



ENSAFE

Industrial Hygiene

*Setting Up an IH
Sampling Plan*

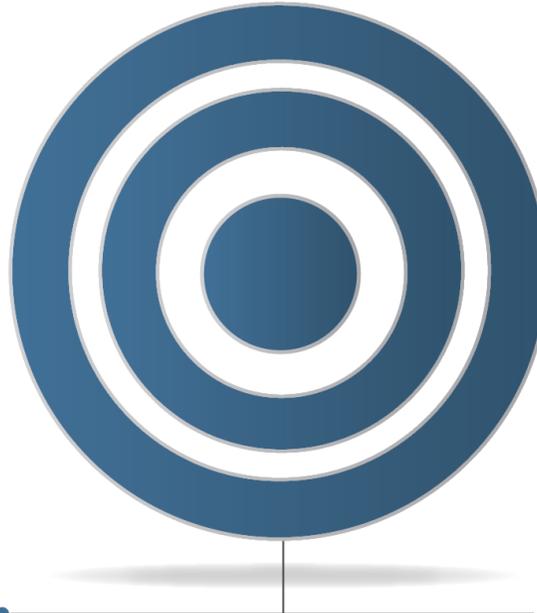
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Sr. Industrial Hygienist*

ENSAFE

Engineering | environmental | health & safety | technology

Goal of Industrial Hygiene Program

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

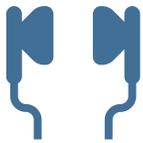


Occupational Health Hazards



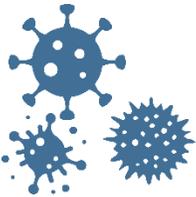
Chemical Hazards

- 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.)

