Ontwikkeling van Generieke Exposure Scenarios voor chelaten

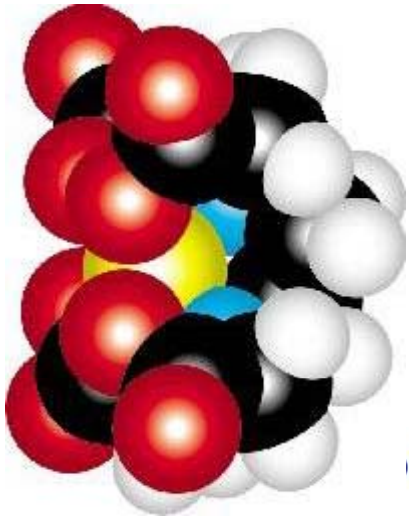
TNO | Knowledge for business

Selma Hertsenberg, project manager

AkzoNobel
Tomorrow's Answers Today

Chelaten

- Functie: in oplossing brengen en controleren van metaal ionen
- Brede range van applicaties:
  - Voorkomen neerslaan van metaal ionen
  - Oplossen van neergeslagen stoffen
  - Optimaliseren van processen
- Hazard: laag toxisch, verwaarloosbare dermale absorptie
- DNELs:
  - Inhalatie: 2 mg/m3
  - Dermal: geen absorptie, alleen lokale effecten



