

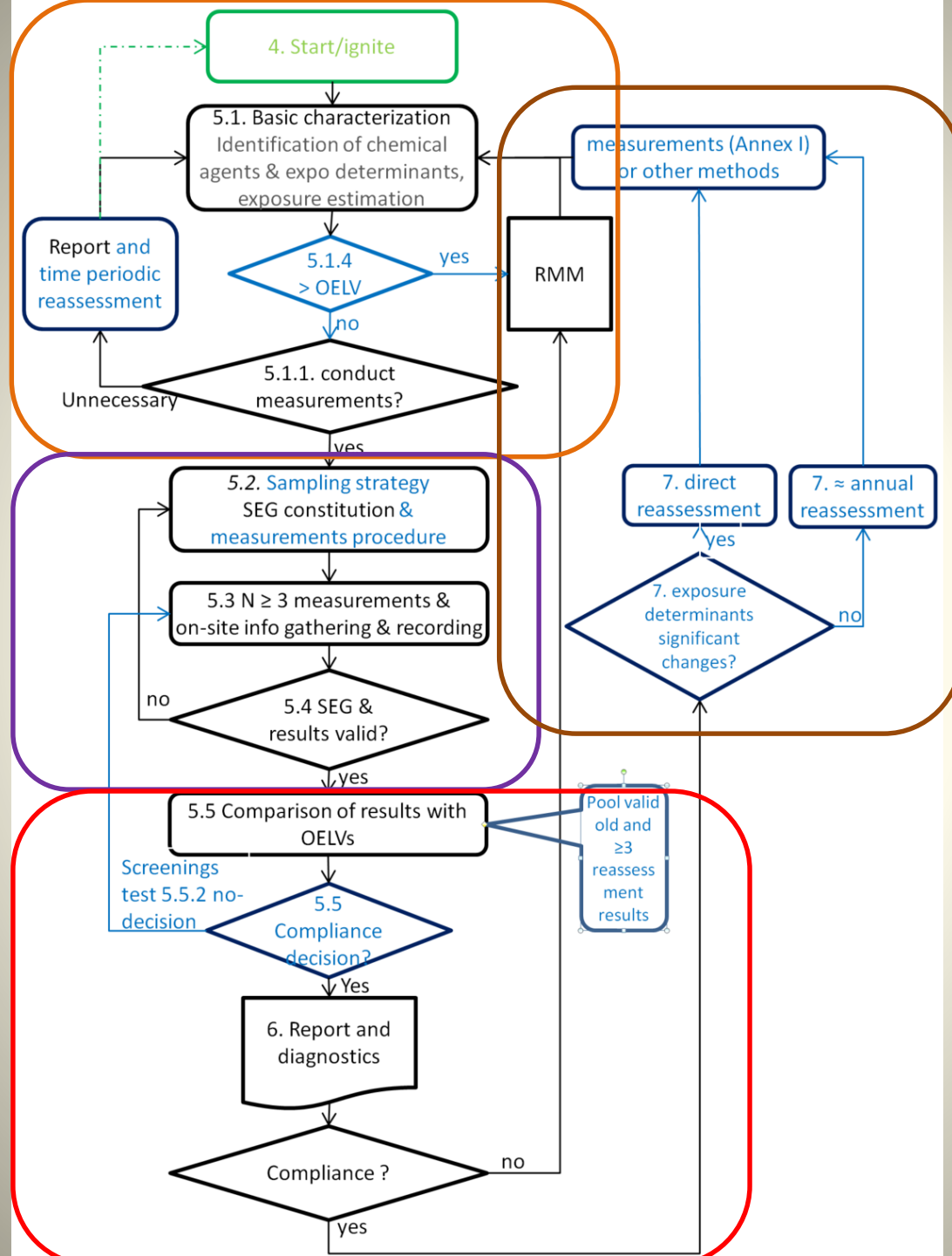
2e NVvA Mirror meeting prEN 689

14 April 2016

Theo Scheffers, NVvA representative

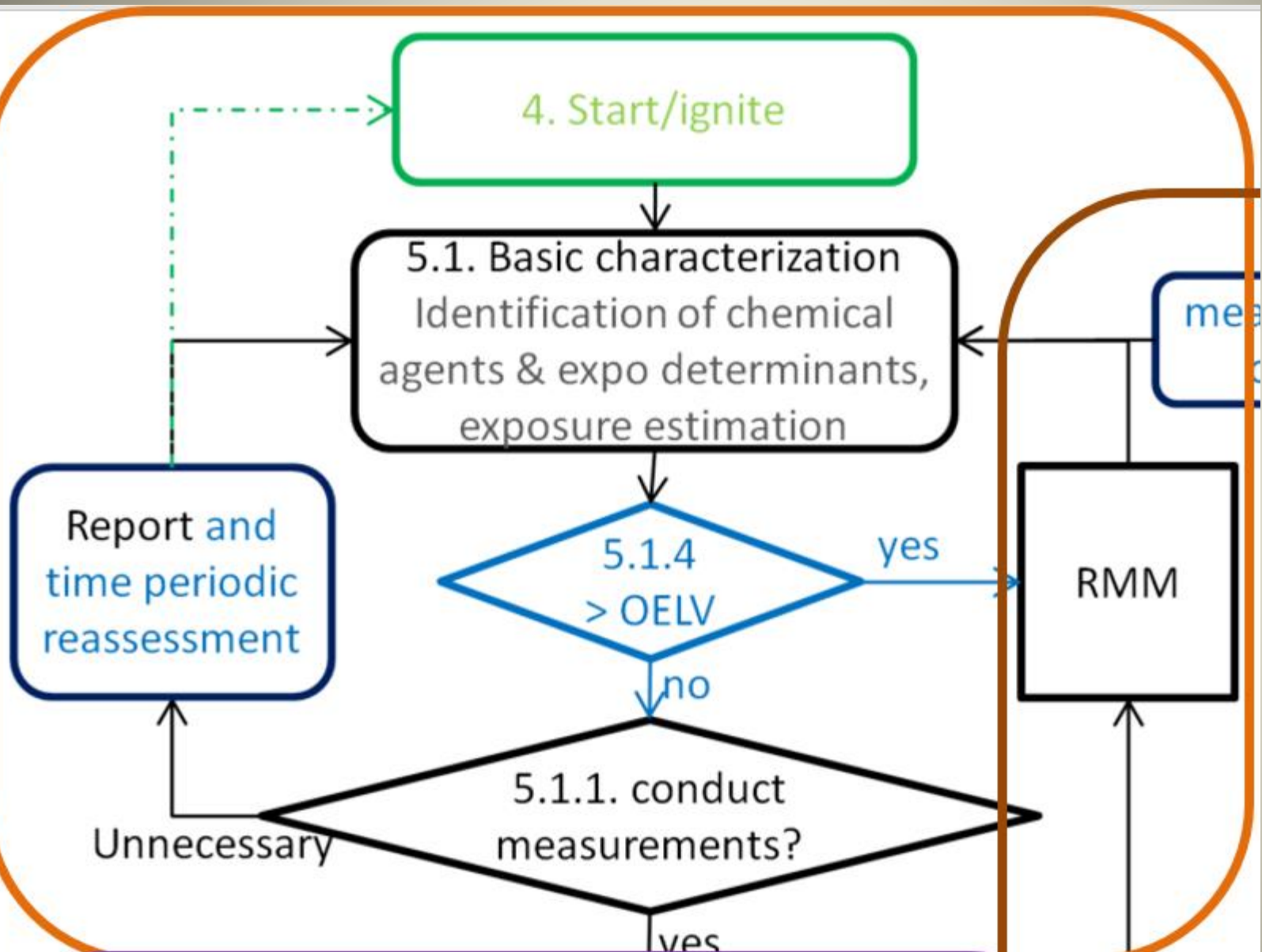
EN:689 1995 versus 2016

- Given a widespread reluctance towards workplace measurements the standard EN689:1995 was written with the focus on **efficiency. (reduction of number of measurements)**
- **This approach can lead to a poor efficacy:** obtain wrong conclusion: “working conditions are well controlled” (but in reality they are not!)