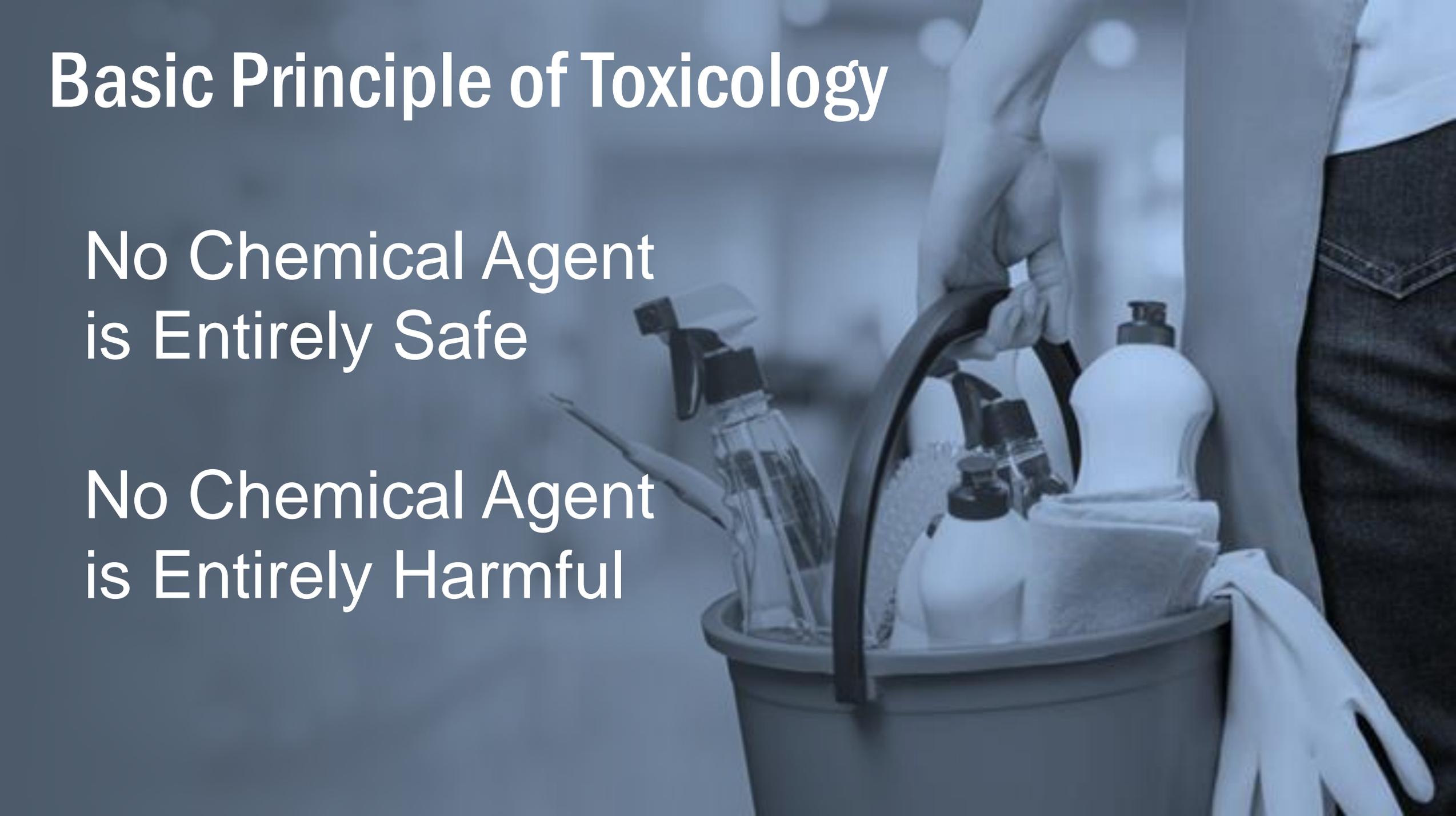


Biological Hazards

- Consists of mold and bloodborne pathogens



Basic Principle of Toxicology

A person wearing a dark apron is holding a bucket filled with various cleaning supplies. The bucket contains a spray bottle, a brush, and a pair of white gloves. The background is blurred, suggesting an indoor setting.

No Chemical Agent
is Entirely Safe

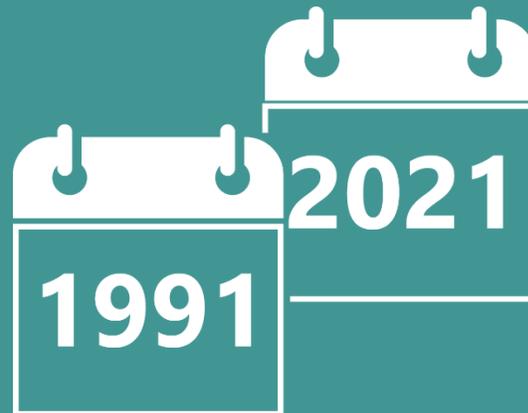
No Chemical Agent
is Entirely Harmful

Dose-Response Relationship



Acute Exposure

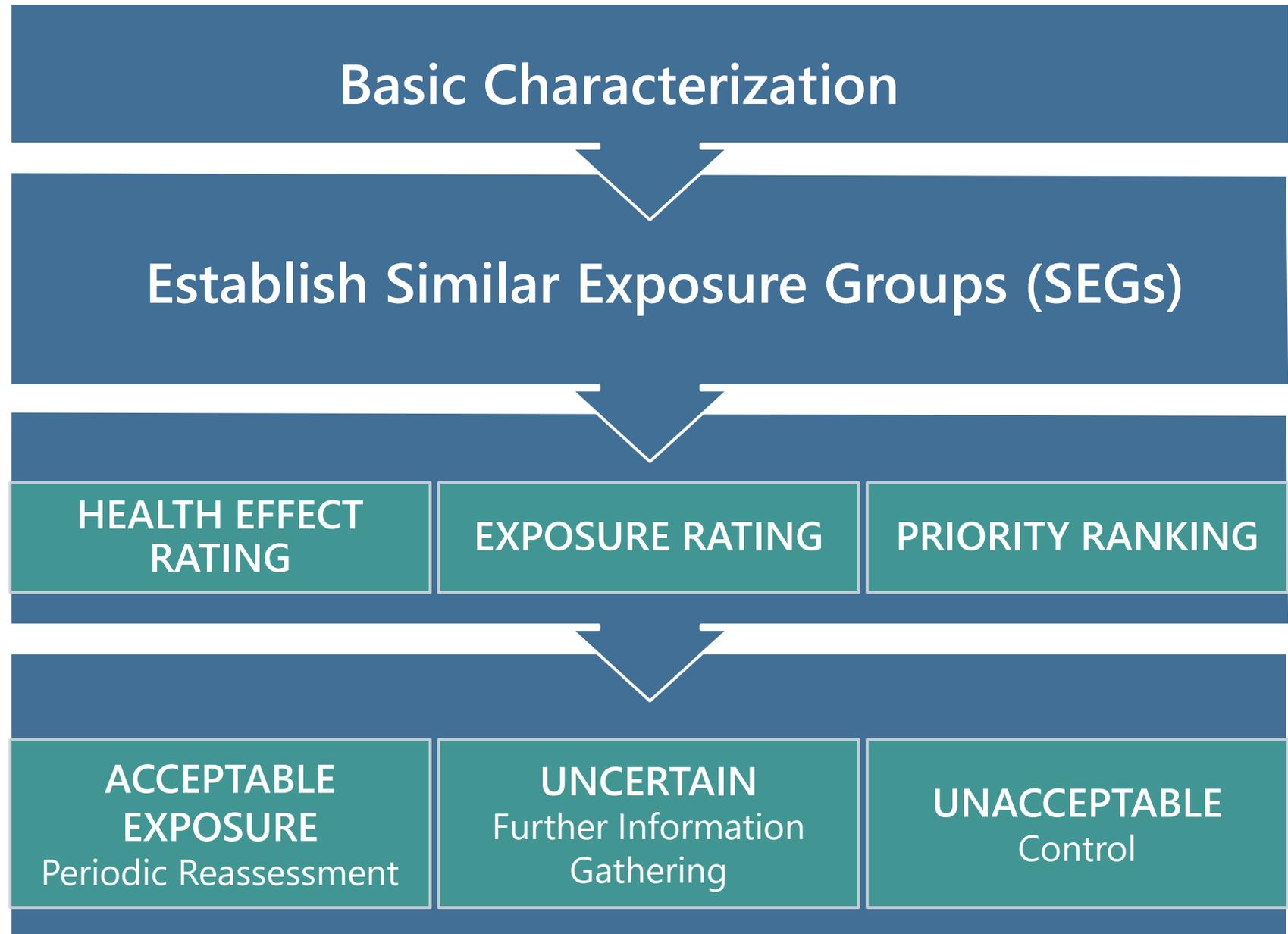
Single or multiple exposure occurring within a short period of time (usually 24 hours or less)



