Die Umweltexpositionsbewertung an einem praktischen Beispiel

REACH für Anwender

Update-Veranstaltung der BAuA, Berlin, 22.04.2010

Nannett Aust

Umweltbundesamt
Fachgebiet Chemikalien
Wörlitzer Platz 1
06844 Dessau-Roßlau

Art. 14: Stoffsicherheitsbericht, Absatz (1)

(1) Stoffsicherheitsbeurteilung (Chemical Safety Assessment: CSA)

- durchzuführen für alle registrierungspflichtigen Stoffe > 10 t/a je Registrant
- für den Stoff selbst
- den Stoff als Komponente eines Gemisches (Art. 14 Abs. (2) definiert Ausnahmen hierzu)
- den Stoff in einem Erzeugnis

Stoffsicherheitsbericht (Chemical Safety Report: CSR)

- dokumentiert die Stoffsicherheitsbeurteilung gem. Art. 14 Absätze 2 bis 7 und Anhang I

Art. 14: Stoffsicherheitsbericht, Absatz (3-4)

(3) Schritte der Stoffsicherheitsbeurteilung

a) Ermittlung schädlicher Wirkungen auf die Gesundheit des Menschen

b) Ermittlung schädlicher Wirkungen durch phys.-chem. Eigenschaften

c) Ermittlung schädlicher Wirkungen auf die Umwelt (u. a. PNEC)

d) Ermittlung der PBT-, vPvB-Eigenschaften

(4) zusätzliche Schritte der Stoffsicherheitsbeurteilung

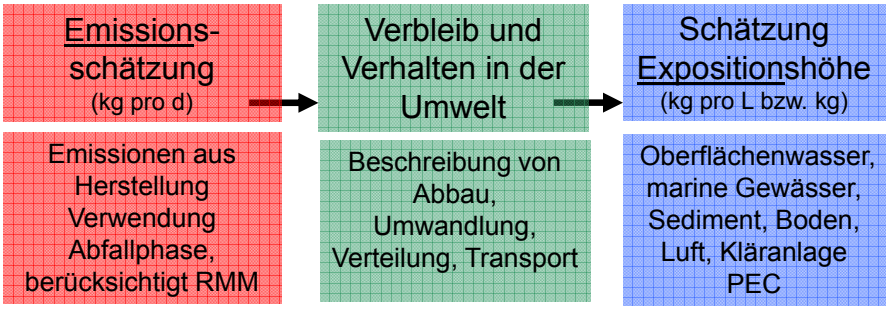
wenn aus Schritt a) – d) folgt, dass Stoff **als gefährlich einzustufen** ist oder es sich um **PBT-, vPvB-Stoff** handelt , sind für alle identifizierten Verwendungen zu erstellen:

a) Expositionsbeurteilung inkl. Entwicklung eines oder mehrerer Expositionsszenarien und Expositionsabschätzung (PEC)

b) Risikobeschreibung

Umweltexpositionsbeurteilung

- Wann: lt. Art. 14 (4) immer wenn Stoff als gefährlich eingestuft oder PBT-Eigenschaften besitzt
- Wie:



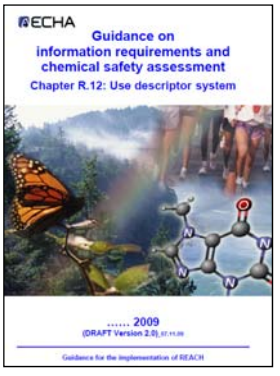
- Womit: verschiedene Softwaretools

Use Descriptor System

- SU: Sector of use
- PC: Produktkategorie
- PROC: Prozesskategorie
- AC: Artikelkategorie
- **ERC: Environmental Release Category**

Environmental release category - ERC

- Beschreiben weite Verwendungsbedingungen
- Default Emissionsfaktoren für Emissionen in Wasser, Luft, Boden
- Spiegeln die folgenden Verwendungscharakteristiken wider:
  - Lebensphase
  - Grad der Geschlossenheit
  - Technischer Nutzen der Substanz in der Verwendung
  - Verbreitung der Verwendung
  - Indoor oder outdoor Verwendung
  - Freisetzungsfördernde Bedingungen



