

# Exposure scenario for MeO, an example



*to cover the use pattern of a widely used substance..*

- MeOxide is a widely used substance
  - > 50 identified uses
  - Among those, typical processes are identified as critical in terms of exposure
  - e.g. “unbagging” of MeO powder and mixing, blending it in an organic matrix to make a liquid matrix for further processing
- Similar process = similar exposure
  - Group all uses characterised by this activity into one generic exposure scenario (GES)

*and identify all uses...*

- From manufacturers and their users, an exhaustive list of identified uses is put together
  - Compilation of all use descriptors (SU, PROC etc. codes) via questionnaires
- Grouping of similar uses (processes) into groups for Generic Exposure Scenarios (GES)
  - Identify most critical use descriptors assigned to the group's uses, for use in first tier modeling

## *Hazard profile of MeO?*

- Human health:
  - Inhalation DNEL (OEL): 2mg/m<sup>3</sup> (total inhalable)
  - Systemic (including dermal): 10mg/day internal
- Environment
  - PNEC water: 25µg/l
  - PNEC sediment: 250mg/kg DW
  - PNEC soil: 500 mg/kg DW

# *Exposure assessment*

- Identification of main exposure routes
  - Human health (workers)
    - inhalation of powder/dust
    - dermal absorption
  - Environment
    - Process emissions to air (to soil), to water (to sediment)
  - *Professional use: not further considered here*
  - *Consumer/use life exposure:*
    - *Combined with other sources*
    - *Not further considered here*

# 1. Exposure assessment human health, workers

- Tier 1: Use of “Metals-EASE” model (MEASE)
  - Setting of parameters driving exposure
  - Consideration of risk reduction measures
  - Exposure through inhalation and dermal contact

## Exposure estimate

Dermal exposure estimate

Exposed skin area

**Total dermal loading**

**Inhalation exposure estimate**

## Exposure estimate

300 µg/cm<sup>2</sup>/day

240 cm<sup>2</sup>

**72 mg/day**

**0,001 mg/m<sup>3</sup>**

developed by



on behalf of



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<http://www.ebrc.de/ebrc/ebrc-mease.php>

## *MEASE simulation*

- Borderline risk so further refinement


## *Refining the scenario*

- **Use ART (tier 2)**
- **Measured data** from companies having the process
  - What process conditions?
  - Risk reduction measures?
  - Safe general workplace atmosphere is primary target
    - Personal protection is applied if needed

Database: different sectors having similar process

- 50P: 0.2 mg/m<sup>3</sup> / 90P 1.2 mg/m<sup>3</sup>
- ⇨ Safe use demonstrated through measured data
  - RMM: general LEV, gloves, workplace risk management system

## 2. Exposure assessment: environment

- ERC: assumes loss of x% to water (e.g. ERC 2,3)  

- Me-SPERCS: developed for metal-related processes
  - Me-SPERC for “formulation of Me compounds”: 0.5%
    - Conservative, 90P of database of different metals (high-low use volume, high-low toxicity)



- **SPERC Guidance**
- **SPERC fact sheets:**  
link Operational  
Conditions and Risk  
Management  
Measures to release

Life-cycle stage	Substance	Linked to ERC	Default release to air (incl.RMMs)	Default release to water (incl. on-site RMMs)	SPERC fact sheet
Production	metal	1	0.03 %	0.01 %	<a href="#">Download version 1.2</a>
Production	metal compounds	1	0.03 %	0.02 %	<a href="#">Download version 1.1</a>
Formulation	alloy	2,3	0.007 %	0.003 %	<a href="#">Download version 1.1</a>
Formulation	metal compounds	2,3	0.004 %	0.5 %	<a href="#">Download version 1.1</a>
use-shape	metal	12a	0.02%	0.01 %	<a href="#">Download version 1.2</a>
Use-intermediate	metal/alloy	6a	0.03 %	0.02 %	See SPERC Production of metal compound
Use-Metallic coating	metal + metal compounds	5	0.4 %	0.6 %	<a href="#">Download version 1.1</a>
Use-batteries	metal + metal compounds		0.002 %	0.003 %	<a href="#">Download version 1.1</a>
Use	metal compounds	4-7	0.1 %	0.6 %	<a href="#">Download version 1.1</a> (further refinements are ongoing)
Service life	metal	8-11	Use ERC	Use ERC	
Service life	metal compounds	8-11	Use ERC	Use ERC	
Waste	metal				Under development
Waste	metal compounds				Under development

To keep posted on future updates please email your contact details to Dr. Frederik Verdonck at [frederik.verdonck@arche-consulting.be](mailto:frederik.verdonck@arche-consulting.be) or visit our website on a regular basis.

<http://www.arche-consulting.be/Metal-CSA-toolbox/spercs-tool-for-metals>

## *Refinement of environmental assessment*

- Measured emissions data: replace SPERC by (specific) measured emission factor
  - Very difficult to get emissions data down the supply chain
  - But measured data may be key in high tonnages ranges
- Apply DU-calculator to the specific local situation
  - Receiving environment e.g. Water flow, effluent flow
  - For some Metals: local water conditions pH, hardness, DOC for correction bioavailability (if models existing)

## *Downstream users exposure calculation tool*

### Principle:

- M/I draft initial (G)ES
  - Perform risk characterisation (RC)
  - Often based on default assumptions
  
- DU have option to tweak ES to better reflect local conditions
  - ‘Scaling’ of parameters

*<http://www.arche-consulting.be/Metal-CSA-toolbox/du-scaling-tool>*

# *DU calculator simulation*

# *Conclusions*

- GES allow to cover several identified uses at same time in one scenario
  - Similar process = similar exposure = similar RMM
- Development of GES is needed when widely used substances with many identified uses
  - E-MSDS: not practical for each identified use specifically
- Risk management measures are necessarily set to minimal to cover all situations
  - can be further specified

## *Conclusions (2)*

- Exposure models are needed for 1st tier exposure assessment
- Generic models are very conservative
  - Sector specific models should be used (MEASE, Me-SPERCs,...)
- The further down the supply chain, the more difficult to get exposure data
  - Tonnage of use is critical modelling parameter
  - Measured exposure data may still be needed

