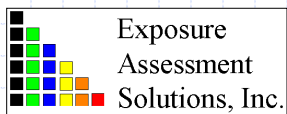


# Control Banding – The Good, The Bad, and The Pulchritude Challenged

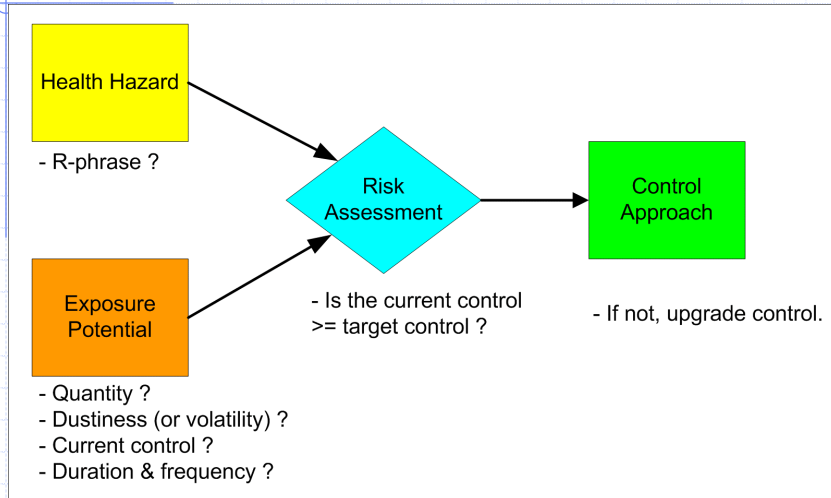
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# Control Banding – The Good, The Bad, and The Pulchritude Challenged

- ◆ Overview
- ◆ The Good
- ◆ The Bad
- ◆ The Ugly
- ◆ Example
- ◆ Opportunities

## Overview (cont'd)



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## Overview (cont'd)

◆ The "risk assessment" basically ask this question:

- Is the upper end of the predicted exposures – i.e., the **exposure predictor band** - less than or equal to the **target exposure range** for the selected Hazard Band?

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## Hazard group vs. target exposure range

Hazard Group (w/ examples)	Target airborne concentration range	
	Particulate	Vapors
<b>A</b> - Skin and eye irritants	>1-10 mg/m <sup>3</sup>	>50-500 ppm
<b>B</b> - Harmful on single exposure	>0.1-1 mg/m <sup>3</sup>	>5-50 ppm
<b>C</b> - Severely irritating & corrosive; skin sensitizers	>0.01-0.1 mg/m <sup>3</sup>	>0.5-5 ppm
<b>D</b> - Very toxic on single exposure; reproductive hazard	<0.01 mg/m <sup>3</sup>	<0.5 ppm
<b>E</b> - Carcinogens, asthmagens	Seek specialist advice	
S: Skin and eye contact	Prevent or reduce skin and/or eye exposure	

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## Predicted exposures - solids

Control Approach	Exposure Predictor Band (mg/m <sup>3</sup> )			
	g – lo,med	g – hi kg,tonne – lo	kg – med,hi	tonne – med,hi
General ventilation	0.01-0.1	0.1-1	1-10	>10
Local Exhaust	0.001-0.01	0.01-0.1	0.1-1	1-10
Containment	<0.001	0.001-0.01	0.01-0.1	0.1-1

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## Predicted exposures - vapors

Control Approach	Exposure Predictor Band (ppm)			
	ml – lo	ml – med,hi L, m <sup>3</sup> – lo	m <sup>3</sup> – med L – med,hi	m <sup>3</sup> – hi
General ventilation	<5	5-50	50-500	>500
Local Exhaust	<0.5	0.5-5	5-50	5-500
Containment	<0.05	0.05-0.5	0.5-5	0.5-5

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## Overview (cont'd)

- ◆ Scheme is basically a qualitative exposure assessment
  - determine hazard (from the MSDS)
  - determine amount and physical state
  - assign appropriate level of control
- ◆ *At its core, however, the UK control banding scheme is an exposure prediction model.*

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## The Good - Advantages

- ◆ Users = SME operators
- ◆ Use of R-phrases
- ◆ Universal application

## The Good (cont'd)

- ◆ Users = SME operators
  - Designed to be implemented by the employer.
  - Online version is better than printed version. Gives generally good advice.
    - ◆ <http://www.hse.gov.uk>
  - Focus is on controls rather than exposure measurements.
  - Recommendations are immediately available.

## The Good (cont'd)

### ◆ Use of R-phrases

- Can be applied to ...
- ... substances either w/ or w/o an exposure limits
- ... to mixtures
- Based on a well-known toxicity classification system.

## The Good (cont'd)

### ◆ Universal application

- Can be applied in both developed and developing nations
- An internationalized version is available - WHO and ILO
- Dermal, ergonomic, and safety versions are in development.