Chronic Exposure

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

Qualitative Assessment

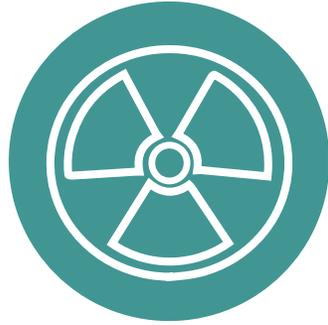






1

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

U. S. Department of Labor
Occupational Safety and Health Administration



Air Sampling Worksheet

1. Reporting ID: 888888		2. Inspection Number: 112456789		3. Sampling Number: 497339105	
4. Establishment Name: J & N Caring		7. Person Performing Sampling (Signature): RIMA		8. Print Last Name: RIMA	
5. Employee (Name, Address, Telephone Number): (123) 456-7899		10. Job Title: Brass Squeeze Molder Machine Operator - 12 years		11. Occupation Code:	
6. Sampling Date: 06-14-07		9. CSHO ID: Z1234		14. Exposure Information: a. Number: 2 b. Duration: 3.5 Yrs/ea person	
11. Job Title: Brass Squeeze Molder Machine Operator - 12 years		12. Occupation Code:		15. Weather Conditions: Indoors 16. Photo(s): Y	
13. PPE (Type and effectiveness): Safety glasses and ear plugs, no respirator worn		17. Pump Checks and Adjustments: 7:30 - ok, 8:30 - ok, 9:30 - ok, 10:30 - ok, 11:30 - ok, 12:30 - ok, 1:30 - ok, 2:30 - ok		18. Job Description, Operation, Work Location(s), Ventilation, and Controls: Operates brass squeeze molding machine. Fills and compacts sand into mold. Finished mold placed on pouring line. There are fans but no exhaust ventilation.	

19. Pump Number: **10337** Cont'd

		Sampling Data	
20. Lab Sample Number			
21. Sample Substitution Number	ER300		
22. Sample Type	P		
23. Sample Media	MCEF		
24. Filter/Tube Number	ER300		
25. Time On/Off	6:30am	1:00pm	
	12:30pm	2:48pm	
26. Total Time (in minutes)	360	108	
27. Flow Rate (l/min) <input checked="" type="checkbox"/> l/min <input type="checkbox"/> cc/min	2.13	2.13	
28. Volume (in liters)	766.8	230	= 996.8 Total volume
29. Net Sample Weight (in mg)			
30. Analyze Samples for:	31. Indicate Which Samples to Analyze in TWA, Ceiling, etc. Calculations:		
Welding Fume (Lead & Cadmium)	T		
32. Interferences and IH Comments to Lab	33. Supporting Samples: a. Blank: ER302	34. Chain of Custody: a. Seals Intact? Y N b. Rec'd in Lab c. Rec'd by Anal d. Anal. Completed e. Calc. Checked f. Sign: OK'd	Initials: _____ Date: _____