Green is somehow missing in the prEN_689: NL RIE/stakeholder question

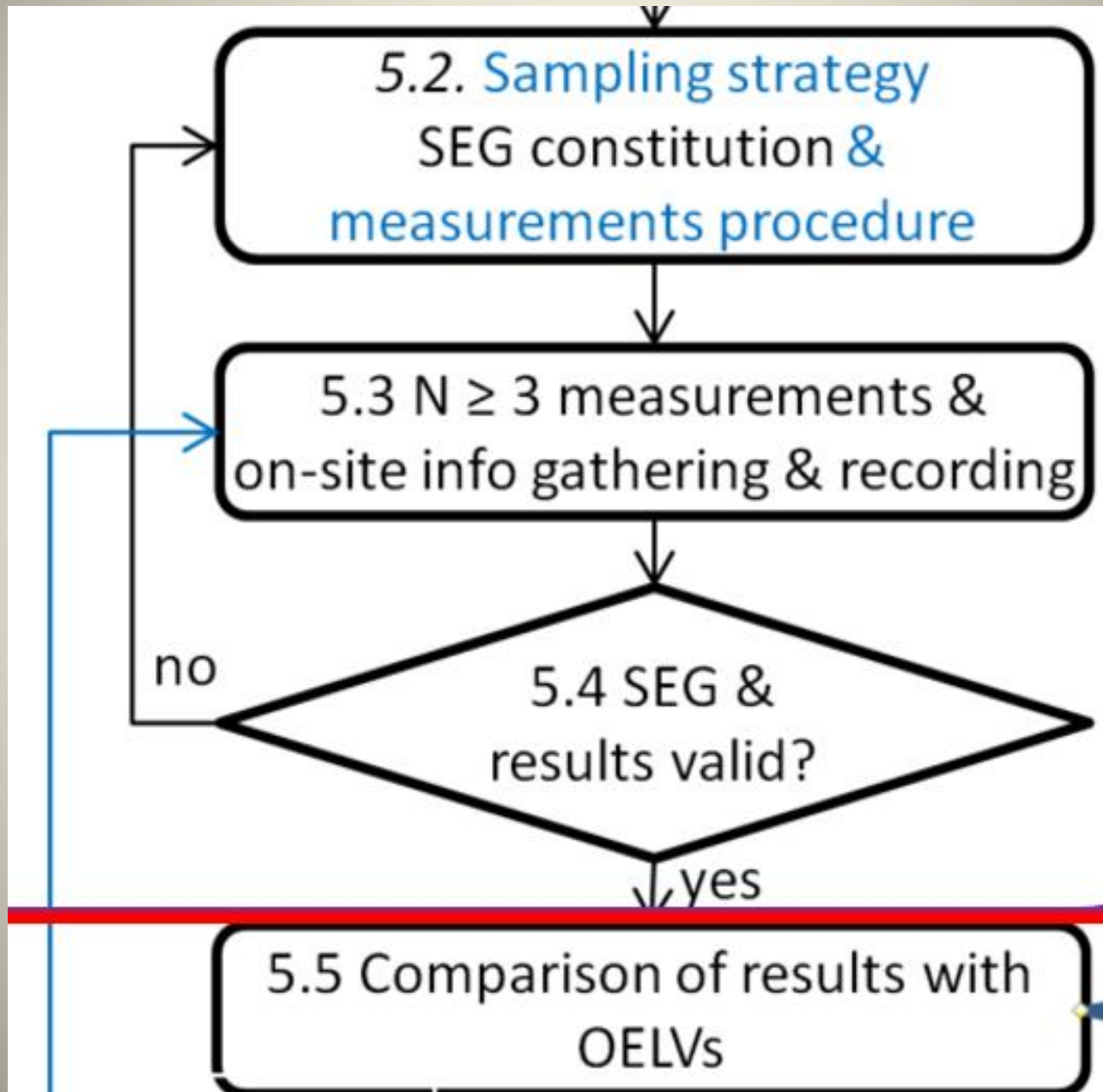
Blue parts in the Figure 1 are in the text but not in the current figure



