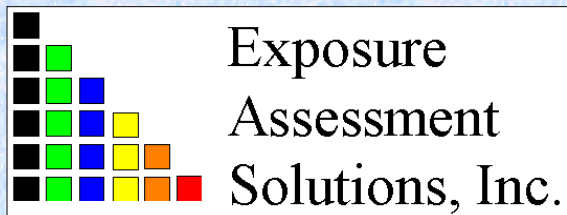


# Control Banding – Advantages and Potential Issues

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# Control Banding – Advantages and Potential Issues

- ◆ Overview
- ◆ Advantages
- ◆ Potential Issues
- ◆ Opportunities

# Overview

## ◆ Precepts:

- Most substances can be grouped into four health hazard bands.
- Each band can be assigned a target maximum exposure that should not be exceeded.
- Exposures are primarily a function of quantity, dustiness (or volatility), and the level of control.
- Most facilities use similar unit operations (e.g., bag filling, mixing, material transfer).
- A combination of unit operation and exposure control can be recommended so that the target maximum exposure is not exceeded during each shift.

# Overview

- ◆ The employer uses a short checklist.
- ◆ The UK control banding scheme is, at its core, an exposure prediction model.

Health Hazard

- R-phrases ?

Exposure Potential

- Quantity ?  
- Dustiness (or volatility) ?  
- Current control ?  
- Duration & frequency ?

Risk Assessment

- Is the current control  
>= target control ?

Control Approach

- If not, upgrade control.

# 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	

## 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

## 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

# Advantages

- ◆ Designed to be implemented by the employer.
- ◆ Focus is on controls rather than exposure measurements.
- ◆ Can be applied to substances either w/ or w/o an exposure limits.
- ◆ Recommendations are immediately available.

# Potential Issues

## ◆ Exposure Prediction Accuracy

- 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

# Potential Issues

## ◆ R-phrases

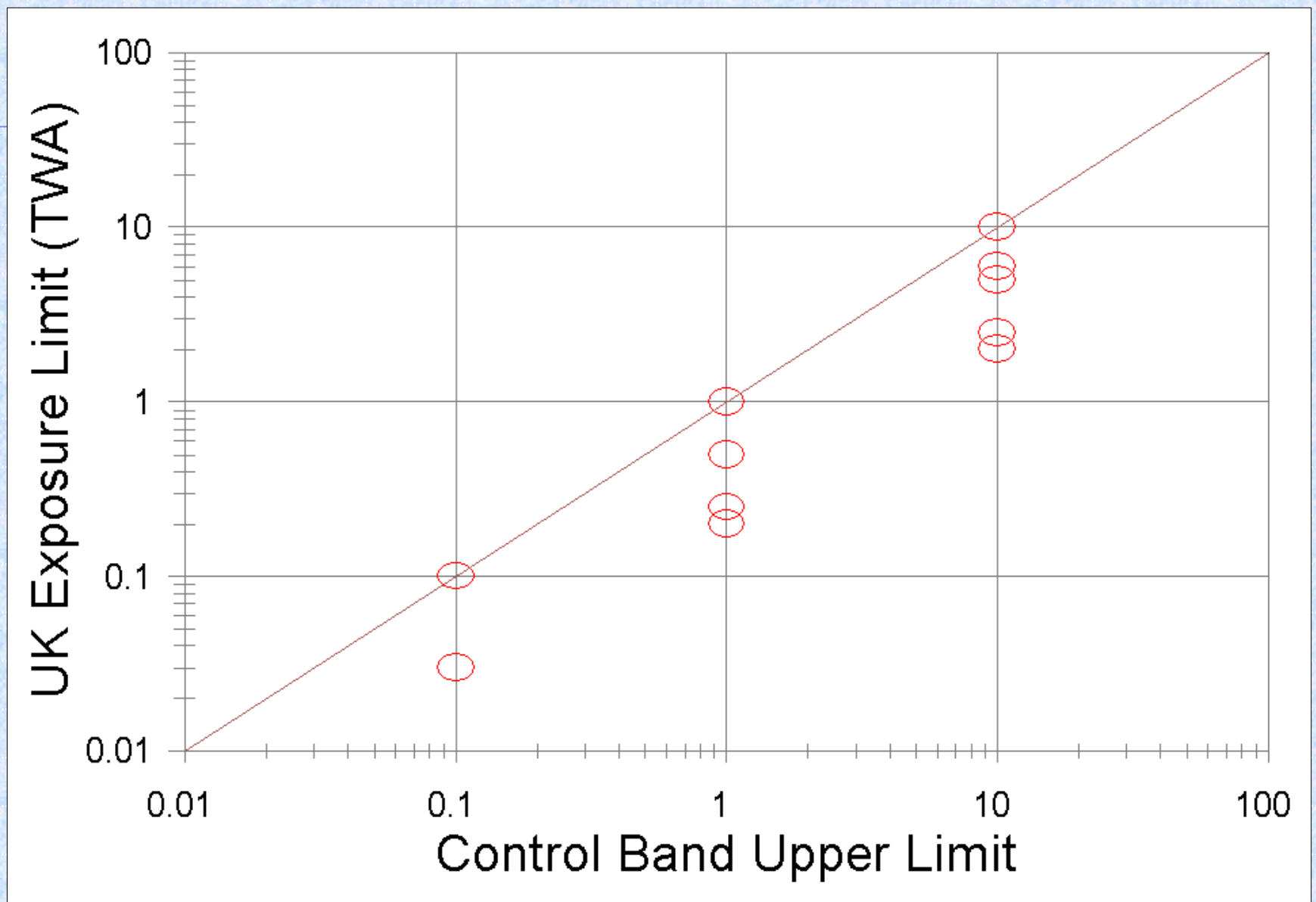
- In principle, the R-phrase (i.e., risk phrase) for a substance is assigned by the supplier or manufacturer and is essential for establishing the target control band. How accessible, accurate, and consistent are the R-phrases ?
- Lists for EU regulated substances are available – who assigns the R-phrase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