Case File Page _____ of _____
OSHA-91A (Rev. 1/64)

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

Local exhaust ventilation



Occupational Noise - 1910.95

noise monitoring

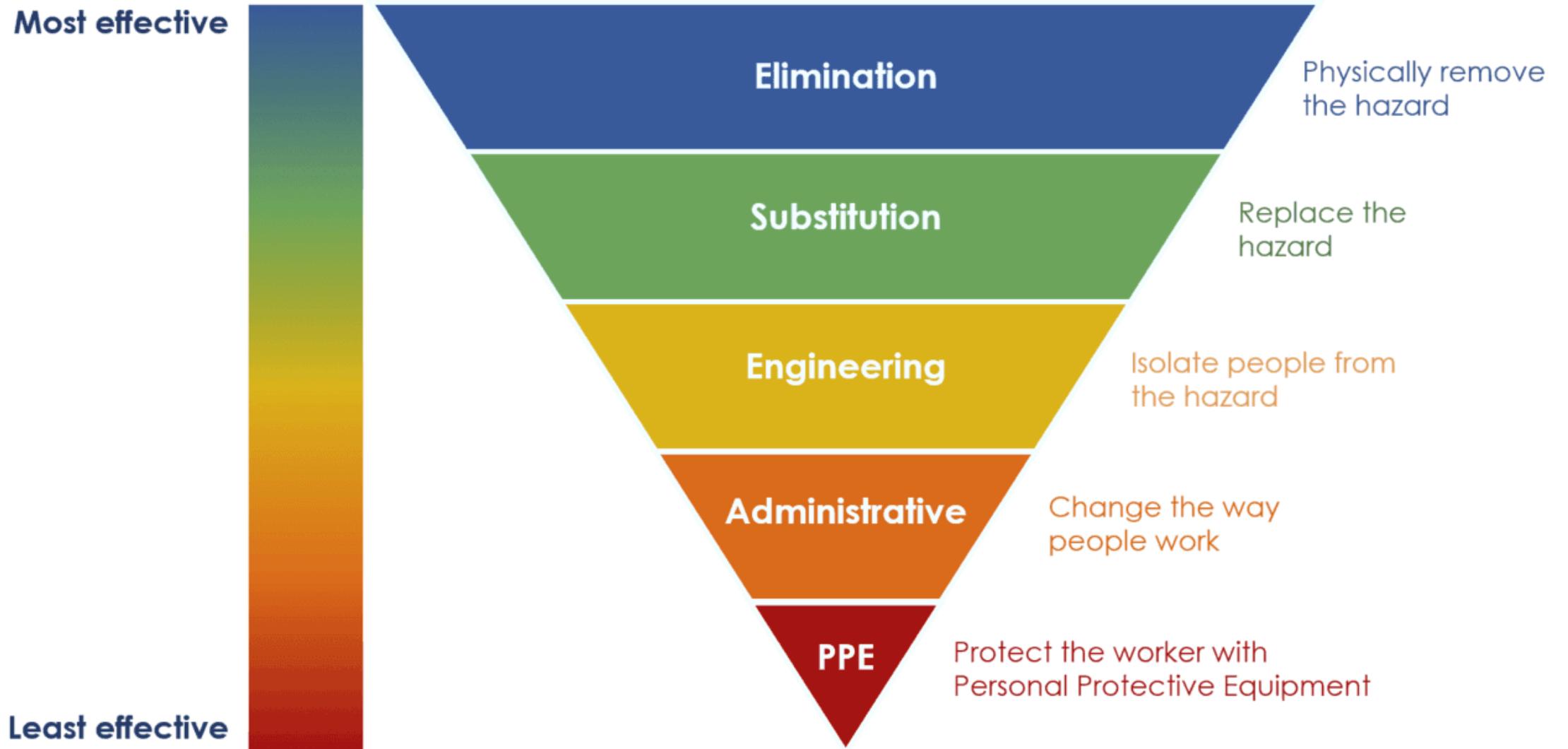
Sound
Level
Survey

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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