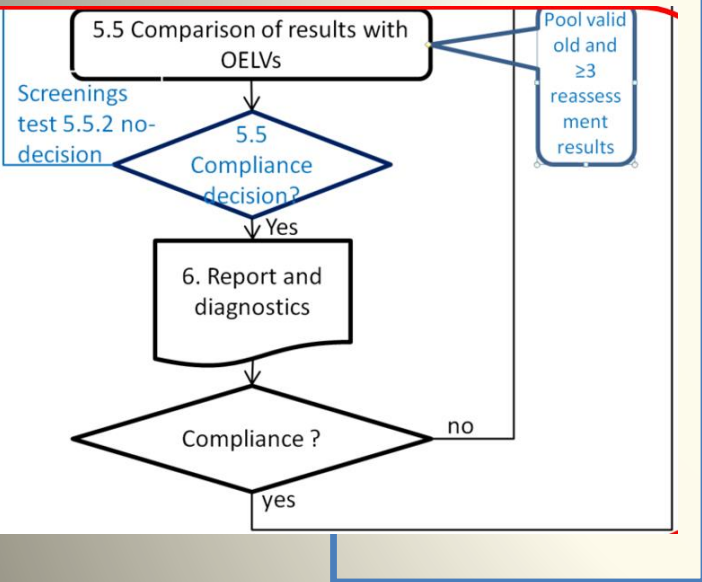
Green is somehow missing in the standard: NL RIE / stakeholder question

Blue parts in the Figure 1 are in the text but not in the current figure

REPRESENTATIVENESS



Screenings test 5.5.2



Decision 5.5.2	Compliance	Non-compliance	No decision
Sample size N	All outcome < f*OELV	k > OEL	Otherwise: additional measurements
3	f=0.1	≥ 1	
4	f=0.15		
5	f=0.2		

Workshop question (1)

What would you decide if:

- Three measurements 0.09; 0.08 and 0.09 mg/m³

- Filling bags

- $CV_t = 30\%$

- OELV: 1 mg/m³

- 5.5.2. Compliance?

Decision 5.5.2	Compliance	Non- compliance	No decision
Sample size N	All outcome < f*OELV	k > OEL	Otherwise: additional measurements
3	f=0.1	≥ 1	
4	f=0.15		
5	f=0.2		

- GSD=1.07 !

- Is this GSD representative for this exposure profile?

- If no, then validate SEG & measurements before compliance testing

Workshop question (2)

What would you decide if:

- Three solvent measurements 0.01: 0.3 and 10 ppm

- Painting outside

- OELV: 100 ppm

- 5.5.2. Compliance?

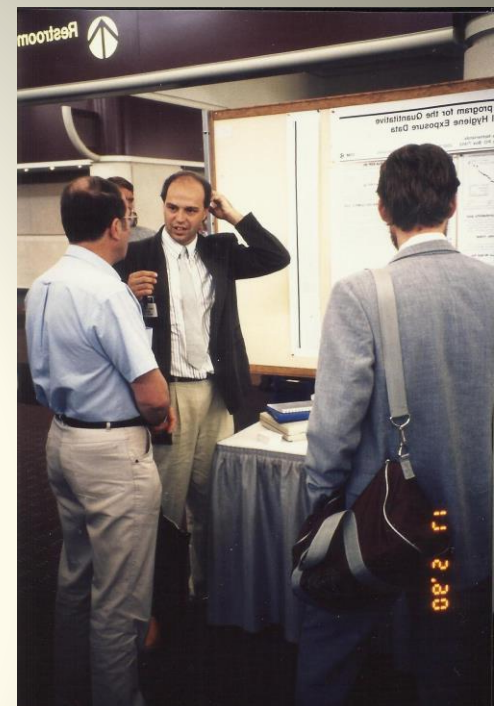
Decision 5.5.2	Compliance	Non-compliance	No decision
Sample size N	All outcome < f*OELV	k > OEL	Otherwise: additional measurements
3	f=0.1	≥ 1	
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- GSD=31 ! (3 orders of magnitude)

- Representative GSD for this exposure profile?

Painters GSD, read-across Annals 1985

Type of object	Number of painters*	Types of paint	Remarks
1 Apartment building	6	Chlororubber paint	
2 Ambassador's house	4 H	Synthetic wall paint, prime colour varnish	
3 Telephone district centre	3 H	Alkyd resin, latex wall paint, synthetic wall paint	
4 Brewery	4	Synthetic wall paint, 2-component epoxy resin	
5 Furniture showroom	6 H	Alkyd resin	Spraying by 1 painter
6 Canteen	4	Structure wall paint, alkyd resin	Spraying by 1 painter assisted by 1 colleague
7 Room of regents in Lower House residence	4	Turpentine paint	Only 2 painters were sampled
8 Garage	5 H	Latex wall paint, synthetic wall paint, 2-component varnish	
9 Pumping station	4	Chlororubber paint	During only a few minutes were protective clothes with air refreshment worn
10 Laboratory	2 H	Synthetic wall paint	
11 Laboratory	3 H	Varnish, alkyd resin	
12 Distributing station	2	2-component polyurethane lacquer	Spray-painting was performed during several minutes



