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Basic characterization

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The stepwise approach to establish a sampling plan in a workplace survey

manage exposure in the workplace

Workplace survey & compliance testing

This is the bit we are talking about

Workplace survey

I. Basic characterization

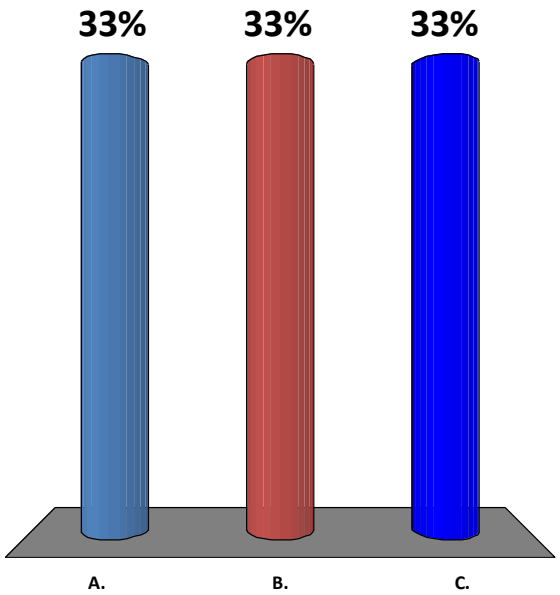
II. Choosing the appropriate OEL

III. Workplace air sampling

IV. Compliance testing

Polling 1. What is your experience with workplace survey?

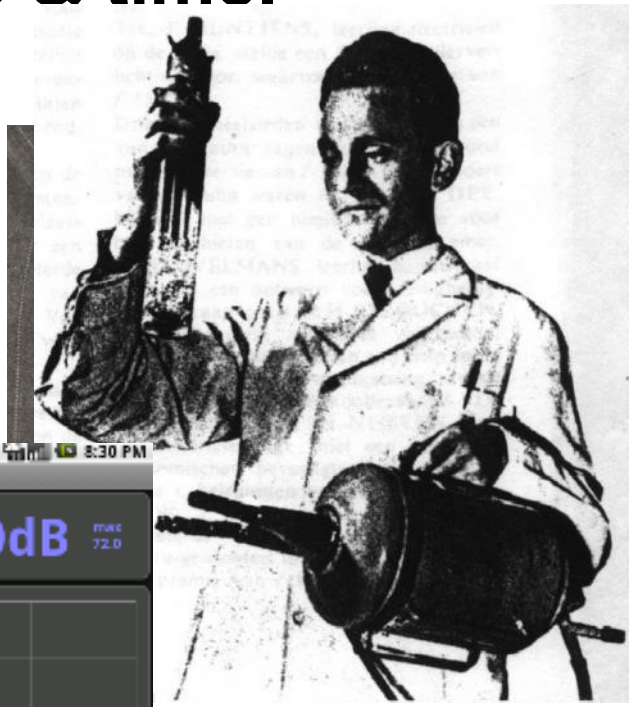
A. None
B. Limited
C. Extensive

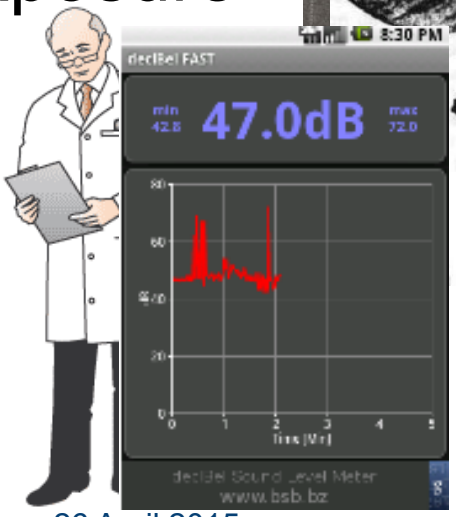


Goal of the workplace survey

To know workers exposure in space & time.

