Towards a Global GSD library

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Session A4

Mo 24 September 8:30 Room RPS

The 11th International Occupational Hygiene Association (IOHA) International Scientific Conference

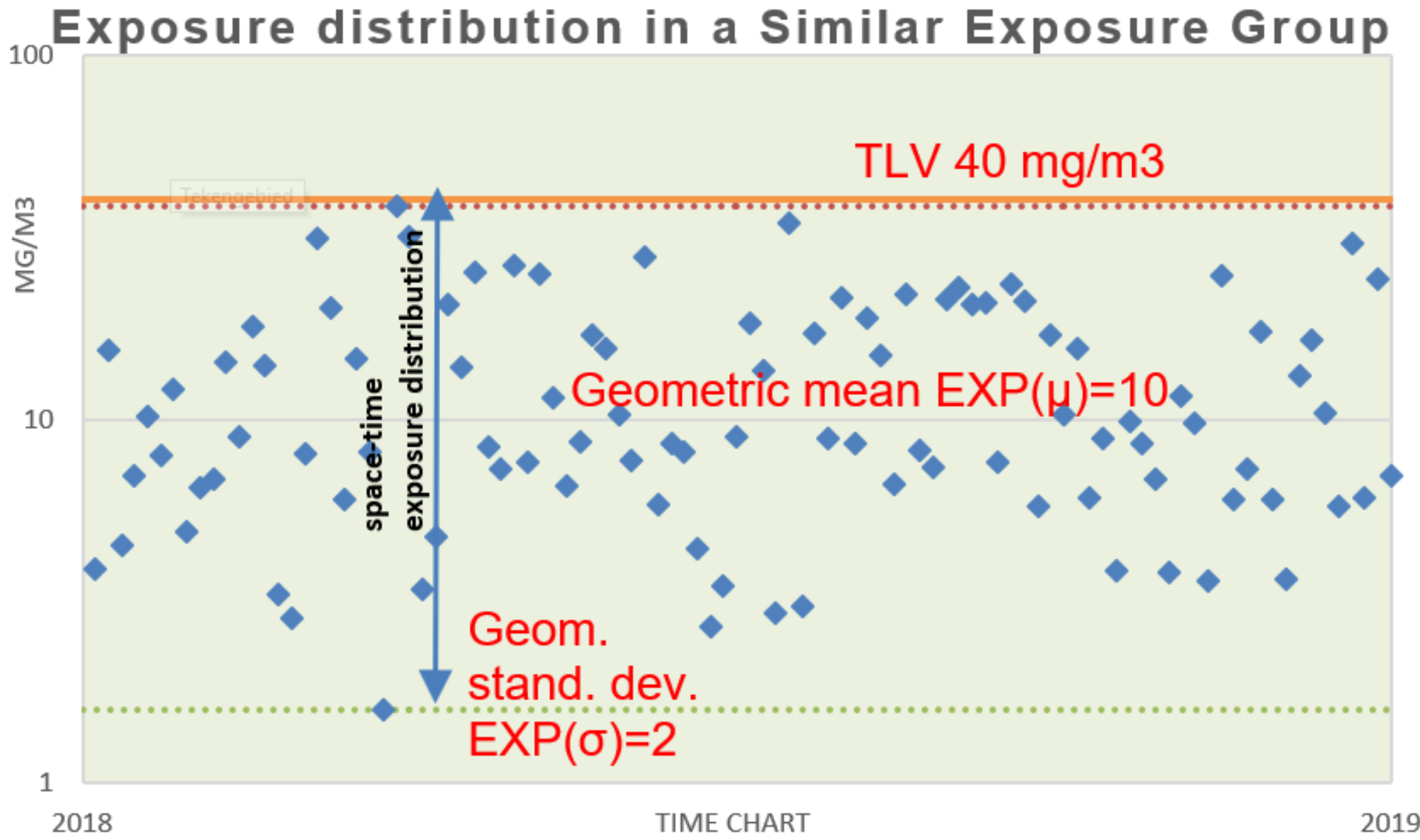
1. Why is prior GSD knowledge important?

