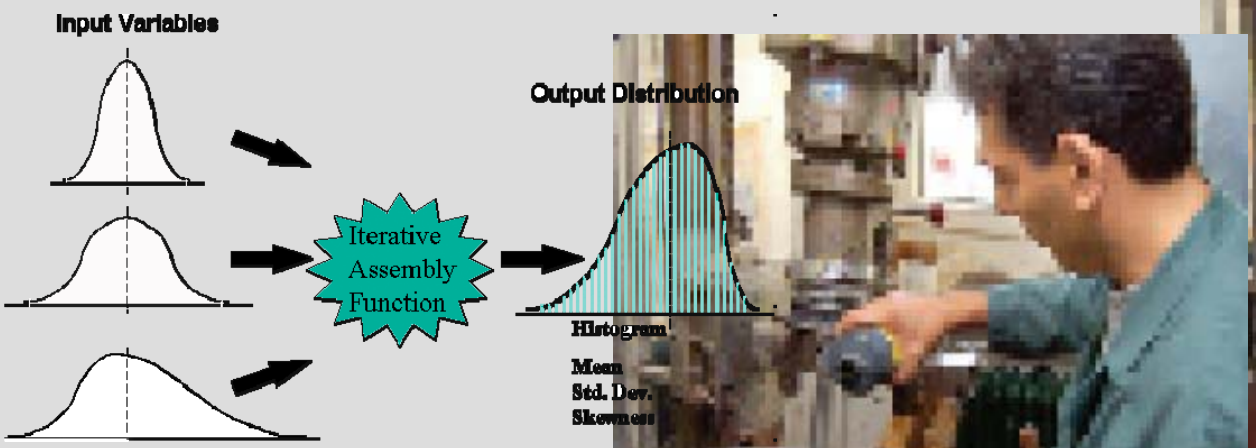
Bundesanstalt für Arbeitsschutz und Arbeitsmedizin



Evaluation of the EMKG

Results of an integrated evaluation by comparing OELs with measurement data and using Monte Carlo Simulation