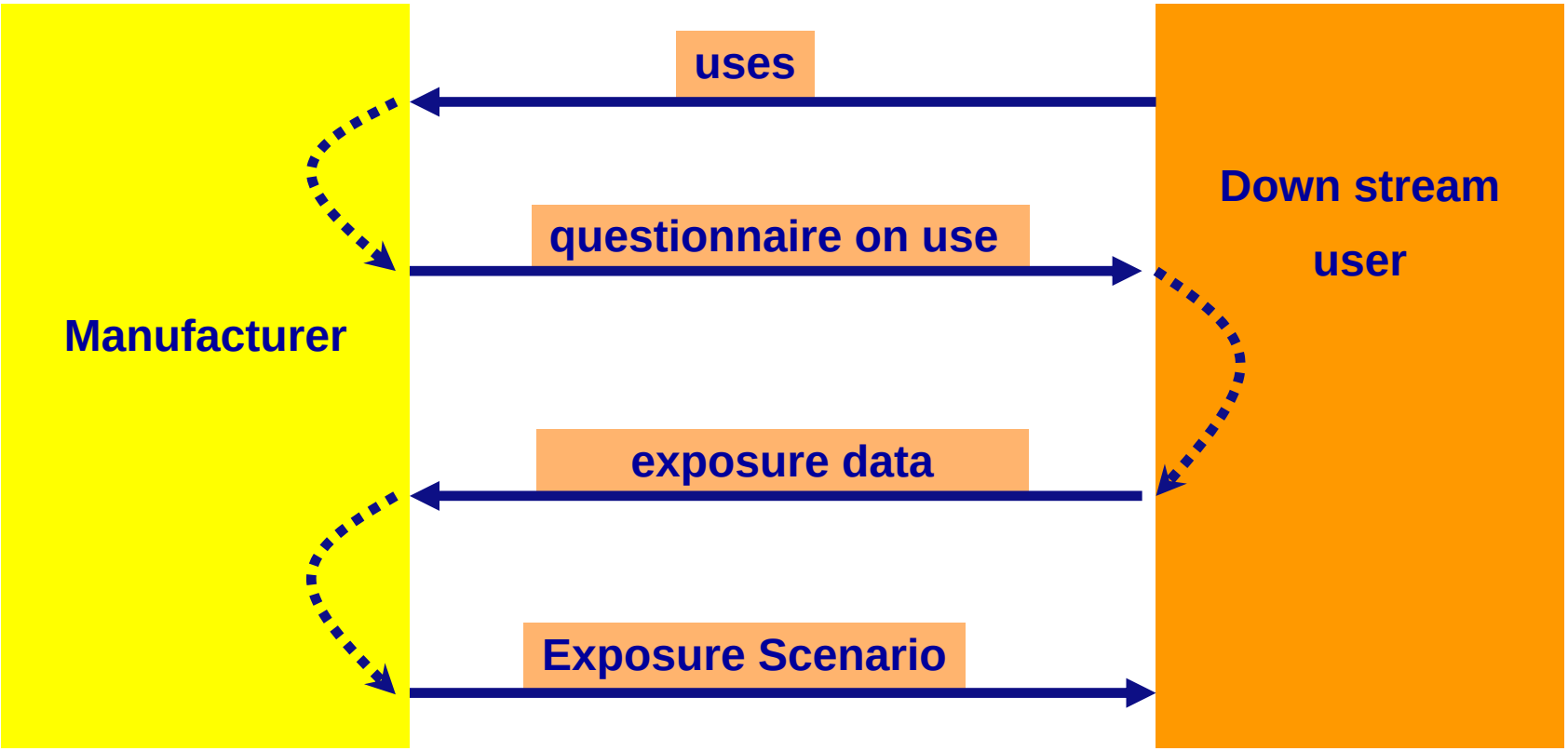
Akzo Nobel applicaties

April 2009

code	description
AD	adhesives
BU	Building and construct
CB	cleaning boilers/heat exchangers
CO	cosmetics
CP	Coproducers
DI	distributors
FC	functional chemicals
FE	feed additives
FO	Food
GT	gas treatment
HE	herbicides
HO	household cleaning
II	I&I cleaners
IN	Inks
LE	leather
MW	metal working fluids
OD	oil drilling
PA	paint
PH	pharmaceuticals
PO	Polymers
PT	photography
PU	Pulp
SC	Soil cleaning
SU	sugar industry
TE	textile
WT	water treatment