ERC	Life cycle Stage	level of containment	technical fate	Dispersiv-ness	indoor / outdoor	rele ase
1	Manufacture	open-closed		Industrial	Indoor	n.a
2	Formulation	open-closed	not included into matrix	Industrial	Indoor	n.a.
3	Formulation	open-closed	Inclusion into/onto matrix	Industrial	Indoor	n.a.
4	End use	open-closed	processing aid, not becoming part of arti.	Industrial	Indoor	n.a.
5	End use	open-closed	Inclusion into/onto matrix	Industrial	Indoor	n.a.
6a	End use	open-closed	Intermediate	Industrial	Indoor	n.a.
6b	End use	open-closed	reactive processing aid	Industrial	Indoor	n.a.
6c	End use	open-closed	monomers for polymers	Industrial	Indoor	n.a.
6d	End use	open-closed	monomers for rubbers or thermosets	Industrial	Indoor	n.a.
7	End use	closed system	processing aid	Industrial	Indoor	n.a.
8a	End use	open-closed	processing aid	wide disperse	Indoor	n.a.
8b	End use	open-closed	reaction on use	wide disperse	Indoor	n.a.
8c	End use	open-closed	Inclusion into/onto matrix	wide disperse	Indoor	n.a.
8d	End use	open-closed	processing aid	wide disperse	Outdoor	n.a.
8e	End use	open-closed	reaction on use	wide disperse	Outdoor	n.a.
8f	End use	open-closed	Inclusion into/onto matrix	wide disperse	Outdoor	n.a.
9a	End use	closed system	processing aid	wide disperse	Indoor	n.a.
9b	End use	closed system	processing aid	wide disperse	Outdoor	n.a.
10a	Service life	open	Inclusion into/onto matrix	wide disperse	Outdoor	Low
10b	Service life	open	Inclusion into/onto matrix / removal proc.	wide disperse	Outdoor	High
11a	Service life	open	Inclusion into/onto matrix	wide disperse	Indoor	Low
11b	Service life	open	inclusion into/onto matrix / removal proc.	wide disperse	Indoor	High
12a	Service life	open-closed	Losses from matrix during article processing	Industrial	Indoor	Low
12b	Service life	open-closed	Losses from matrix during article processing	Industrial	Indoor	High

Environmental release category - ERC

Umwelt Bundes Amt

No	ERC	Default release factors resulting from the conditions of used described in the ERCs.		
		to air	to water (no STP)	to soil
1	Manufacture of chemicals	5%	6%	0.01%
2	Formulation of preparations	2.5%	2%	0.01%
2	Formulation in materials	30%	0.2%	0.1%
4	Industrial use of processing aids	100%	100%	5%
5	Industrial inclusion into or onto a matrix	50%	50%	1%.
6A	Industrial use of intermediates	5%	2%	0.1%
6B	Industrial use of reactive processing aids	0.10%	5%	0.025%
6C	Industrial use of monomers for polymerisation	5%	5%	0%
6D	Industrial use of auxiliaries for polymerisation	35%	0.005%	0.025%
7	Industrial use of substances in closed systems	5%	5%	5%
8A	Wide dispersive indoor use of processing aids, open	100%	100%	n.a.
8B	Wide dispersive indoor use of reactive substances , open	0.10%	2%	n.a.
8C	Wide dispersive indoor use, inclusion into or onto a matrix	15%	1%	n.a.
8D	Wide dispersive outdoor use of processing aids, open	100%	100%	20%

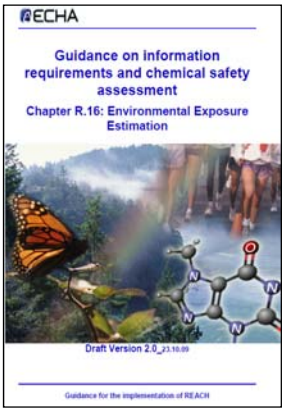
Special Environmental Release Category - SPERC

- Zur Verfeinerung der ERC-basierten Emissionsschätzung
- Basieren auf guter Praxis, Information von Verbänden, Handelsorganisationen, Informationen aus Emission Scenario Documents (ESDs)
- Enthalten:
  - typische Emissionfaktoren
  - typische Risikomanagementmaßnahmen
  - Effektivitäten von Risikomanagementmaßnahmen
  - sichere Verwendungsmengen
- SPERCs sind in SPERCs fact sheets dokumentiert
- Werden auf der Website von CEFIC verfügbar sein