I. Exposure assessment quality check

II. Support small sample compliance testing

III. Improve Bayesian statistics performance

IV. Myth busting



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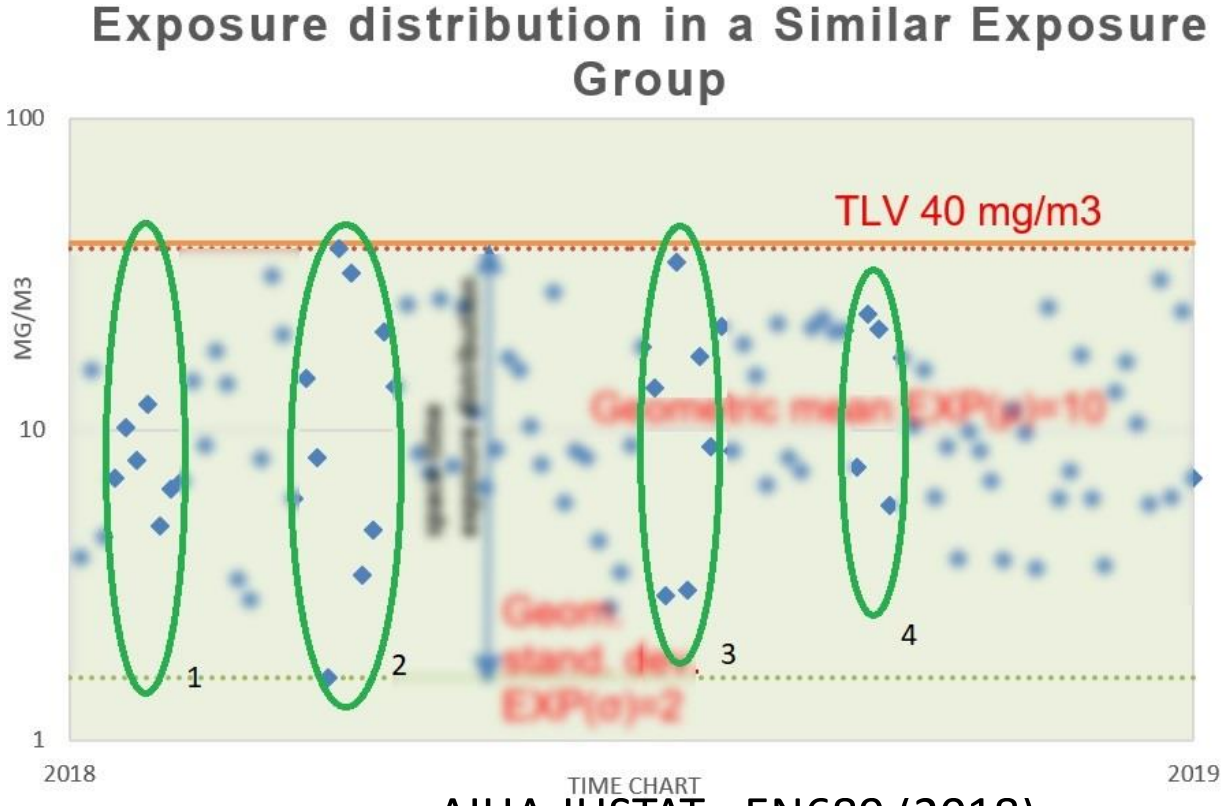
Quality check: which sample(s) can be used in compliance testing?



