for Employee Exposure

- Qualitative exposure assessment
- Quantitative exposure assessment

3

Conduct Sampling

- Document Results
- Notify Workers

4

Select and Evaluate Exposure Control Methods

- Use "Hierarchy of Controls" methodology

5

Conduct on-going monitoring based on sampling plan



Questions?

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