Verbleib und Verhalten in der Umwelt

- Substanzspezifisch
- Verteilungsprozesse in Guideline R.16 beschrieben
- für verschiedene Umweltkompartimente

		Luft direkt	Wasser inkl. Sediment via STP	Wasser inkl. Sediment direkt	Boden direkt
local scale	industrial setting	**X**	**X**	N	N
local scale	wide dis-persive use	N	**X**	N	N
regional scale	industrial setting	**X**	**X** (80 %)	**X** (20%)	**X**
regional scale	wide dis-persive use				



Lokale Expositionsbeurteilung: Indudrieszenario

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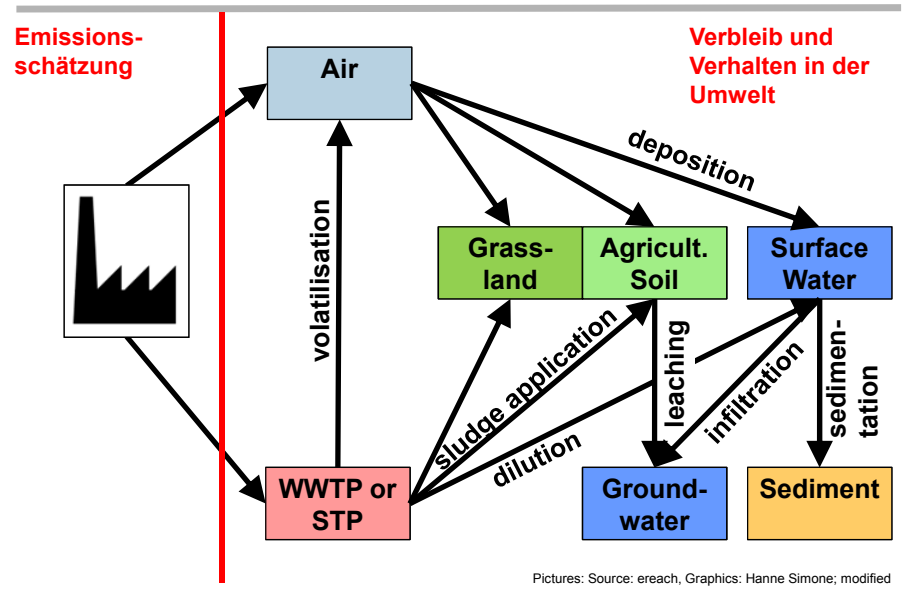
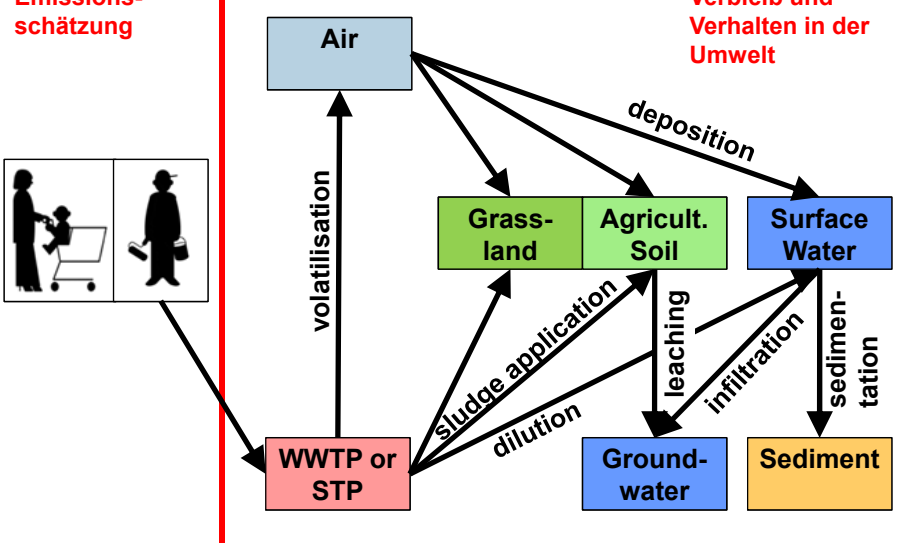


