HOW OEL’s ARE DEVELOPED

Presented by: Lydia Renton, CIH, ROH

OHAO Spring Symposium
March 21, 2013
Topics

• What are OEL’s?
• How are they developed?
• How should you use them?
• Global interpretation
• Alberta’s OEL Update Process

Next Speaker:
Ontario’s OEL Update Process – Marc Cousineau
(MOL Provincial Hygienist)
What are OELs?

An **occupational exposure limit** is an upper limit on the acceptable concentration of a hazardous substance in workplace air for a particular material or class of materials. It is typically set by competent national authorities and enforced by legislation to protect occupational safety and health. It can be a tool in risk assessment and in the management of activities involving handling of dangerous substances.

There are many dangerous substances for which there are no formal occupational exposure limits. In these cases, control banding strategies can be used to ensure safe handling.
OELs: How are they developed?

- Historical perspective of North American OELs
- Called various:
  - OEL = occupational exposure limit
  - PEL = permissible exposure level
  - REL = regulated exposure level
  - TWAE = time-weighted allowable exposure
  - TLV = threshold limit value
ACGIH TLVs

• Set by volunteer body of subject matter experts (hygienists, some physicians & toxicologists)
• Recommendations based strictly on “low effect/no effect” level, plus "safety factor"
• Not specifically considered or addressed (usually):
  - Technical ability to accurately measure at concentration recommended,
  - feasibility of engineering controls, or
  - effectiveness of personal protective equipment
• Review cycle ≥ 2 years
OSHA PELs (USA)

• Set after considering technical issues:
  • accurate measurement
  • risk levels
  • feasibility of industrial groups achievement
  • economic impact on small business

• Politics: Congress can override issuing OSHA PEL

• Bureaucracy: >15-20 years new or revised PEL; grossly out-dated by comparison to ACGIH
NIOSH RELs

• less subject to non-health review requirements than OSHA
• sometimes consider measurement capabilities as well as health effects
• funding precarious for decades
• most RELs date back decades
• Very few new or revised Criteria Documents have been issued from about the mid-1980s
OELs: How should you use them?

• Depends
• But, always know the basis of development (studies, industry, target organs, etc.)
• Check the documentation
  • Online
  • ACGIH TLV Documentation
  • Gestis
Effective and Efficient Protection of Workers & Communities

Hierarchy of OELs / Hazard Banding
- Health Based OEL (traditional)
- Working Provisional OEL
- DNEL / DMEL (Prescriptive)
- Hazard Banding

Availability of Toxicological Data

Hierarchy of Exposure Assessment
- Validated Monitoring
- Monitoring
- Modeling
- Qualitative

Certainty of Exposure Judgment

Hierarchy of Exposure Controls / Management
- Elimination of Hazards
- Engineering Controls
- Administrative Controls
- PPE

Sustainability of Control

WESA
Hierarchy of OELs

As more toxicological and epidemiological data becomes available, we move up the hierarchy of OELs.

Quantitative Health Based OELs
- Regulatory, Authoritative
- Traditional
  (TLVs, MAKs, WEELs, PELs, MACs, RELs)

Health Based OELs

Working Provisional OELs
(internal company, trade association, vendor limits)

Prescriptive Process Based OELs
(REACH DNELs/DMELs)

Most Extensive Data Requirements
(human epidemiology studies)
> quality, > certainty

Moderate Data Requirements
(in vitro and animal studies and anecdotal reports of human health effects)
> quality, > certainty

Least Data Requirements
(in vitro and animal studies)

Hazard Banding Strategies
- Pharmaceutical banding
- Occupational exposure banding

Control Banding = Hazard Bands + Exposure Risk Assessment + Exposure Measurement

**Exposure Risk Assessment**

Collect all relevant exposure information and assess exposure risk against "Hazard Criteria".

**Exposure Management**

Define Controls & Programs Utilizing the Hierarchy of Controls.

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**Hazard Assessment**

Identify and Define "Hazard Criteria"
- Hazard Bands (OEBs)
- Exposure Limits (OELs)
- Skin Notations,

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**Industrial Hygiene Process**

Anticipation + Recognition → Evaluation → Control + Confirm

Re-Evaluate as Required

Courtesy of ERAM Working Group
Alberta’s OEL Update Process

• Section 16 of Alberta OHS Code: OELs in Table 2, Schedule 1
• Review & consultation ~ 3 years; 5 year cycle.
• March 2012, Alberta signed MOU with B.C, Sask & Man
• Develop lists for OELs different from ACGIH TLVs
• Mtgs with Working Group
• Presentations from Stakeholders
• Consensus based decisions
• Where no consensus – govt will decide
• Public consultation process & time period
• New OELs effective 2014
Alberta OEL Technical Working Group 2012

- WESA hired July 2012 to provide technical support to OEL Working Group
- Targeted discussions; monthly mtgs for 5 months
- Reps from govt, labour, trade associations, industry groups, AIHA Local section
- Shortlist of 60+ OELs which were different from 2012 ACGIH TLVs – numerically or size-selective
- Easiest to address the ‘total’ particulates
- Separate list for size-selective OELs – inhalable & IFV
<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS No.</th>
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**Occupational Exposure Limits (Alberta & Other Jurisdictions)**

<table>
<thead>
<tr>
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<th>8-hour</th>
<th>15-min</th>
<th>Ceiling</th>
<th>Proposed ACGIH TLV</th>
<th>British Columbia</th>
<th>Saskatchewan</th>
<th>Manitoba</th>
<th>Ontario</th>
<th>NIOSH REL</th>
<th>OSHA PEL</th>
<th>Germany MAK</th>
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<tbody>
<tr>
<td>Current Alberta OEL</td>
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Canadian jurisdictions:
- British Columbia: Same as 2012 ACGIH TLVs
- Saskatchewan: Same as 2012 ACGIH TLVs
- Manitoba: Same as 2012 ACGIH TLVs
- Ontario: Same as 2012 ACGIH TLVs

International jurisdictions:
- NIOSH REL
- OSHA PEL
- Germany MAK
- Australia
- UK
<table>
<thead>
<tr>
<th>Chemical Summary and Use:</th>
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<tbody>
<tr>
<td><strong>Summary of Basis for ACGIH TLV (xxxx):</strong></td>
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<td><strong>Summary of additional pertinent information:</strong></td>
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<td>(a) Related to health effects (priority to human data):</td>
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<td>(b) Related to workplace exposures:</td>
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<td>(c) Measurement of substance:</td>
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<td><strong>Bibliography:</strong></td>
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Searched Databases for OEL Info (post 2006)

- ACGIH Documentation of TLVs (available OHAO website)
- OSHReferences (Pub Med – Toxline, MedLine, NIOSHTIC)
- Chempendium (ChemInfo)
- RTECS
- ATSDR – Agency for Toxic Substances & Disease Registry
  http://www.atsdr.cdc.gov
- International Agency for Research on Cancer
  http://monographs.iarc.fr/
- National Toxicology Program http://ntp.niehs.nih.gov/
- CAREX Canada http://www.carexcanada.ca
GESTIS

• Info on chemicals with exposure limits/levels, by jurisdiction
• Info on analytical methods
• www.dguv.de/ifa/en/gestis/analytical_methods/index.jsp
Examples of Summary tables and reports