- Easy for ionising radiation
- Difficult for most other occupational loads including chemical exposure
  - Expensive
  - Complicated (sampling & analytical)





Exposure assessment & compliance testing strategies

Numerous guidances:

- CEN 689. EU (1996). Outdated as EU standard since 2006. Update 2016(?).
- AIHA “A Strategy for Assessing and Managing Occupational Exposures”. (Third edition 2006)
- Leidel & Busch NIOSH 173 (1977) Occupational exposure sampling strategy manual
- The BOHS-NVvA guidance (2011) for group and individual compliance testing
- Practical guidelines within the framework of the EU chemicals at work directive (98/24/EC)
- The ECHA worker exposure assessment guidance within REACH (2010)

Describe, focus and minimize sampling effort

See further: http://www.tsac.nl/websites.html#Exposure_assessment

Guidances on workplace survey

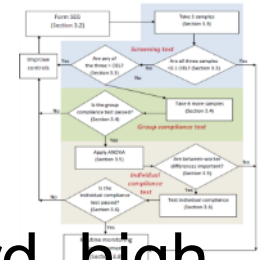
I. Basic characterization
   1. Substance risk potential information
   2. SEG formation
   3. Prior knowledge
   4. Sampling strategy
   5. Sampling & analytical methods libraries

~~II. Choosing the best OEL~~

III. [Workplace air sampling]

IV. Compliance testing

Substance risk potential information



Goal: to focus on substance with high health hazard, high exposure potential and low OEL

- Physical Chemical properties
  - Qualitative: molecular dispersion (ppm) or conglomerates (mg/m^3)
  - Quantitative: Saturation concentration (C_{sat}) or dustiness

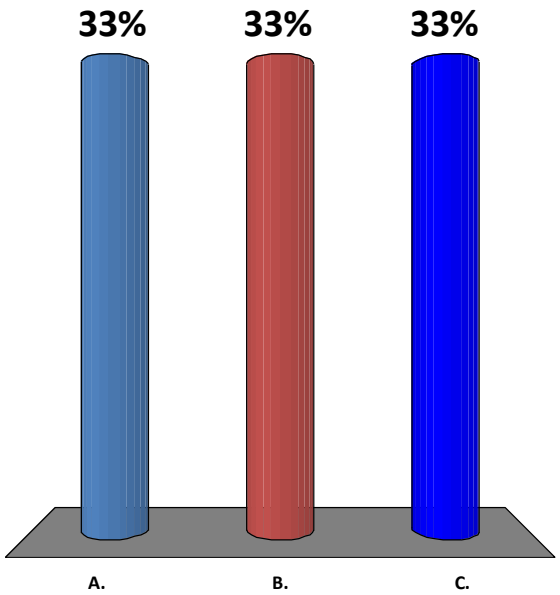
- Health hazard properties (GHS/CLP)
  http://www.tsac.nl/websites.html#Properties
- Risk potential assessment tools like Control Banding, Risk Ranking, ratio OEL/ C_{sat} etc.

Polling 2. Do you use risk potential assessment tools ?