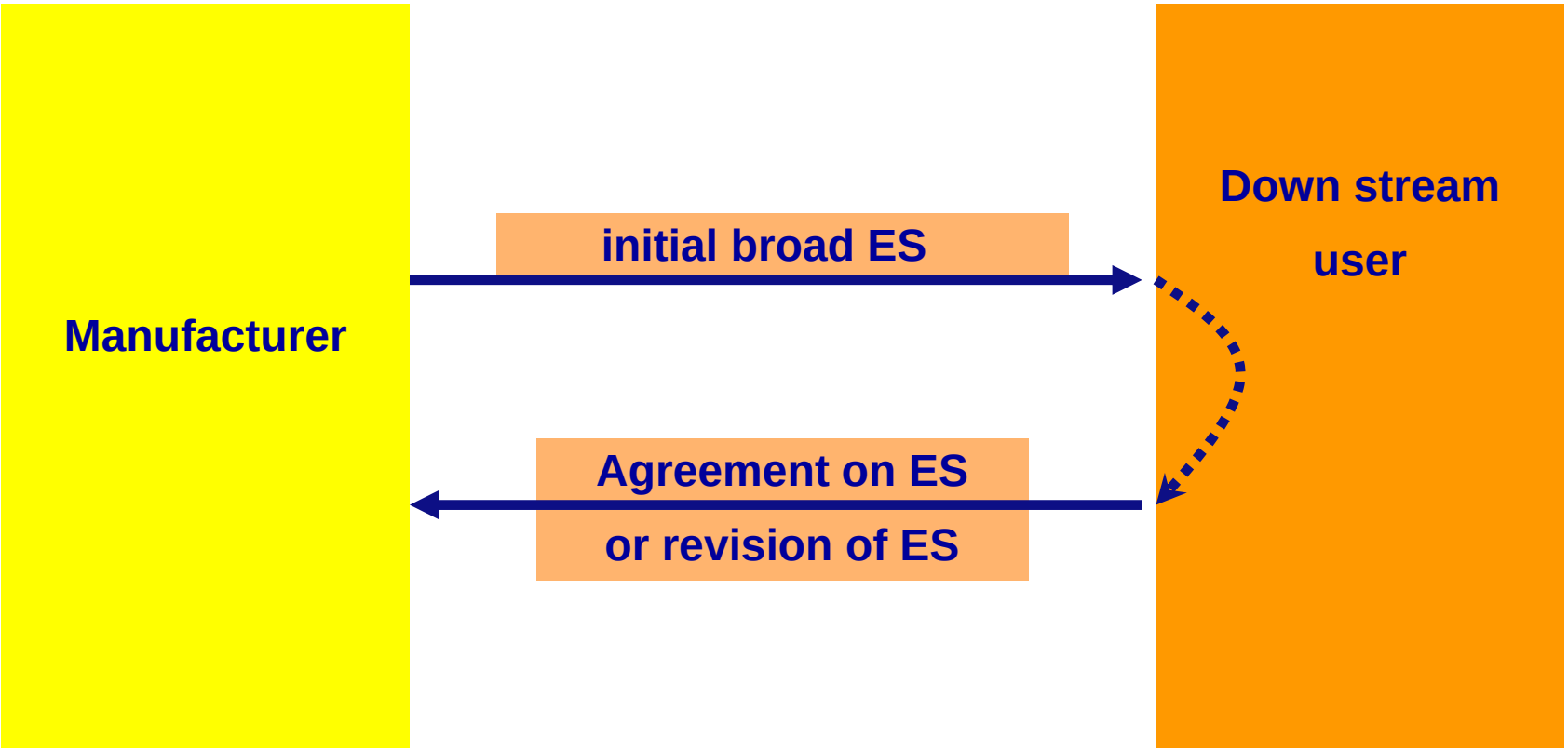
Mogelijke optie

“What we do not like to see”

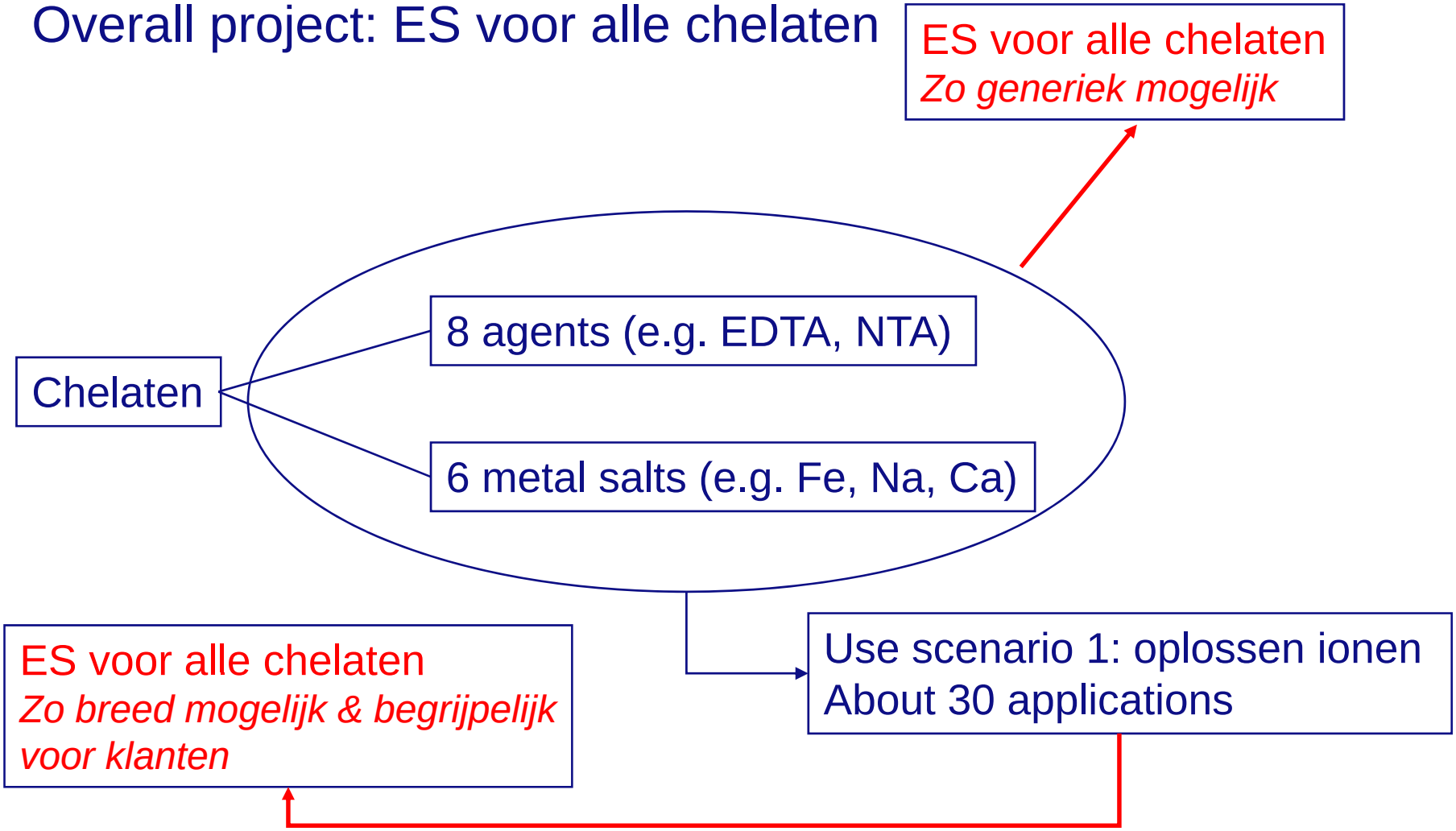


Uitgangspunt dit project:

“What we do like to see”



Overall project: ES voor alle chelaten



Stap 1: clustering van gebruiken

- Bepaal Life Cycle Stage (LCS)
  - Productie, Formuleren, Eind gebruik
- Ken Descriptors of Use (DoU) toe

  standaard REACH format om gebruiken te beschrijven
  - SU = Sector of use (23 sectors described) → welke sector
  - PC = Product category (40 types described) → type product
  - PROC = Process category (24 described) → wat gebeurt er
  - AC = Article category (40 described) → type article
  - ERC = Environmental Release Category (12 described) → release
- Clustering gebaseerd op LCS en DoU

Clustering based on:
-Worker exposure (PROC)
-Environmental emission (ERC)
-Consumer exposure

Distributors

ES 1
Production
Industrial

HE, PT, TE, AD, PA, CO, GT, CP, FC

ES 2
Formulation
Industrial

BU, PH, PT, PA, AD, IN, I&I, HO, HE, PO, CO, FO, FE

ES 3
End use:
Pure chelates
Industrial

CP, WT, LE, PU, WT, MW, TE, OD, GT, SU, CB, SC

ES 4
End use:
Spray formulations
Industrial/professional

CB, PA, FE, I&I, BU, PA, HE, I&I

ES 5
End use:
Use formulations
(none-spraying)
Industrial/professional

PH, HO, FC, CO, PO, AD, IN, PT, I&I, IN, LE, PA, AD

ES 6
End use:
Building industry

PT, OD, IN, I&I, PU, PT, I&I, SU, HE

ES 7
End use:
consumers

PA, I&I, HO, SC, AD, CO, FO, PA, MW, AD, PA, HO

Stap 2: worker exposure assessments

Dermaal: geen absorptie → geen DNEL → niet relevant
Liquids: lage dampspanning → niet relevant (behalve verspuiten)
Solids: handeling met hoogste blootstelling schatten

ES	Relevant PROC	Relevant solids?	Relevant liquids?
1+2+3 Industrieel	8/9 (transfer) +1,2,3,4,5,13,14 indien in gesloten proces	Yes	No
4 Industrieel/professioneel	7+11 (spraying)	No	Yes (7 and 11)
5 Industrieel/professioneel	8/9 (transfer) 10 (kwasten/rollen) 19 (hand mixing)	Yes (8/9) No (10) Yes (19)	No
6 professioneel	21, 24 (bewerken artikelen)	Yes	No

Stap 2: worker exposure assessments

- ECETOC TRA → geen veilig gebruik

- Stoffenmanager, met verschillende input parameters:
  - Operational conditions (OC)
    - Percentage chelaat in eindproduct
    - Duur van de handeling
  - Risk management measures (RMM)
    - Lokale afzuiging
    - Spuitcabine
    - PPE
  - Gezocht naar meest geschikte combinaties → laat de keuze aan DU

Stap 2: worker exposure assessments

Spuiten

	Standard scenario 11	Option 11A	Option 11B	Option 11C	Option 11D	Option 11E	Option 11F	Option 11G
Duration Percentage RMM	- 50 minutes - 100% - none	- 8 hours - 3% - none	- 4 hours - 35% - Local Exhaust Ventilation[2]	- 8 hours - 35% - cabin[9]	- 6 hours - 50% - spraying booth[10]	- 8 hours - 35% - Personal Protective Equipment[11]	- foaming[12] - 6 hours - 15% - none	- foaming[7] - 2 hours - 100% - none
Inhalation dust	Not relevant because the substance is used via a liquid product							
Inhalation liquid[13]	1.84 mg/m³	1.74 mg/m³	1.99 mg/m³	1.92 mg/m³	1.54 mg/m³	1.92 mg/m³	1.70 mg/m³	1.99 mg/m³
Dermal	Negligible exposure because dermal absorption is ≤ 0.001%							

