

Industrial Hygiene Regulatory Limits and Best Practice Guidelines

**Carolinas Air Pollution
Control Association**

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Presentation Outline

- Industrial Hygiene Fundamentals
- Control Hierarchy
- Regulatory Limits
- Alternative Guidelines
- Terminology
- Examples
- Conclusions



Definition

- **Industrial Hygiene is a science and art devoted to the anticipation, recognition, evaluation, and control of those environmental factors or stresses arising in or from the workplace which may cause sickness, impaired health and well being, or significant discomfort among workers or among citizens of the community.**



Fundamental IH Approach

- **Anticipation/Recognition**
 - Expect there could be risks and potential health hazards associated with a process, task, chemical, etc.
- **Evaluation/Measurement**
 - Understand the general likelihood and severity of an exposure occurring
 - Use qualitative or quantitative measures to compare the exposure to a standard or some acceptable level
- **Control**
 - Reduce, limit, or manage the exposure to an acceptable level (e.g. TLV, PEL, REL, etc.)



Hierarchy of Controls

- **Elimination/Substitution** - Remove hazard from process, source modification, use less hazardous material
- **Engineering/Process change** - Ventilation, enclosure, isolation, etc.
- **Administrative** - Job rotation, training, etc.
- **PPE** - Respirators, gloves, aprons, etc.



Why PPE is not a solution



What is an “acceptable “ level

- OSHA Permissible Exposure Limits (PELs)
- ACGIH[®] Threshold Limit Values (TLVs[®])
- NIOSH Recommended Exposure Limits (RELs)
- AIHA Workplace Environmental Exposure Limits (WEELs)
- Manufacturer’s suggested guidelines



OSHA PELs

- Adopted from the ACGIH 1969 TLVs
- 1980s Recognized that many had become outdated
- 1988 OSHA proposed updating 420 PELs
- 1989 Final Rule reduced 212 PELs and set PELs for 164 previously unregulated substances
- 1992 Legal challenge reverted PELs back to original limits



Updated or new PELs since 1992

- 1994 Asbestos (revised)
- 1997 Methylene Chloride
- 2006 Hexavalent Chromium
- 2016 Respirable Crystalline Silica
- 2018 Beryllium



ACGIH

- Charitable scientific organization that has advanced occupational and environmental health for over 80 years
- Publish the TLVs which are based upon the Documentation



TLV

- Concentration for a conventional 8-hour workday and 40-hour workweek, to which it is believed that **nearly all** workers may be repeatedly exposed, day after day, over the course of a working lifetime without adverse effect.



ACGIH TLVs

- Reviewed regularly and updated
- Based upon current scientific data following a two year “Notice of Intended Change” requesting comments from the scientific community



Standard/Guideline units

- PPM – Parts per million
- Mg/m³ – Milligrams per cubic meter
- F/cc – Fibers per cubic centimeter
- I – Inhalable fraction
- R – Respirable fraction
- S – Skin absorption potential
- C – Ceiling concentration
- Sen – Sensitizer
- STEL – Short term exposure limit



OSHA Annotated Tables

- "OSHA recommends that employers consider using the alternative occupational exposure limits because the Agency believes that exposures above some of these alternative occupational exposure limits may be hazardous to workers, even when the exposure levels are in compliance with the relevant PELs"



Example 1 - Manganese

- OSHA PEL - 5 mg/m³ C
- ACGIH TLV - 0.1 mg/m³ TWA (I)
- NIOSH REL - 1 mg/m³ TWA



Manganese



Example 2 – Refractory Ceramic Fibers (RCF)

- PEL - None
- TLV - 0.2 f/cc TWA
- REL – None
- Manufacturer – 0.5 f/cc TWA



Example 3 – Carbon Monoxide

- PEL – 50 ppm TWA
- TLV – 25 ppm TWA
- REL – 35 ppm TWA



Example 4 – Respirable Crystalline Silica

- PEL – $50 \mu\text{g}/\text{m}^3$ TWA
- TLV – $25 \mu\text{g}/\text{m}^3$ TWA
- REL – $50 \mu\text{g}/\text{m}^3$ TWA



Conclusion and Summary

- OSHA PELs – Required compliance; however many are outdated
- Suggested guidelines (TLV, REL, etc.) usually more current and may be more restrictive
- Use the OSHA annotated tables
- Remember - someone's health may be dependent upon your choice for comparison



Questions?

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