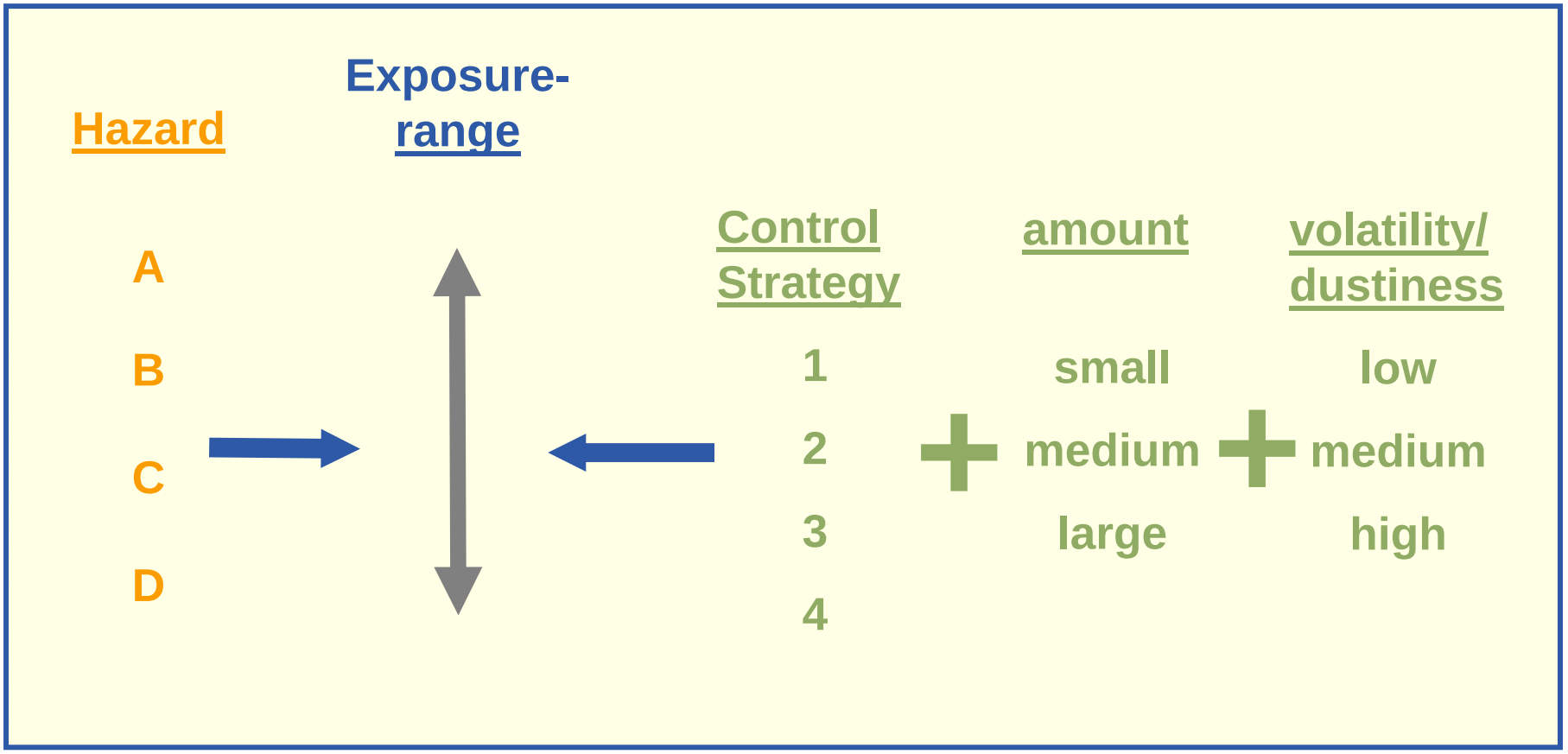
Background of the EMKG

- **EMKG** → Easy to Use Workplace Control Scheme

- The EMKG is a generic risk assessment scheme that is based on COSHH Essentials

- The EMKG takes into account the requirements of the German Hazardous Substances Ordinance

The Control-Banding Approach



Target Exposures - Vapour

Hazard Group	Target exposure range	R-phrase examples
A	50 – 500 ppm	R36
B	5 - 50 ppm	R20
C	0.5 - 5 ppm	R23
D	0.05 - 0.5 ppm	R26

Predicted exposure ranges [ppm]

Control strategy	Exposure potential			
	EPL4	EPL3	EPL2	EPL1
ventilation	>500	50 -500	5 - 50	< 5
LEV	5 - 500	5 - 50	0,5 - 5	< 0,5
Closed system	0,5 - 5	0,5 - 5	0,05 – 0,5	< 0,05

04.07.2011

Characterization of the empirical data

Exposure :

- BAuA field studies (1991 - 2001) (textile industry, plastics processing, rubber production, screen printing, offset printing, furniture industry, optician workshops)
- about 2000 personal sampling data

Hazard:

- OELs from German TRGS 900, vapours 174, dusts 56

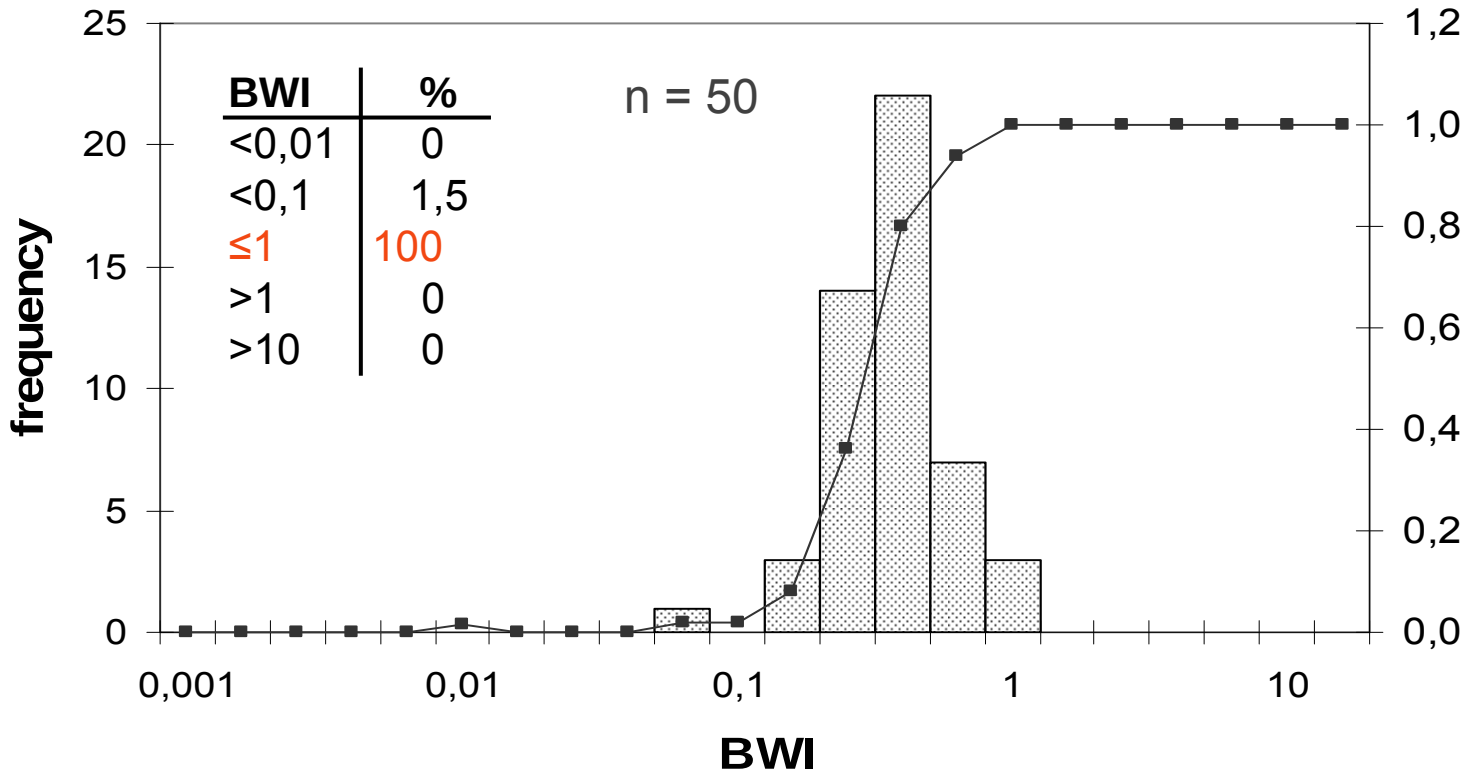
Comparison between measured exposures and OELs

$$\mathbf{BWI} = \frac{C_1}{OEL_1} + \frac{C_2}{OEL_2} + \ldots \frac{C_N}{OEL_N}$$