AIHA-IHSTAT EN689 (2018)

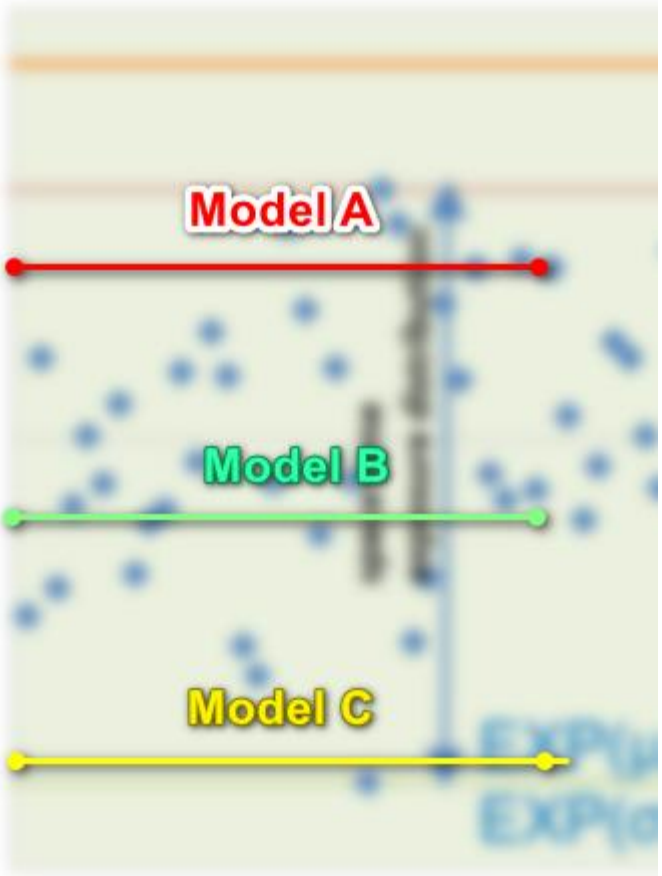
1: N=6 GM=6.8 GSD=1.4: $C_{95\%}$=13.3, $C_{95\%,70\%}$=15.8

2: N=8 GM=9.7 GSD=3.1: $C_{95\%}$=62.2, $C_{95\%,70\%}$=100.7

3: N=7 GM=10.5 GSD=2.6: $C_{95\%}$=50.2, $C_{95\%,70\%}$=78.9

4: N=4 GM=12 GSD=2.0: $C_{95\%}$=39.2, ~~$C_{95\%,70\%}$=69.8~~, 4/4 >.15 OELV

Quality check GM: use models, with care

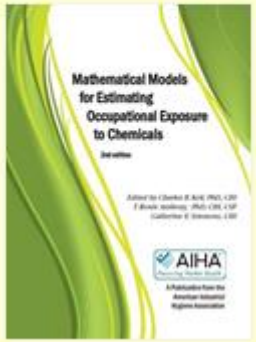


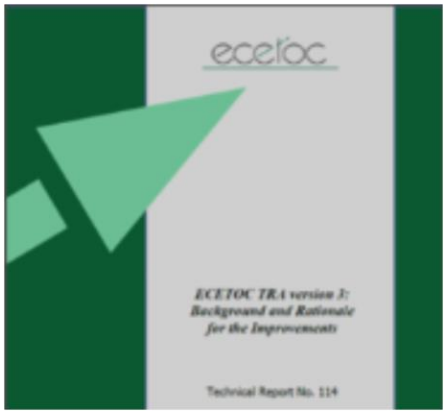
MEASE 1.02.01 © 2009, 2010 EBRC Consulting GmbH
Exposure Assessment Tool D. Vetter
For Metals And Inorganic Substances Hannover, Germany

Stoffenmanager®7

AIHA
Protecting Worker Health

IH Mod





chesar

ART ADVANCED REACH TOOL

AIHA
Protecting Worker Health
Exposure Assessment Strategies Committee

Qualitative Exposure Assessment tool
The CheckList

Washington DC
IOHA 2018

NVvA Conference 2018

IST Institute for Work and Health
Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra
scaht

Nenad Savic
Institute for Work and Health (IST)
Route de la Corniche 2, Epalinges-Lausanne
Switzerland