## The Bad – Disadvantages

- ◆ Users = SME operators
- ◆ Reliance on R-phrases
- ◆ Control efficacy - no requirement to verify
- ◆ Lack of convincing validation
- ◆ Limited application

## The Bad (cont'd)

- ◆ Users = SME operators
  - Will they ...
  - ... conscientiously apply control banding?
  - ... to all tasks and substances?
  - ... move to higher levels of control when indicated?
  - ... seek professional help when indicated?
  - Employers are expected to know how to implement the control guidance sheets.
  - Employer-based assessments may be subject to fudging and equivocation.

## The Bad (cont'd)

### ◆ Reliance on R-phrases

- In principle, the R-phrase (i.e., risk phrase) for a substance is assigned by the supplier or manufacturer and is essential for establishing the target control band.
- How accessible, accurate, and consistent are the R-phrases ?
- Lists for EU regulated substances are available – but, who assigns the R-phrase? ...using what procedure? ... re-evaluation?

## The Bad (cont'd)

### ◆ Control efficacy

- All general ventilation, LEV, or containment solutions are assumed equal in efficacy.
- No requirement to verify that exposures are indeed controlled.
- No consideration of the effect of individual work practices.



## The Bad (cont'd)

### ◆ Control efficacy (cont'd)

#### ■ HSE:

- ◆ "...use of the scheme will not in itself constitute a suitable and sufficient workplace risk assessment as required by regulation..."
- ◆ Employers should consider "...the need to monitor exposure to ensure adequacy of control."
- ◆ so: Russell *et al.* AOH 42:367-376, 1998

## The Bad (cont'd)

### ◆ Control efficacy (cont'd)

- Exposure control goals are not indicated to the employer.
- Upper limits for the Hazard Band is not provided.
- Online version: OELs are not provided for substances with limits.

## The Bad (cont'd)

### ◆ Lack of convincing validation

- Exposure prediction is built into control banding.
- How accurate are the exposure predictions of the control banding core model?
- "...a high degree of reliance has been placed upon peer review."
  - ◆ so: Maidment, AOH 42:391-400, 1998

## The Bad (cont'd)

### ◆ Limited application

- The available control guidance sheets cover only a fraction of actual processes.
- Control banding cannot be applied to hot processes, spray applications, and bioaerosols.

## The Ugly – Other Issues

- ◆ OELs and exposure measurements are virtually eliminated
- ◆ OELs may be replaced with R-phrases
- ◆ Reduced knowledge base

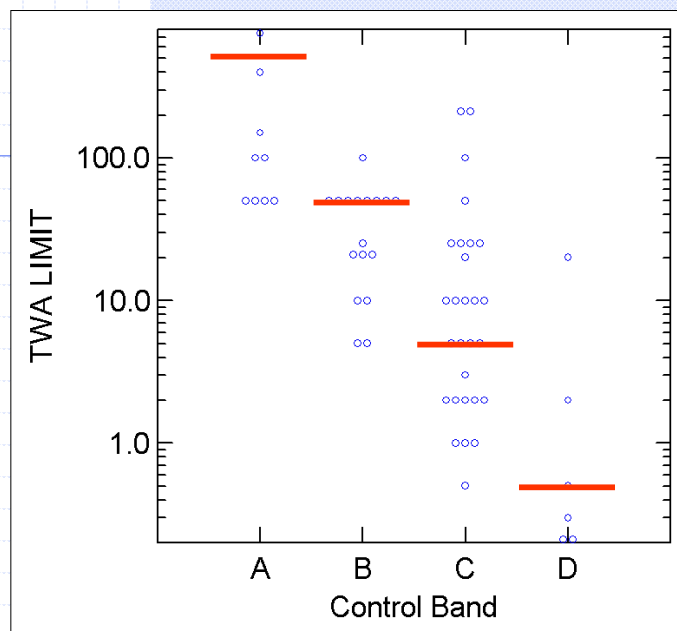
## The Ugly (cont'd)