Painter group	Number of painters (n)	Tolerance factor k_7^*	Log normality P_t^\dagger	Geom. mean GM_t^\ddagger (mg m^{-3})	Geom. stand GSD_t^\S
House painters	20	2.752	0.85	58.66	2.086
Total group	45	2.408	0.38	100.9	2.673
House painters	20	2.752	0.50	0.15	1.936
Total group	45	2.408	0.04**	0.28	2.648

Screening test 5.5.2. evidence based?

Yes, if exposure variability $GSD \leq 3$!

Only in combination with a sound basic characterization (5.1), sampling strategy (5.2), measurement plan (5.3) and validation (5.4).

INRS (2005) ND2231

Decision 5.5.2	Compliance	Non-compliance	No decision
Sample size N	All outcome < f*OELV	k > OEL	Otherwise: additional measurements
3	f=0.1	≥ 1	
4	f=0.15		
5	f=0.2		

Workshop question (3)

What would you decide if:

- ≥ 6 measurement in a clean room
- $GSD=2$
- $CV_t=5\%$
- $C_{95\%,70\%}<OELV$

prEN 689 (2016) 5.5.3

**Compliance &
reassessment**

**Non-
compliance**

$C_{95,70\%}\leq OELV$

$C_{95,70\%}>OELV$

- 5.5.3. Compliance?
- 5.4. Is a $GSD=2$ representative for a clean room?
- If no, then validate SEG & measurements before compliance testing

Workshop question (4)

What would you decide if:

- ≥ 6 measurement outdoor painter, solvent exposure
- $GSD=1.4$
- $CV_t=5\%$
- $C_{95\%,70\%} < OELV$

prEN 689 (2016) 5.5.3

Compliance & reassessment	Non-compliance
$C_{95,70\%} \leq OELV$	$C_{95,70\%} > OELV$

- 5.5.3. Compliance?
- 5.4. Quality? Is a $GSD=1.4$ typical for a painter?
- If no, then validate SEG & measurements before compliance testing