Transfer

All PROCs

	Standard scenario 8	Option 8A
Duration RMM 1 RMM 2	- 1 hour - Local Exhaust Ventilation[3]	- 3 hours - Local Exhaust Ventilation[3] - filter mask P2[4]
Inhalation dust	1.09 mg/m³	1.75 mg/m³
Inhalation liquid	Negligible exposure due to the very low vapour pressure	
Dermal	Negligible exposure because dermal absorption is ≤ 0.001%	

Stap 3: Exposure Scenarios

- Uitgangspunt: 1 cluster = 1 ES
- Termen Stoffenmanager als ‘standaard zinnen’
- Begrijpelijk voor klanten
  - Leg onduidelijke begrippen uit
  - Maak gebruiksomstandigheden zo ruim mogelijk
  - Handleiding voor gebruik en lezen ES
- Aanpassing op format Akzo Nobel

Adding chelates to liquid and solid formulations

This Generic Exposure Scenario (GES) is applicable for chelates:

- With a long term inhalation DNEL not below 2 mg/m^3
- With a $PNEC_{freshwater}$ not below 2.2 mg/l
- That have a negligible dermal uptake
- Which are not class 1 or 2 Carcinogenic Mutagenic and/or Reproduction toxic, nor Persistent Bio Accumulating and Toxic, nor very Persistent and very Bio accumulating
- In the solid (coarse dust) and liquid form

This Generic Exposure Scenario is applicable for worker exposure and environmental emission.

Title and covered activities	
1. Short title of the exposure scenario	Adding Chelates to liquid and solid formulations *Exposure was evaluated by use of Stoffenmanager 4.0 and EUSES 2.1*
2. Processes and activities covered	•Sector of Use: SU 3 (industrial use), SU10 (formulation) •Product Category: All PCs •Process Category: PROCs: 1, 2, 3, 4, 5, 6, 8a/b, 9, 10,14 and 19 •Environmental Release Category: ERCs: 2 and 3 (both formulation) See:http://guidance.echa.europa.eu/docs/guidance_document/Inforeq_CSR_R12_en.pdf (R12, draft version 2.0, 2009) **Processes and activities covered:** PROC 1, PROC 2, PROC 3: use in closed continuous and batch processes, synthesis or formulation, with occasional controlled exposure, for example: sampling; mixing in a closed system; blending in a closed system. PROC 4: use in batch and other process with opportunity for exposure, for example: sampling; mixing; blending. PROC 5: formulation of liquid and solid-based products, for example: sampling; mixing; blending; calendaring. PROC 6: calendering operations. PROC 8 a/b: charging/discharging from/to vessels at dedicated and non-dedicated facilities, for example: manual discharging of powders from bags into an open vessel; dumping of powders through a pipe or chute; adding liquids, for example by pumping; relatively small scale or manually scattering/strewing of the product; manually

Operational Conditions (OC)	
3. Duration and frequency of use	Duration and frequency of the standard scenarios are presented. Please note that working with chelates in solid forms requires Local Exhaust Ventilation (LEV). Alternative options are described in paragraph 8. **Liquid form:** PROC 1, PROC 2, PROC 3, PROC 4, PROC 5, PROC 6, PROC 8a/b, PROC 9, PROC 10 and PROC 19: may be performed during the whole shift (up to 8 hours per day; during the whole year) under the condition that no aerosols are formed. **Solid form:** PROC 1, PROC 2, PROC 3, PROC 4, PROC 5, PROC 6, PROC 9 and PROC 14 may be performed during the whole shift (up to 8 hours per day; during the whole year) as long as no direct contact with solid chelates takes place PROC 8a/b: may be performed up to 1 hour 50 minutes per day during the whole year PROC 10: may be performed during the whole shift (up to 8 hours per day; during the whole year) as long as the maximum time exposed to 100% pure chelate dust is maximum 1 hour and 50 minutes per day. PROC 19: without LEV may be performed up to 3 hour 55 minutes per day during the whole year **Environmental release** ERC2, ERC 3 (formulation of preparations and into a matrix) 200 or more emission days per year; standard spillage of 2%; please check paragraph 8 for more options
4.1 Physical form of substance or preparation; surface to volume ratio of articles;	**All PROCs** •Pure solid substance: coarse dust. •Liquid form: chelates in solution or suspension with a vapor pressure below 1 Pascal (includes all dissolvine products). •Chelates processed into tablets: solid tablets with a possibility for dust formation.
4.2 Concentration of substance in preparation	The concentrations of the substance for the standard scenarios are presented. Scaling options are described in paragraph 8. **All PROCs** up to 100% substance can be used.
4.3 Amount used per time or activity	Description of standard scenarios, please check paragraph 8 for more options! All yearly use amounts are given in 100% active material in acid form. •Up to 440 tonnes of active material per year (if connected to a municipal Sewage Treatment Plant (STP)) •Up to 1,460 tonnes of active material per year (if connected to an adapted STP with an 70% efficiency)
5. Other relevant operational conditions of use	PROC 9: use of chelates in dedicated filling lines that are designed to minimize spillage. Avoid direct contact with chelates as much as possible.
Risk Management measures (RMM)	
6.1 Risk management measures related to human health (specified for workers or consumers)	Check chapter 8 of the safety data sheet for specific recommendations on the use of appropriate gloves and goggles. Please note that the prescribed personal protective equipment is mandatory. Here the RMMs of the standard scenarios are presented. Alternative options are described in paragraph 8 of this ES. For **solids:** all PROCs except PROC 19, LEV required (efficiency at least 70%). For **liquids**: all PROCs, no RMM needed Wear gloves in case the use of chelates results in intimate skin contact.