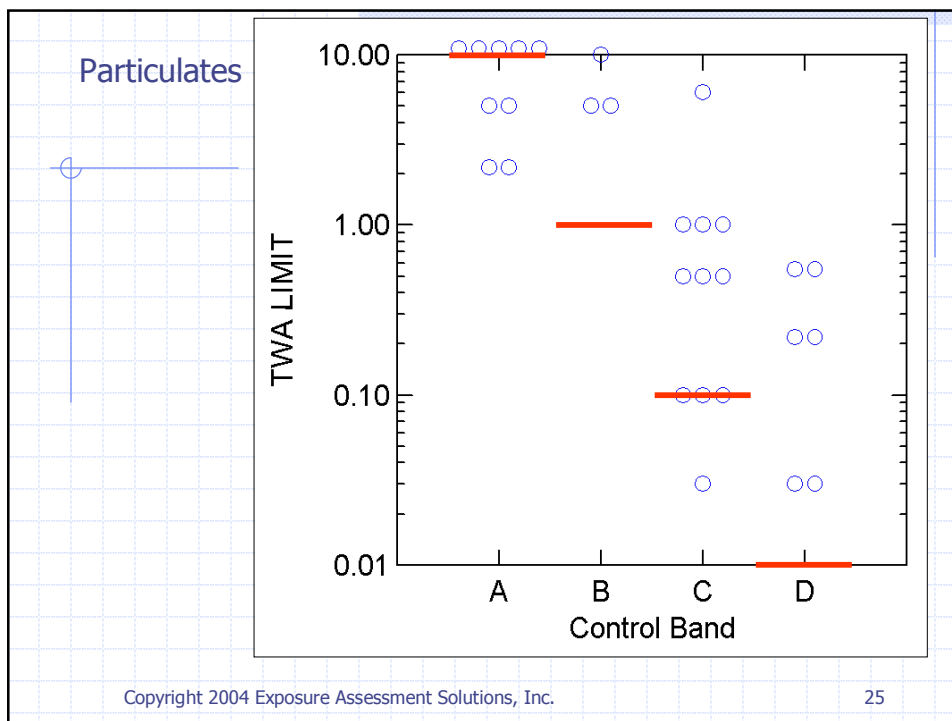
- ◆ OELs and exposure measurements are virtually eliminated
  - OELs are neither mentioned nor used.
  - Target exposure ranges are not given.
  - Verification of control is not required.

## The Ugly (cont'd)

- ◆ OELs may be replaced with R-phrases
  - UK may eliminate ~350 "unreliable" OELs and replace with "COSHH Essentials" and R-phrases.
  - See HSE Consultative Document 189, "Proposals to introduce a new occupational exposure limits (OEL) framework" (2003)

Vapors





## The Ugly (cont'd)

### ◆ Reduced knowledge base

- R-phrases appear to be driven by short-term acute toxicity animal studies.
- In future, even fewer measurements will be available for occupational epidemiology.
- Since OELs are now (nearly) irrelevant, industry will no longer be encouraged to engage in occupational epidemiology.

## Example

### ◆ Source:

- HSE Consultative Document 189
- "Proposals to introduce a new occupational exposure limits (OEL) framework"
- 2003

### Box 4 - Examples of how the new system will operate – paper format

Jane Green, works manager at Wonderglues Ltd, wants to dispense 4-methylpentan-2-one from drums into 250ml bottles. She has not used the chemical before so she purchases the list of WELs from HSE Books.

She looks up 4-methylpentan-2-one and finds:

- it has WEL values of 50ppm 8 hour time weighted average (TWA) and 100ppm short term limit;
- it has a skin notation, with an explanation which warns Jane that the chemical can cause harm as a result of being absorbed into the body through the skin;
- the main health effects are irritation of eyes, nose and throat;
- it has been assigned *COSHH Essentials* hazard groups B and S – (the publication explains *COSHH Essentials* and tells her it can be purchased from HSE Books); and
- for quantities of less than 1 litre general ventilation will provide adequate control, but for larger quantities engineering control will be required.

Jane decides *COSHH Essentials* will help her and orders it from HSE Books. Using the checklist and the hazard grouping given in the list of WELs, she selects control guidance sheets on general advice on engineering control, use of engineering controls in drum emptying and skin protection.

## Example (cont'd)

### ◆ Observations

- Risk management, even for substances with OELs, will consist of applying COSHH Essentials (i.e., control banding).
- No requirement to *verify* that controls are effective.
- The substance has a STEL. Will the control strategy prevent both full-shift and peak exposures?
- However, if conscientiously applied, Jane will learn from the use of COSHH Essentials (especially the online version).

## Opportunities

### ◆ OSHA

- Encourage the development of industry-specific versions of control banding

### ◆ NIOSH

- Test and validate using the HE Program
- Develop Specific SME Versions
- Evaluate the R-phrased approach to developing exposure limits (provisional or otherwise).

## Opportunities

### ◆ Industry and Trade Organizations

- Develop industry or trade specific versions of the control banding scheme.

### ◆ Unions

- Develop job, craft, and/or industry specific versions of control banding

## Opportunities

### ◆ Corporation or Plant

- Develop control banding schemes for repeating unit operations.
- Use for qualitative exposure assessments.

### ◆ Academia

- Develop a conceptual model for developing control banding applications
- Develop industry, unit operation, trade, or craft specific versions.



## Conclusions

- ◆ The technical basis of control banding must be transparent and accessible.
- ◆ Validation must be convincing.
- ◆ R-phrases must be available, as well as their basis and an assessment of their reliability.
- ◆ We should cooperate in developing a “generic” approach to control banding.
- ◆ Trade and craft specific control banding schemes should be encouraged.

## Conclusions (cont'd)

- ◆ Control banding should be used for initial “qualitative” exposure assessments and prioritization.
- ◆ R-phrases can be used to develop provisional exposure limits.
- ◆ Validation of control banding is best done *prospectively*, and not by the analysis of archive datasets.

## Contact Information

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