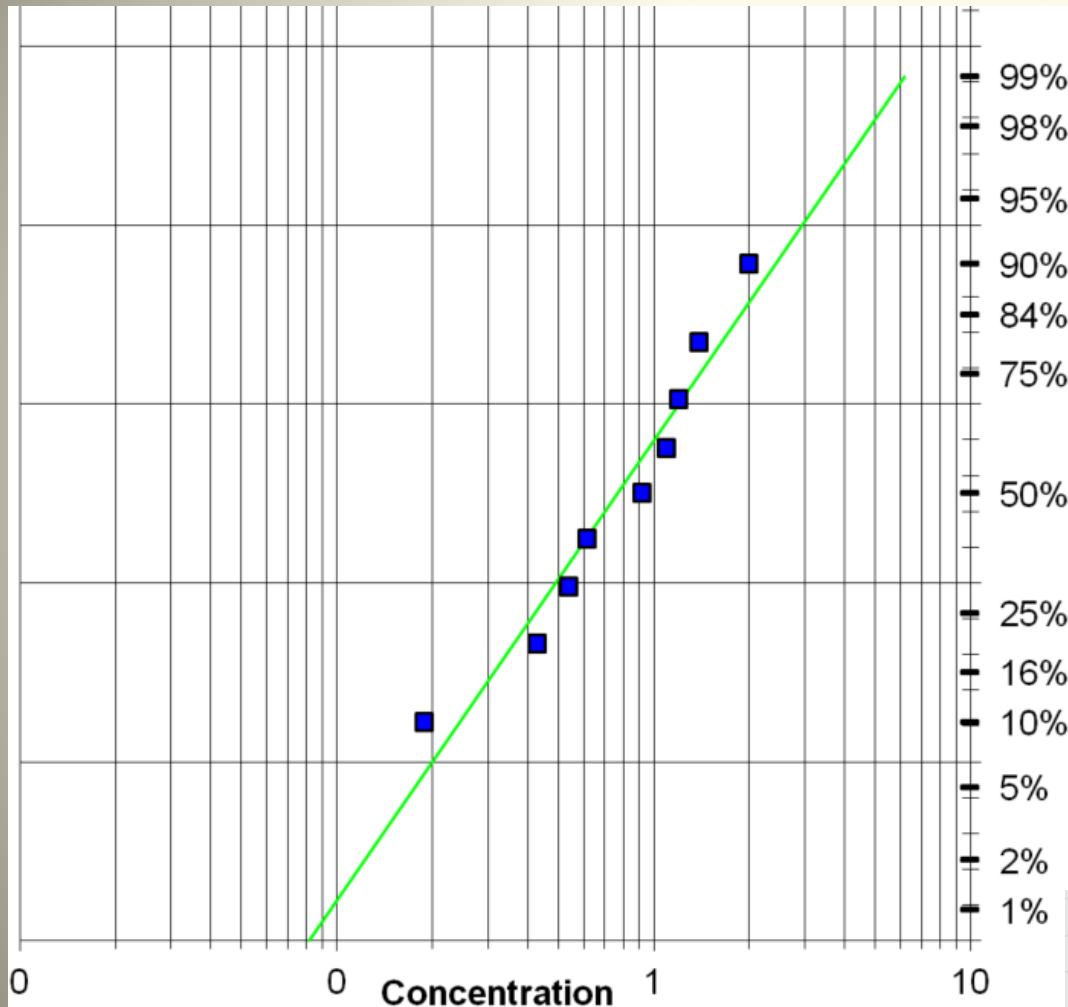
Exposure variability

- Current prEN689 (Annex E) and AIHA IH_Stat condemns $GSD > 3$ as "process out of control or poorly defined SEGs".
- Low GSD's quite often caused by:
 - sampling on one or a few consecutive days within a SEG.
 - small sample size, underestimating the GSD on the average
 - sloppy handling of non-detects
 - autocorrelation (one outcome determines the next)
 - 2-decades analytical detection methods (like gravimetric dust and inorganic acid sampling)
 - EM in stead of PAS
- Use your brains and expertise (and prEN 689)\$!

Exposure variability

- ~~Current prEN689 and AIHA IH_Stat condemns GSD>3 as "process out of control or poorly defined SEGs".~~
- Compare your GSD with the typical variability for the exposure profile tested:
 - measurement series performed before
 - GSDs reported in large databases like the German MEGA and the French Colchis
 - Read across with comparable substances and workplaces
 - Modeling
 - Physical-Chemical properties
 -