Annals of Work Exposures and Health, 2018, Vol. 62, No. 1, 72–87
doi: 10.1093/annweh/wxx079
Advance Access publication 27 September 2017
Original Article
BOHS The Chartered Society for Worker Health Protection
OXFORD

Original Article

ART, Stoffenmanager, and TRA: A Systematic Comparison of Exposure Estimates Using the TREXMO Translation System

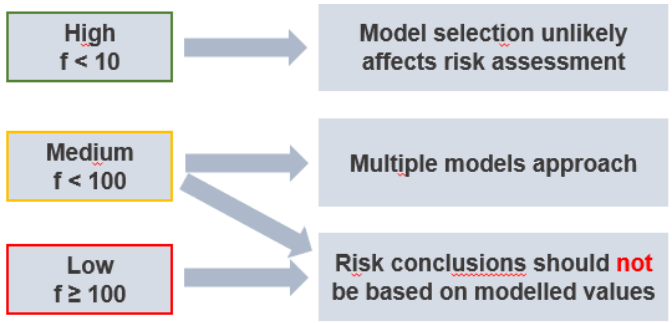
Nenad Savic[1]*, Bojan Gasic[2] and David Vernez[1]

Abstract

Several occupational exposure models are recommended under the EU's REACH legislation. Due to limited availability of high-quality exposure data, their validation is an ongoing process. It was shown, however, that different models may calculate significantly different estimates and thus lead to potentially dangerous conclusions about chemical risk. In this paper, the between-model translation rules

Conclusion

- Differences of few orders of magnitude
- ART (Tier 2) calculates often higher predictions with exposure parameters that describe higher exposure concentrations (e.g. high VP and conc, spraying etc)
- The tiered approach is not applicable always
- Different model - different risk conclusion
- Multiple model approach reasonable



GSD outdoor painting

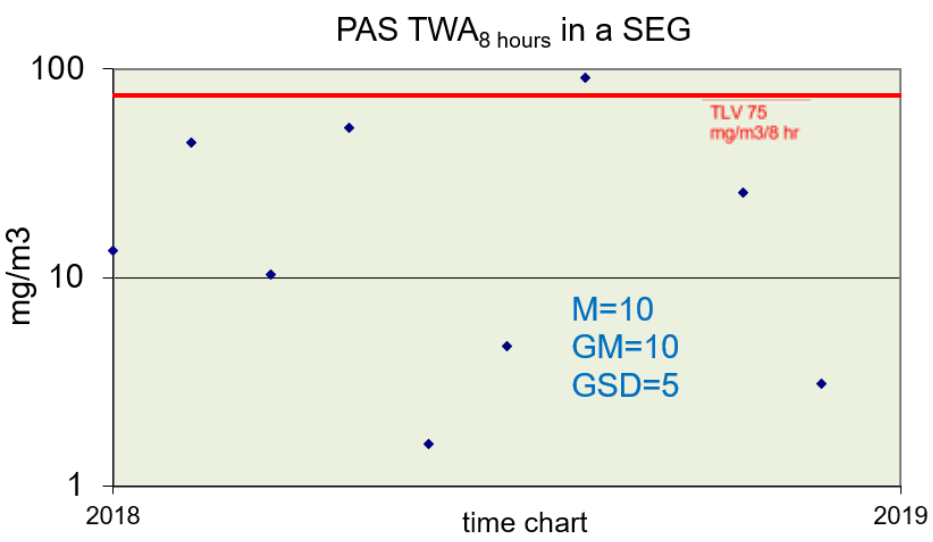
- Which long-term exposure variability represents this exposure profile (Solvent, varying %)?