# Potential Issues

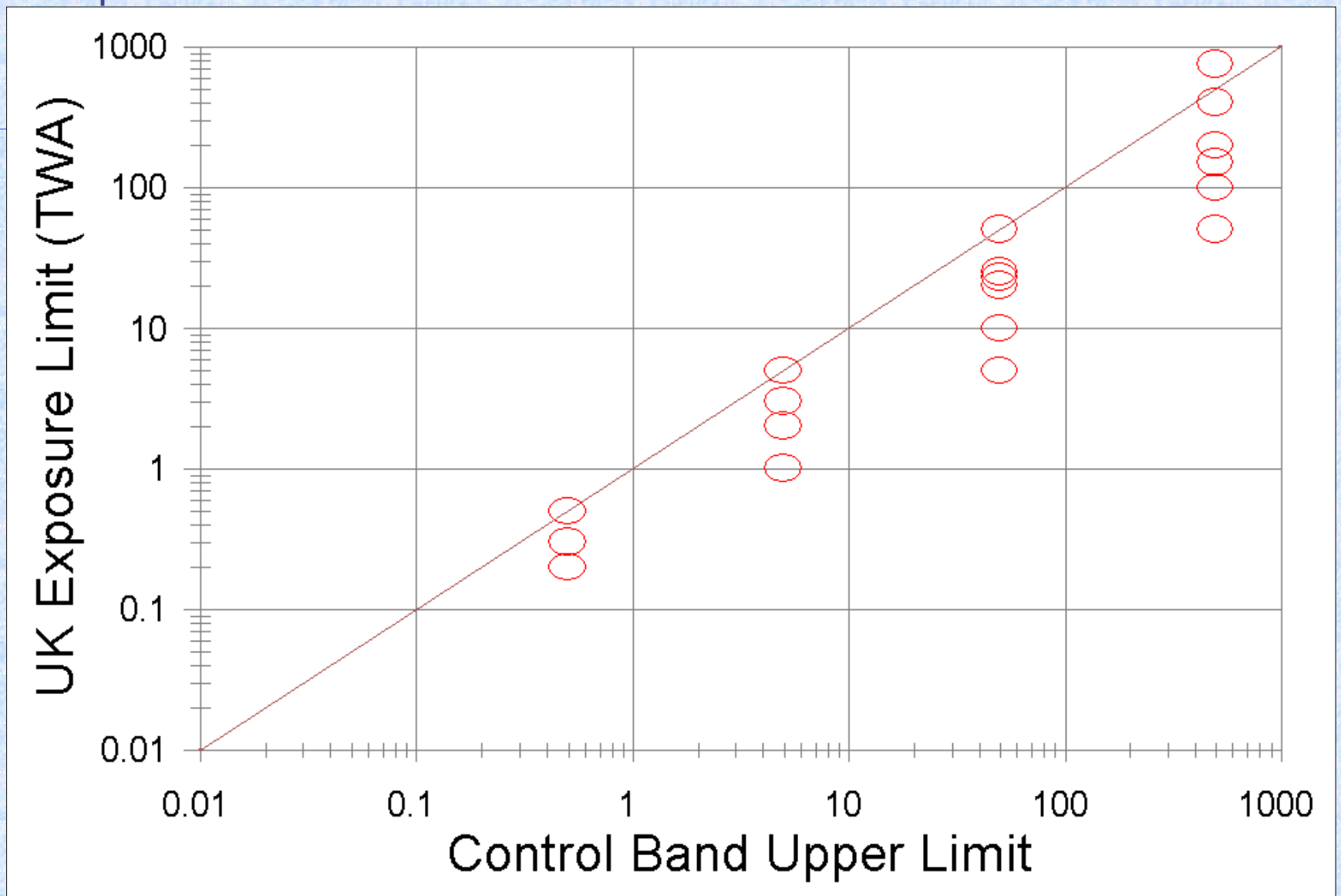
## ◆ Control Band Adequacy

- The R-phrase leads to one of five exposure control bands. How protective is the target exposure control band?
- Yes, occupational exposure limits tend fall within an appropriate band, but also may be considerably less than the upper end of the band.

# Particulates



# Vapors



# Potential Issues

## ◆ Implementation

- Control banding, as envisioned by the UK and EU, is a self-administered, qualitative exposure assessment tool. Will employers conscientiously apply control banding and implement higher levels of control when indicated?

# Potential Issues

## ◆ Testing of New or Existing Controls

- Exposure controls vary in design and effectiveness. Should employers be required or encouraged to verify at some point that existing or upgraded controls indeed limit exposures to the target control band?
- 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

# Potential Issues

- ◆ Industry-specific or unit operation-specific control banding schemes
  - Over the years numerous industry-specific checklists and guidelines have been developed.
  - What is the potential for using the control banding model to develop industry-specific control banding schemes?



## ◆ Examples:

- OSHA 1926.57 ventilation regulations
  - ◆ Hazard band [A..B] + vapor evolution rate [1..4] → level of control
- Refractory ceramic fiber industry
  - ◆ Developed control, PPE, and work practice recommendations for specific unit operations and field procedures, for both manufacturers and users.

# Potential Issues

- ◆ Application outside the UK and EU
  - Implementation of control banding does not guarantee that exposures are adequately controlled relative to a legal exposure limit.