A. Control Banding,

B. ratio OEL/ Csat

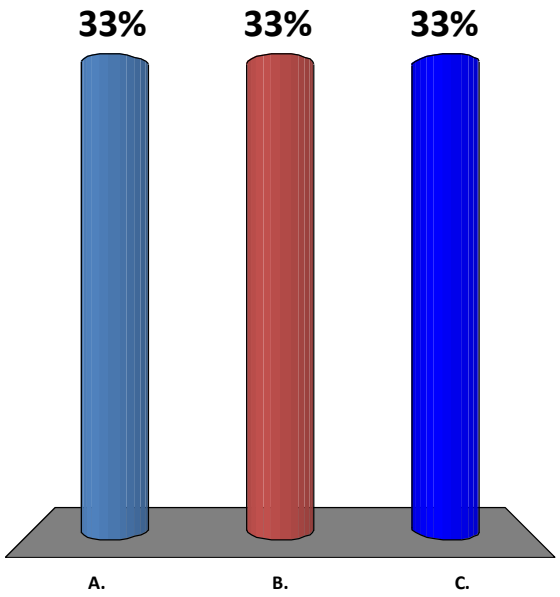
C. Others



Polling 3. For exposure assessment it is important to know

A. that the substance is a liquid/Gas/Solid

B. The saturation concentration or dustiness in relation to the OEL

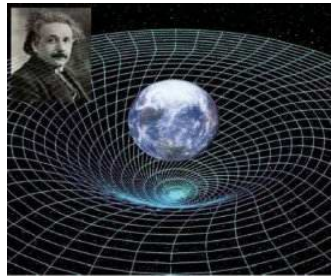


Basic characterization, stepwise approach

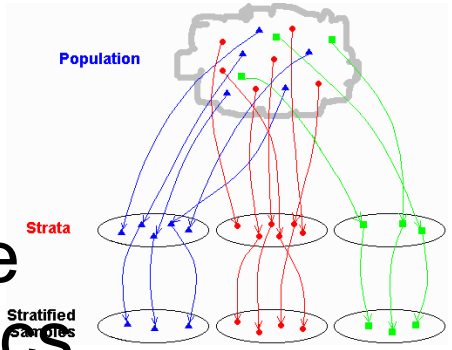
1. Substance risk potential information
2. SEG formation
3. Prior Knowledge
4. Sampling strategy

Similar Exposure Group

Since compliance of all workers on all shifts cannot be established due to limited resources, we (= industrial hygienists):



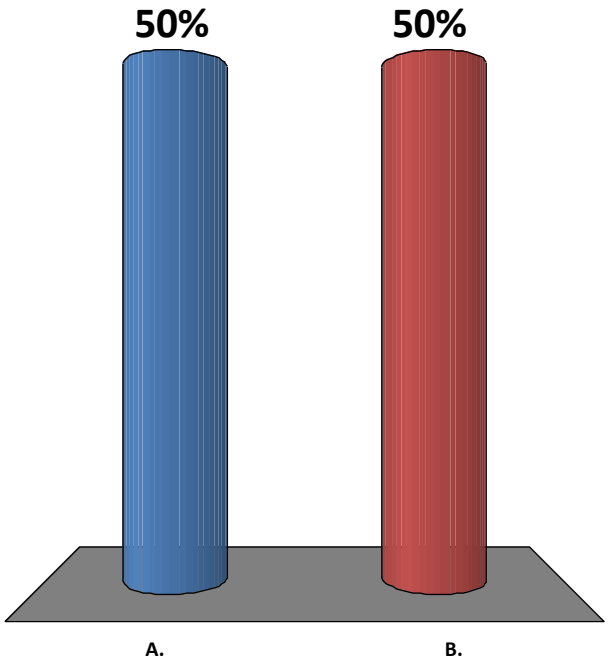
- Group workers by task/job
- Use prior knowledge to focus on high substance contact (level, duration).
- Fill data gaps with Lognormal exposure distribution and uncertainty with statistics
- Sample with lowest sound frequency



What is closest to a similar exposure group?

A. A cluster of comparable job titles at one premises

B. A task within industry



Similar Exposure Group (SEG)

- Workers step in and out:
  - When starting and ending their job (long term) and
  - Daily: begin and end of shift
- workers perform tasks within the shift.
- SEG activity may change (slowly) in time

Within REACH SEG's are sometimes defined as exposure scenario's (lower case)

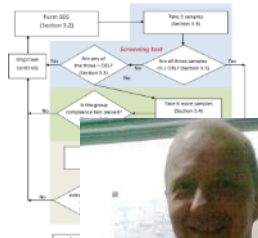
Similar Exposure Group (SEG)

A SEG is group of workers having the same general exposure profile because of

- the similarity and frequency of the tasks they perform,
- the materials and processes with which they work, and
- the similarity of the way they perform the tasks.