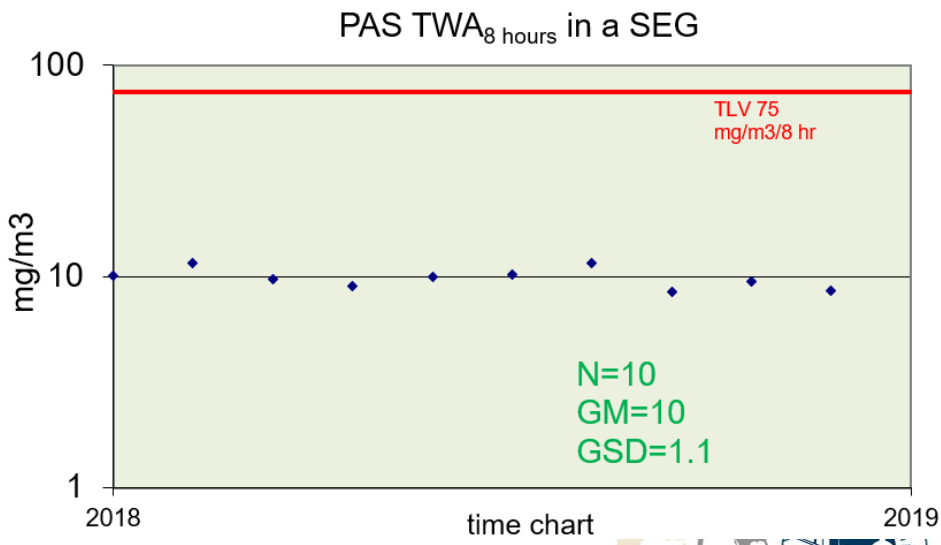
A

GSD large

B

GSD small



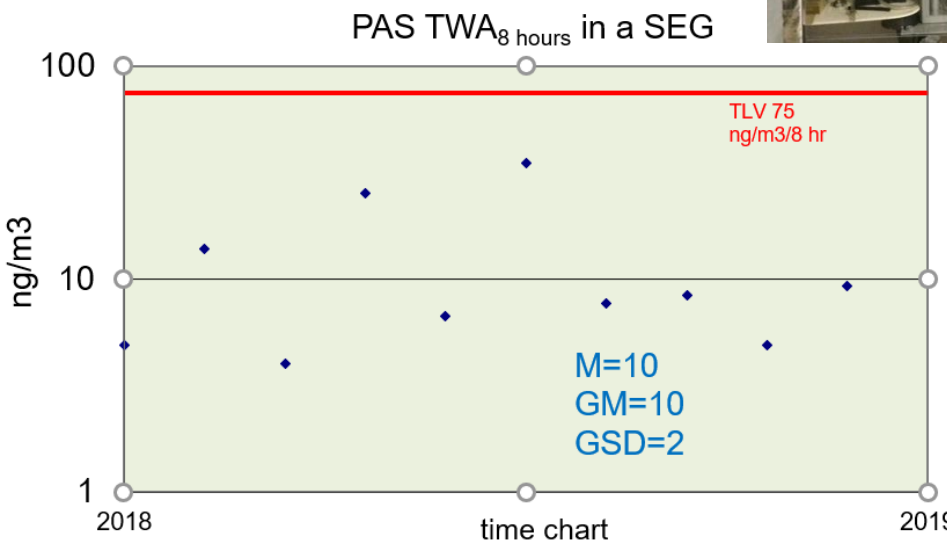


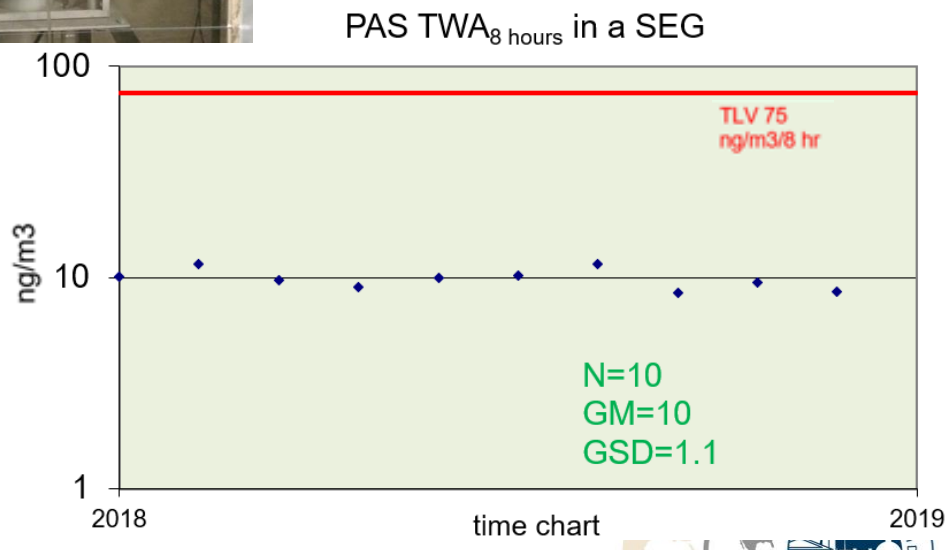
GSD pharma

Which long-term exposure variability represents this exposure profile (2*containment, monitored ventilation)?

C

D

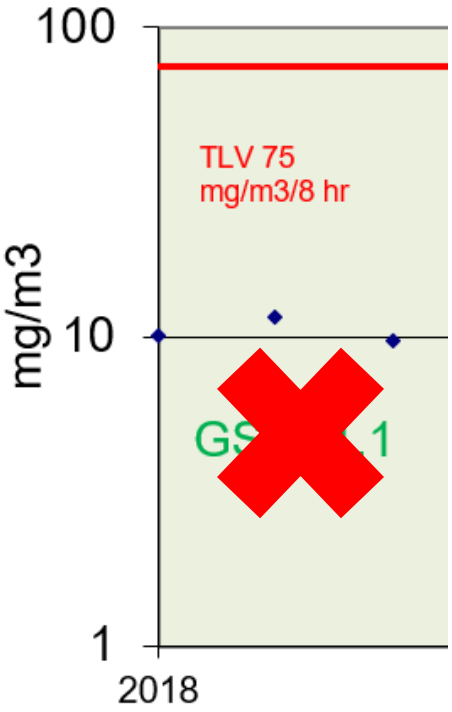




Quality check: which SEG sampling can be tested for compliance?