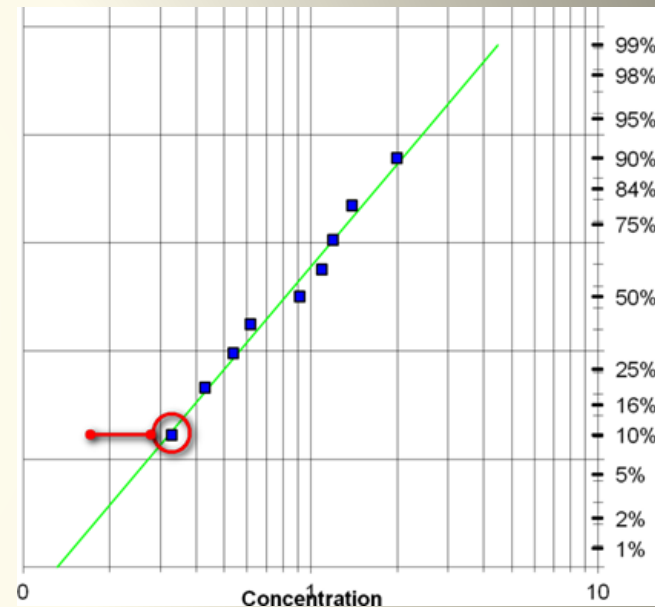
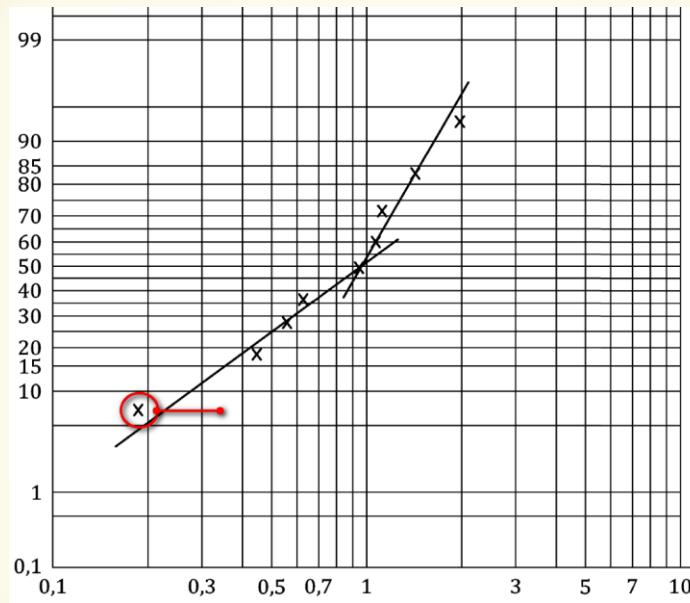
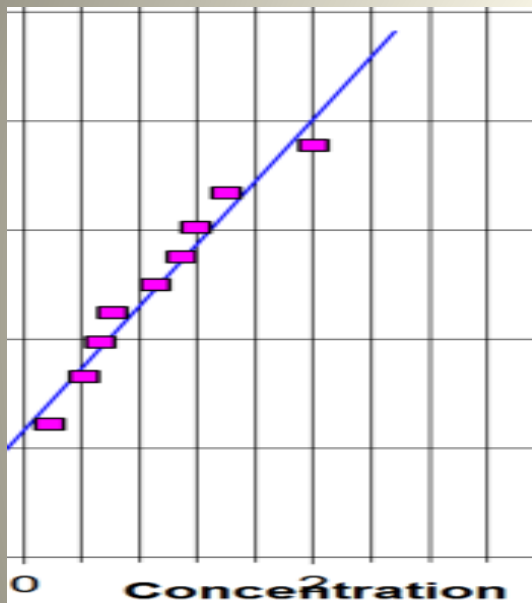
Deviation from lognormal



Example
Figure E.2 Annex E
of the Standard.
IH-Stat plot
N=9
GSD=2.045

TEST FOR DISTRIBUTION FIT	
W-test of logtransformed data (LN)	0.958
Lognormal ($\alpha = 0.05$)?	Yes
W-test of data	0.964
Normal ($\alpha = 0.05$)?	Yes

What to choose?



CVt Normal?

2 lognormal distributions?

Or one inaccurate low value?

Not the statistics, but the exposure determinants (5.1 thru 5.3) will tell!