  - Countries vary regarding the legal obligations of employers.
  - Can control banding be applied outside of the UK and EU?

# Potential Issues

- ◆ Incorporation into an exposure assessment and management program
  - Control banding is basically a structured approach to an industrial hygiene qualitative exposure assessment. What components of control banding can be integrated into a general industrial hygiene program?

# Opportunities

## ◆ OSHA

- Encourage industry to develop their own versions for...
  - ◆ Unregulated substances
  - ◆ Z-table substances
- Permit as a performance-standard alternative
  - ◆ Objective exposure assessment (i.e., modeling) is already permitted in several standards and regulations

# Opportunities

## ◆ NIOSH

- Test in HE Program
  - ◆ Prospectively
    - Administer questionnaire during the walk-through
    - Compare exposure predictions with measurements
    - Keep track of implementation issues and confounders
  - ◆ Retrospectively – review HE files by unit operation
- Develop Specific SME Versions
  - ◆ Use small business experience to develop targeted control banding schemes
- Evaluate the R-phrase approach to developing exposure limits (provisional or otherwise).

# Opportunities

## ◆ Industry and Trade Organizations

- Develop industry or trade specific versions of the control banding scheme.
- Building contracts could require that the main contractor and subcontractors use validated control banding schemes.

# Opportunities

## ◆ Unions

- Develop job, craft, and/or industry specific versions of control banding
- Union contracts could require that employers use validated control banding schemes.