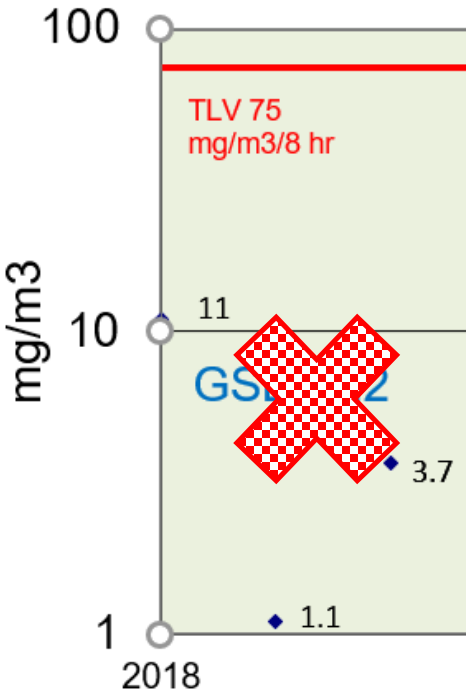
A

Outdoor painting



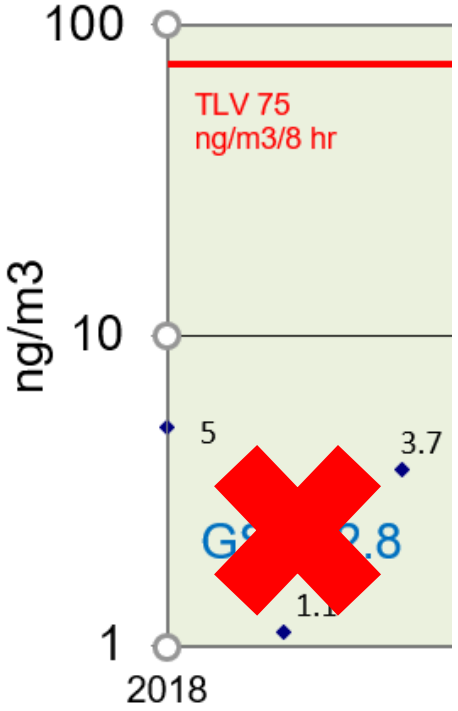
B

Outdoor painting



C

Pharma containment



1. Why is prior knowledge on GSD important?

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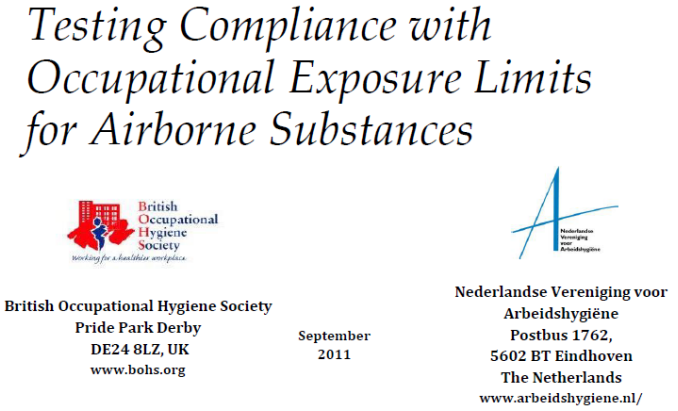
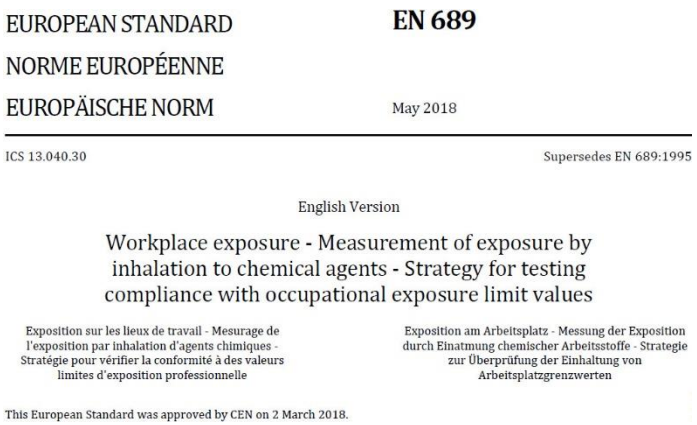
EU/NVvA-BOHS testing compliance


Testing Compliance with Occupational Exposure Limits for Airborne Substances

British Occupational Hygiene Society
Pride Park Derby
DE24 8LZ, UK
www.bohs.org

September 2011

Nederlandse Vereniging voor Arbeidshygiëne
Postbus 1762,
5602 BT Eindhoven
The Netherlands
www.arbeidshygiene.nl/


EUROPEAN STANDARD **EN 689**
NORME EUROPÉENNE
EUROPÄISCHE NORM May 2018

ICS 13.040.30 Supersedes EN 689:1995

English Version

Workplace exposure - Measurement of exposure by inhalation to chemical agents - Strategy for testing compliance with occupational exposure limit values

Exposition sur les lieux de travail - Mesurage de l'exposition par inhalation d'agents chimiques - Stratégie pour vérifier la conformité à des valeurs limites d'exposition professionnelle

Exposition am Arbeitsplatz - Messung der Exposition durch Einatmung chemischer Arbeitsstoffe - Strategie zur Überprüfung der Einhaltung von Arbeitsplatzgrenzwerten

This European Standard was approved by CEN on 2 March 2018.

compliance C<OELV	NVvA-BOHS (2011)	EN 689 (2018)	Implicit requirements
Preliminary test	3-5 samples <0.1 OELV	Clause 5.5.2 3 samples <0.1 OELV 4 samples <0.15 OELV 5 samples <0.2 OELV	LoD <.1 OELV **GSD <3-4**

French validation study INRS2005.Grzebyk_Sandino.ND2231.pdf

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IHDataAnalyst.