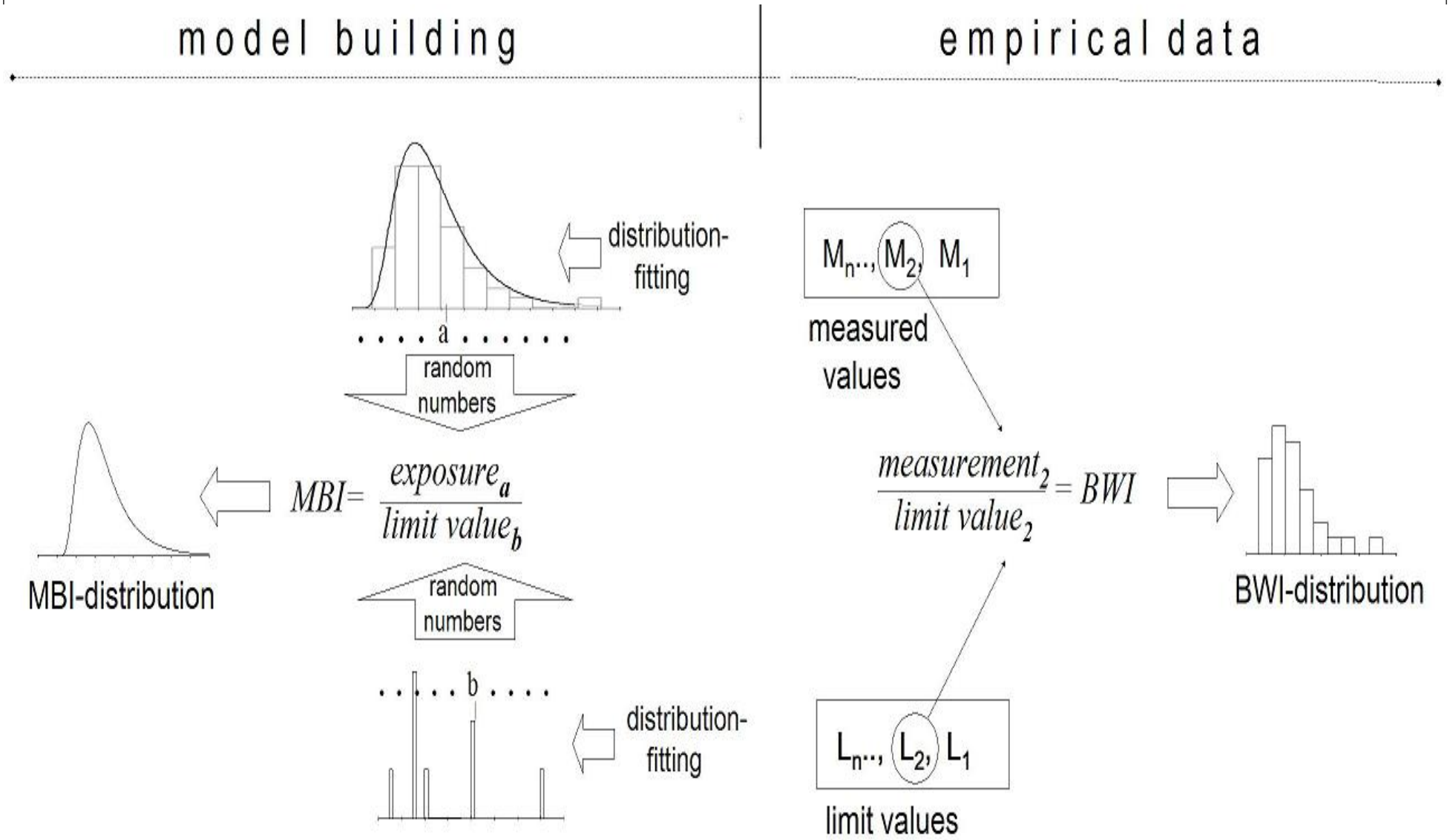
BWI frequency distribution

Control banding scenario: EPL2 (litre, low volatility), ventilation, Hazard group B