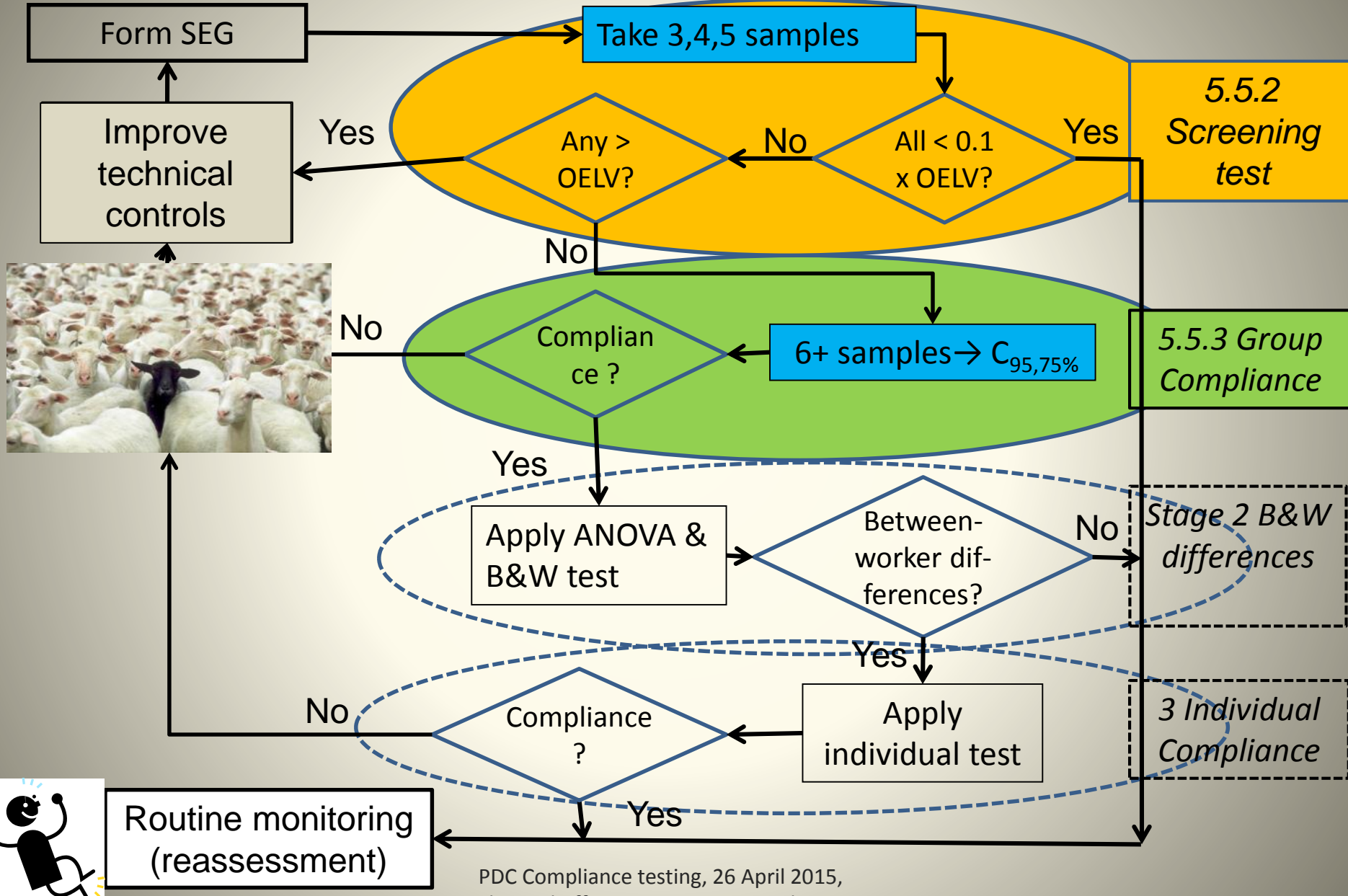
Some workers deviates

If some workers deviate within a group
individual controls may be more effective

Solution

- BOHS-NVvA guidance

prEN 689/NVvA-BOHS testing schemes



Remarks from NVvA mirror session 150919

Unclear (Introduction):

- **why** using this European Standard
- to **whom** it is addressed
- The **additional value** when used

Definition (clause 3):

- What is **Compliance** ?

No start/ignite

Important issue

Compliance decision

- The screenings test 5.5.2. and the 1995 689 annex D.3 both have a three outcome of the compliance test (red, orange, green)
- The 6+ compliance test 5.5.3. has 2 outcome No (red) /periodic resampling decision (orange)

EN 689 (1995) Annex D.3

Compliance	Non-compliance	No decision
$P(C > OELV) \leq 0.1\%$	$P(C > OELV) > 5\%$	Otherwise: additional measurements

prEN 689 (2016) 5.5.3

Decision 5.5.2	Compliance	Non-compliance	No decision
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Compliance & reassessment	Non-compliance
$C_{95,70\%} \leq OELV$	$C_{95,70\%} > OELV$

Next steps 2016

- the CEN enquiry is now scheduled from 2016-06-02 to 2016-09-02 (3 months).
- During this period, each national bodies will organize a national consultation.
- The next WG 1 meeting will be held on 19th and 20th September 2016 in Roma (Italy) and will be dedicated to consider national comments submitted during the CEN-Enquiry.

Who is responsible/accountable for compliance testing quality?

There is no national or EU law demanding compliance testing to be sound science/evidence based, however:

- Causation and control of work-related illness[#] does!
- As occupational hygiene ethics
- So, we are responsible/accountable for good quality compliance testing
- prEN 689 can be a helpful and protective vehicle, especially if science/evidence does not help in the decisions

BOHS

2016