8. Exposure prediction and reference to its source	

Worker

First the standard scenarios are presented, subsequently if available one or more alternative options for control of risks are presented. The exposure estimates for workers are all based on Stoffenmanager 4.0 model.

No alternative options are needed when only liquid forms are handled.
No alternative options are needed when chelates in solid forms are handled in closed processes.

PROC 8a/b (charging/discharging) for activities where contact with the powder is possible

	Standard scenario	Option A	Option B
Duration	1 hour 50 minutes	3 hours 25 minutes	Whole shift
RMM 1	Local Exhaust Ventilation: efficiency at least 70%	Local Exhaust Ventilation: efficiency at least 70%	Powered air respirator; assigned protection factor of 10.
RMM 2		Filter mask P2; assigned protection factor of 5.	
Inhalation dust	2.00 mg/m^3	2.00 mg/m^3	1.99 mg/m^3
Dermal	Not relevant because dermal absorption is negligible		

PROC 9 (charging/discharging of powder) **PROC 14** (preparations by tabletting)

	Standard scenario	Option A
Duration	whole shift	3hours 50 minutes
RMM 1	Local Exhaust Ventilation; efficiency at least 70%	none
Inhalation dust	1.80 mg/m^3	2.00 mg/m^3
Dermal	Not relevant because dermal absorption is negligible	

PROC 19 (hand mixing of powder)

	Standard scenario	Option A
Duration	3hours 55 minutes	8 hours
RMM 1	none	Filter mask P2; assigned protection factor of 5
Inhalation dust	2.00 mg/m^3	1.64 mg/m^3
Dermal	Not relevant because dermal absorption is negligible	

Environment

Amounts to be used per year per location should not exceed 440 tons (100% active material expressed as acid weight) giving a PNEC of max 2.2 mg/l

Stap 4: Training

- 10 salesmanagers (heel EU)
- Doel: kan feedback halen bij klanten
- Leren:
  - Wat is REACH (basis)
  - Wat zijn ES
  - Wat moeten wij daarmee?
- Ervaring:
  - REACH = Moeilijk
  - Maar: het lukt toch om mensen ‘mee’ te krijgen!
  - In 3 maanden tijd veel nuttige reacties
    - Agreement én revision

Hoe verder

- Vergelijking met diverse beschrijvingen/GES uit branches:
  - AISE (zepen)
  - FEICA (lijmen)
  - CEPE (verven)
  - Bouw
- Verwerken van klantreacties (+/- 25)
- Toegepast op andere chelaten → vallen er binnen!
- Schrijven van CSR
- Toepassing op andere groepen van stoffen

Conclusies en aanbevelingen

- Clusteren
  - Van 30 applicaties naar 6 ES
  - Basis goed kiezen!
- Generieke ES
  - Werkt goed voor laag-toxische stoffen
  - Alle chelaten vallen eronder!
  - Geen goede optie bij hoog-toxische stoffen, zoals CMR
- Gebruik Stoffenmanager
  - Zeer geschikt om verschillende opties uit te rekenen
    - Meer opties dan ECETOC TRA
  - Nadeel: dermaal moet apart