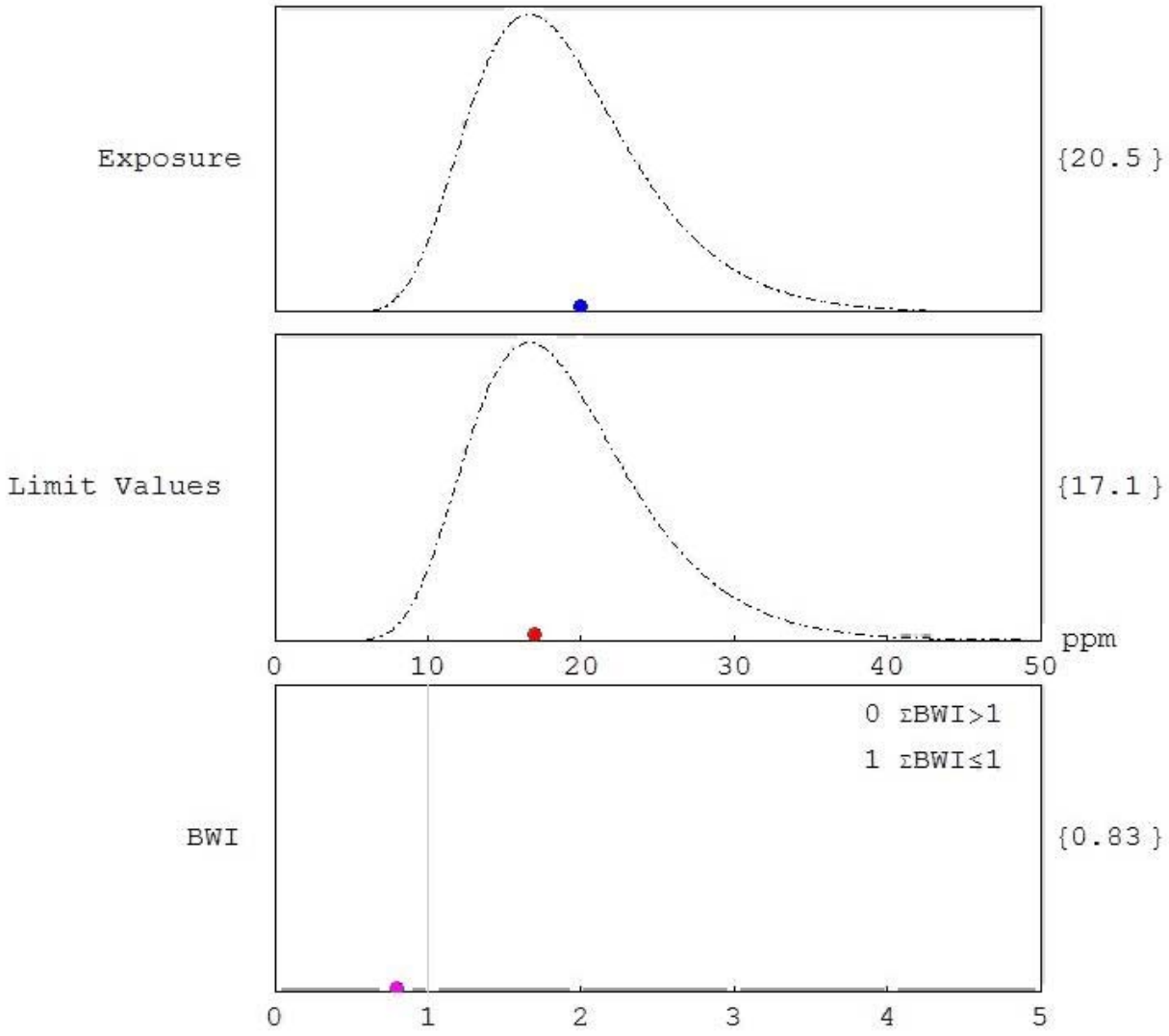
Branch: Screen printing



Evaluation of empirical data vs. model building

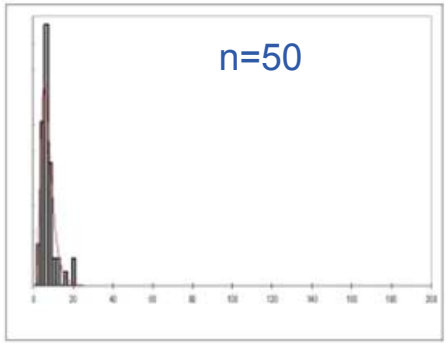
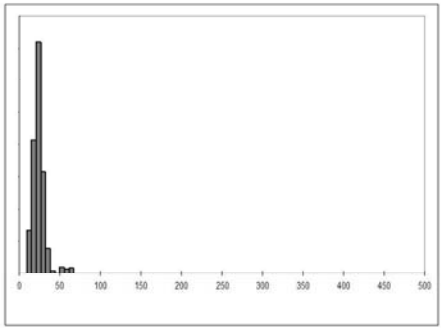
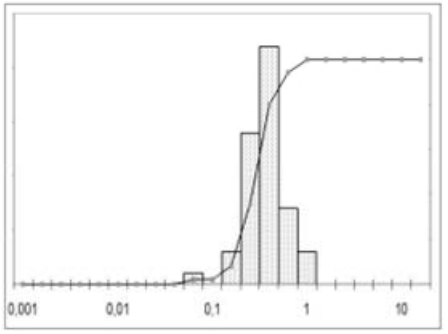
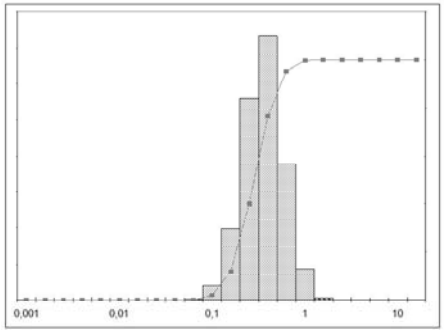