EXPOSTATS

Altrex Chimie

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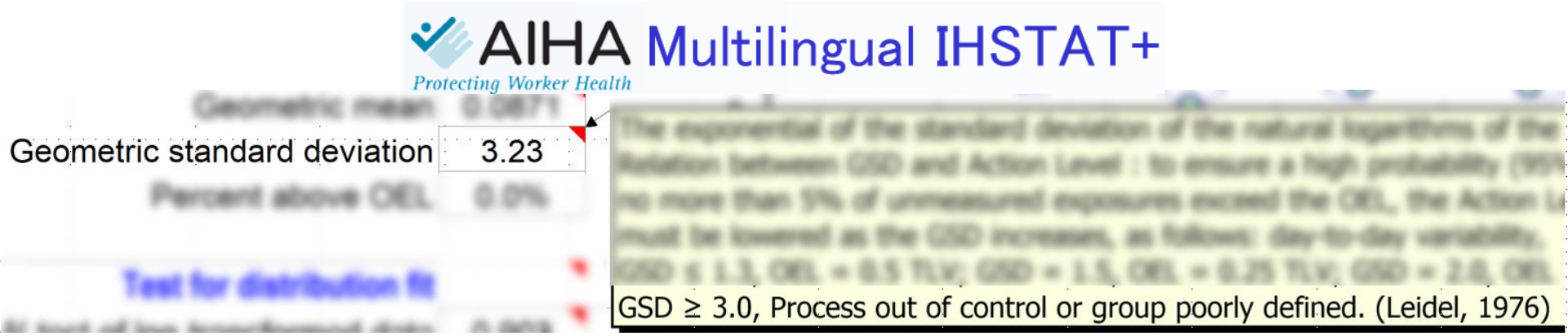

In summary

GSD: an intrinsic property of well defined exposure profiles in

- Similar Exposure Groups (EN 689/AIHA EASC)
- Task/activity Contributing Scenarios (REACH)

A $GSD_{library}$ is of high additional value:

- To test validity of small sample $GSD_{measured}$
- to estimate $C_{95\%}$ in case of $GM_{n=2…5}$ or $GM_{modelling}$
- In the EN689 preliminary compliance test $3 \leq N \leq 5$
- For priors in Bayesian statistics

To a worldwide open source GSD library

1. Why? : EN689, Bayesian, quality control
2. Where to find GSDs from SEGs?
3. First impressions tier 0 GSDs
4. Further steps

Existing GSD info

- Large databases (MEGA, SCOLA, COLCHIC, OSHA CEHD)
- Numerous smaller databases (Health services, industry, consultants)
- Literature: often hidden in exposure determinant studies (B&W, multi-location)
- hazchem@work.eu
- exposure measurement sets of REACH PROCs

Preliminary (tier 0) GSD 'library'

exposure profile	within worker GSD_w	Between & within (b+w) worker GSD_{b+w}	Workers (b+w) + location GSD_{l+b+w}	reference
Gasses & vapours (range)		1.4 ->14		Scheffers & Marquart (2000)*
Liquid (proposed default)			8.2	Tielemans (2008)**
Solid (proposed default)			5.4	
Vapours (range)	1.2->5.6	1.2->8.4		Kromhout (1993) Table 1 ***
Aerosols (range)	1.3->8.2	1.4->17.6		
Grain dust, inspirable endotoxin (BWSTAT)	3.1	4.3		Kromhout (1993) Table 1 raw data

* Long-term sampling, SEGs in chem. industry, LoD regression

** 'Worst-case' sampling, LoD/2

*** Poor quality data (Symansky, 2008) & analysis (GSD_b<1), LoD/2

Next steps

- Broader international recognition that a GSD library is helpful for industrial hygiene.
- Involve universities/institutes through international platforms like IOHA, ILO, …
- ….??

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Thanks for contributing so far

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