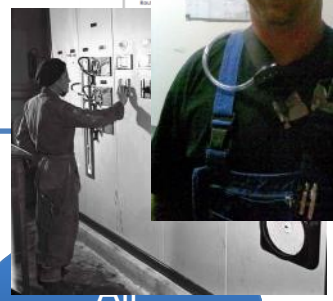
(Mulhausen et al, 1998 p 42)

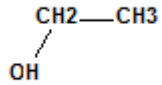
SEG and exposure scenario



exposure scenario 101

OC/RMM

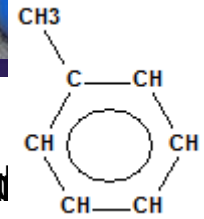




exposure

SEG

OC/RMM



duration)

Basic characterization, stepwise approach

1. Substance risk potential information
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Prior Knowledge

- Earlier measurements
- Publications
- Exposure databases: MEGA (Gr), COLCHIC & SCOLA (Fr), OSHA (USA), NEDB (UK), EXPO (NO)
- Modelling (deterministic or expert judgment)
- Read across (substance or circumstance)
- e-SDS with exposure scenarios

Information may be limited or outdated!

Basic characterization, stepwise approach

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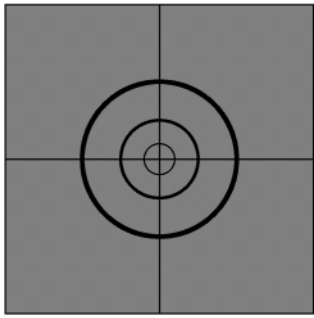
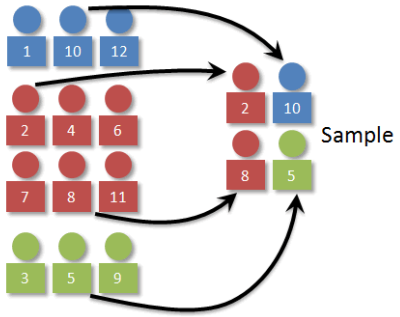
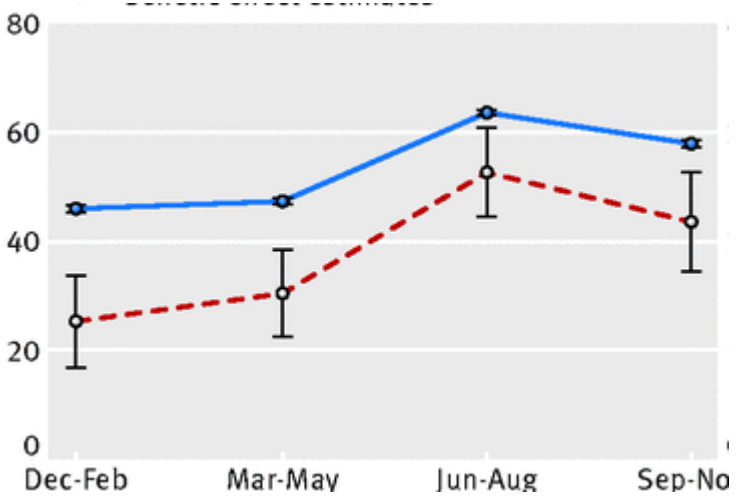


Sampling strategy

Random stratified sampling

- Within the SEG
- In time/seasons
- Between shifts





to establish the “real” exposure variability!

Basic characterization, stepwise approach

1. Substance risk potential information
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Sampling & analytical methods

Electronic libraries:

- NIOSH analytical method; (4e edition)
- OHSA Sampling & Analytical Methods
- methods of the 2e list of EU IOLV's;
- GESTIS >100 substances;
- INRS sampling methods (in French);
- Commercial databases like IFA, DOHSBase (>3000), ALS

See
http://www.tsac.nl/websites.html#Workplace_measurement_methods

Outside the scope of today

- BM
- Skin permeation
- mixtures

mixtures

- Sum score $\sum_{i=1}^{i=n} \left(\frac{C_i}{OELV_i}\right) \leq 1$
- Effect specific Sum score
- Risk Assessment Score C_{sat}/OEL*Tox
- Lead substance OEL based on the Non-ideal, partial vapour pressure
  http://www.tsac.nl/publicaties/Poster_OEL_in_a_mixture.pdf
- Manufacturers in REACH

Summar & Next

I. Basic characterization
Stepwise approach

1. Substance information
   - II. Choosing the OEL (next presentation)
2. SEG
3. Prior Knowledge
4. Sampling strategy

III. Sampling (not in PDC)

IV. Exposure variability & compliance testing (after the break)


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IOHA
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London: Building on Occupational Hygiene Together
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BOHS
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