Monte-Carlo Simulation



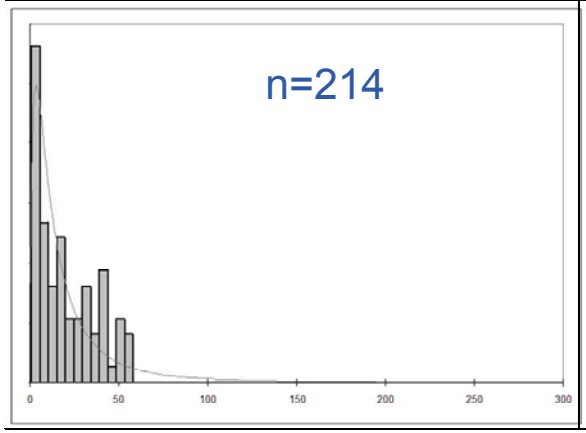
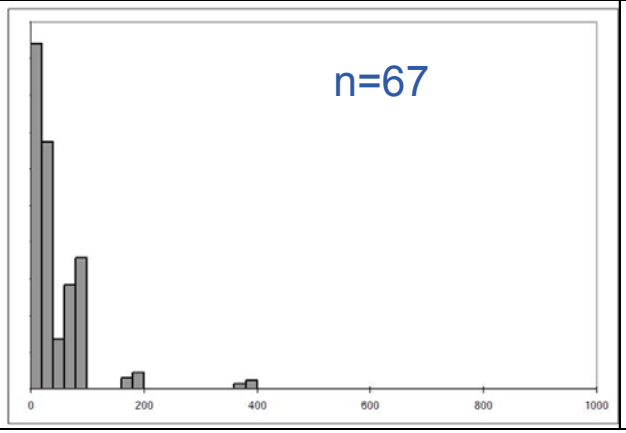
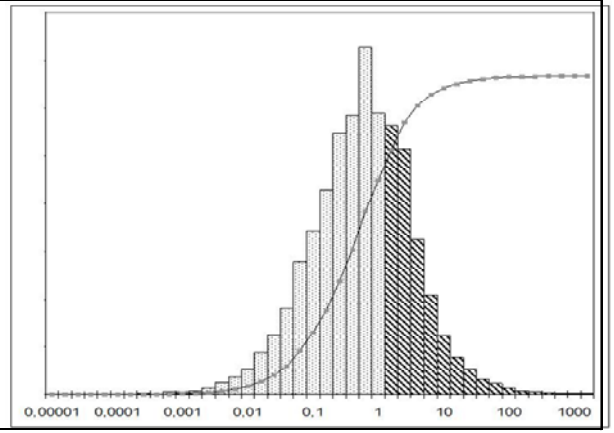
Branch-specific evaluation and simulation (screen printing)

control banding scenario: EPL2 (litre, low volatility), ventilation, hazard group B

Exposure data	OELs	BWI	MBI
			

Generic simulation

Control banding scenario: EPL2 (litre, low volatility), ventilation, hazard group B

Exposure data	OEL	MBI
		

MBI	%
<0,001	0,2
<0,01	2,5
<0,1	19,5
≤1	67,4
>1	32,6
>10	3,7

Summary:

Evaluation of empirical data:

- The empirical data reveal a relative high level of compliance
- But small data base for control strategy 1 only
- Hence further evaluation is needed!

Simulation results:

- The branch specific simulation can reproduce the empirical frequency distributions
- The generic simulation reveals that control banding does not guarantee compliance in either case
- The generic simulation shows that compliance was high for volatile liquids (hazard group C) used in closed systems
- There is also generic evidence that compliance is high for solids (hazard group B) in the presence of local exhaust ventilation

Bundesanstalt für Arbeitsschutz und
Arbeitsmedizin
Friedrich-Henkel-Weg 1-25
44149 Dortmund

Tel. 0231/9071-0
Fax 0231/9071-0
info@baua.bund.de

www.baua.de

04.07.2011