# Opportunities

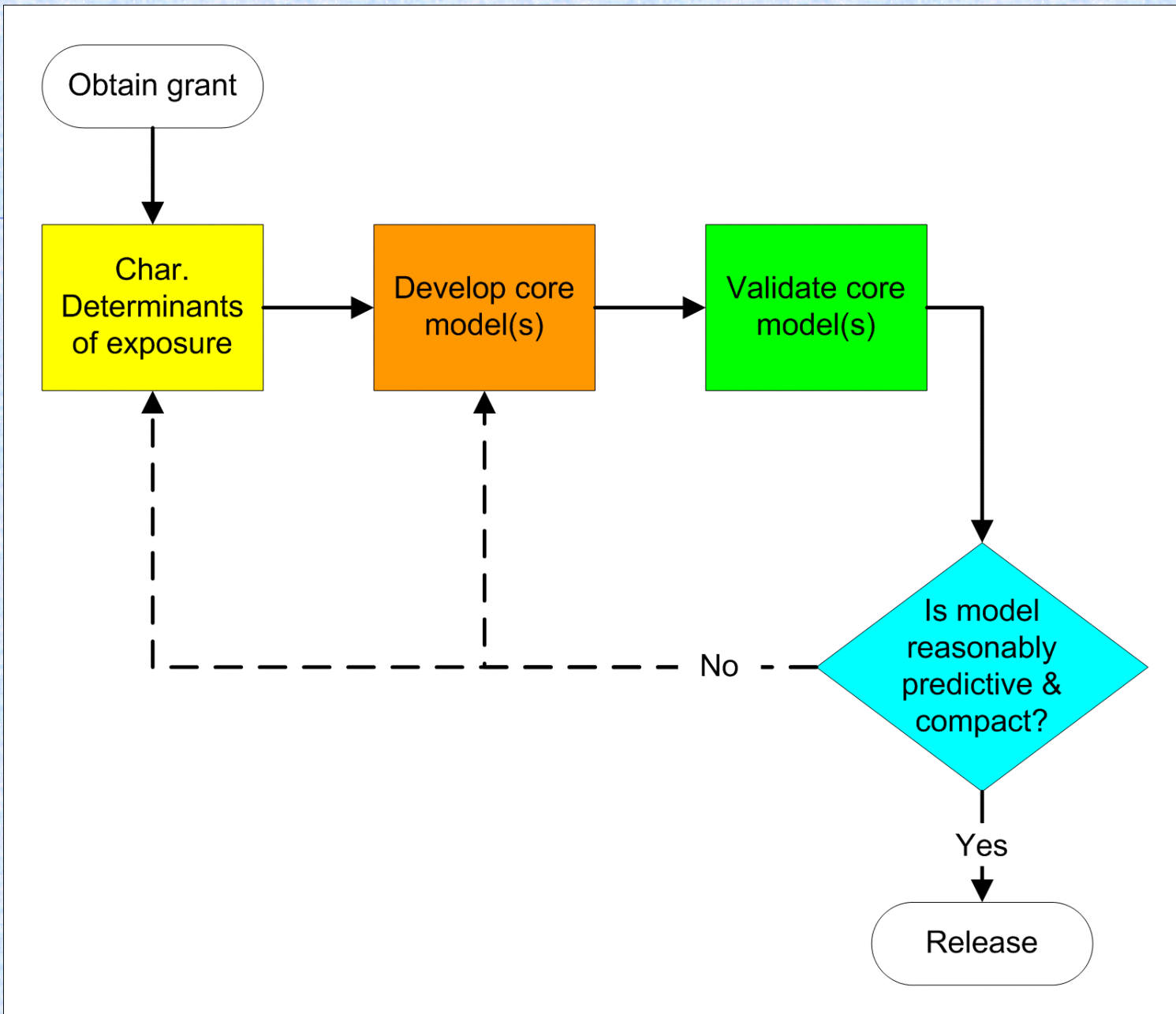
## ◆ Corporation or Plant

- Develop corporation (or plant) control banding scheme for repeating unit operations.
- Use generic and customized versions of control banding for qualitative exposure assessments.

# Opportunities

## ◆ 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.
- ◆ R-phrases must be available, as well as their basis and an assessment of their reliability.
- ◆ Control banding should be embraced by the IH community.
- ◆ We should cooperate in developing a “generic” approach to control banding.
- ◆ Trade and craft specific control banding schemes should be encouraged.

# Contact Information

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