Pictures: Source: ereach, Graphics: Hanne Simone; modified

Lokale Expositionsbeurteilung: Wide dispersive use

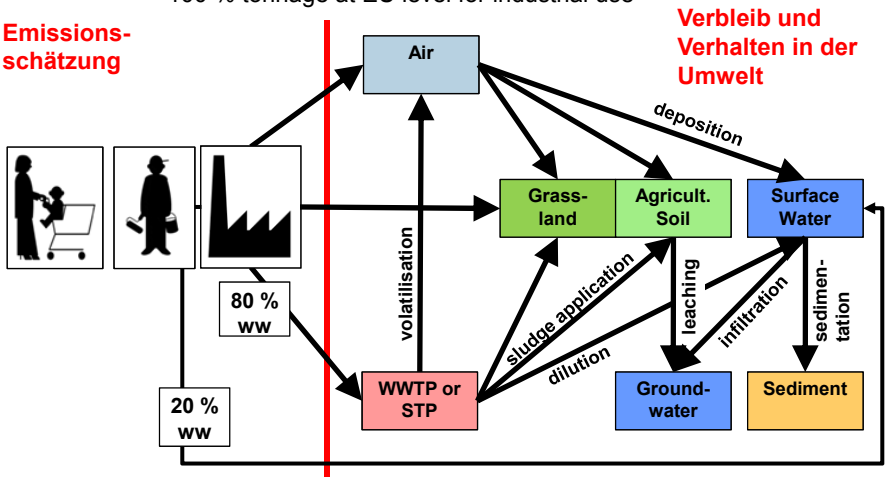
Umwelt Bundes Amt



Regionale Expositionsbeurteilung: wide dispersive use und Industrieszenario

10 % tonnage at EU level for wide dispersive use

100 % tonnage at EU level for industrial use



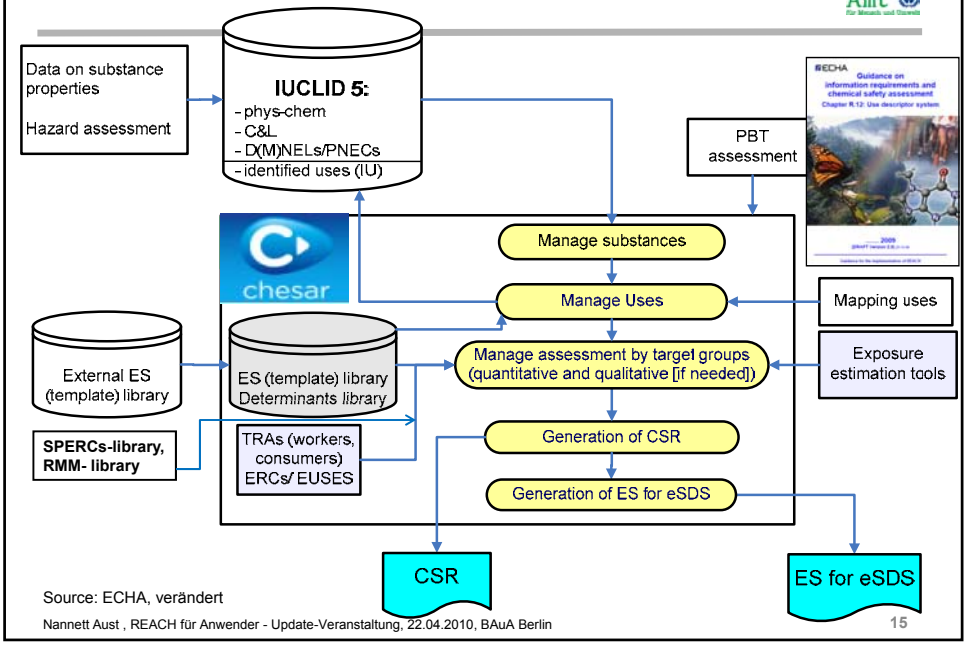
Pictures: Source: ereach, Graphics: Hanne Simone; modified

Instrumente zur Expositionsbeurteilung

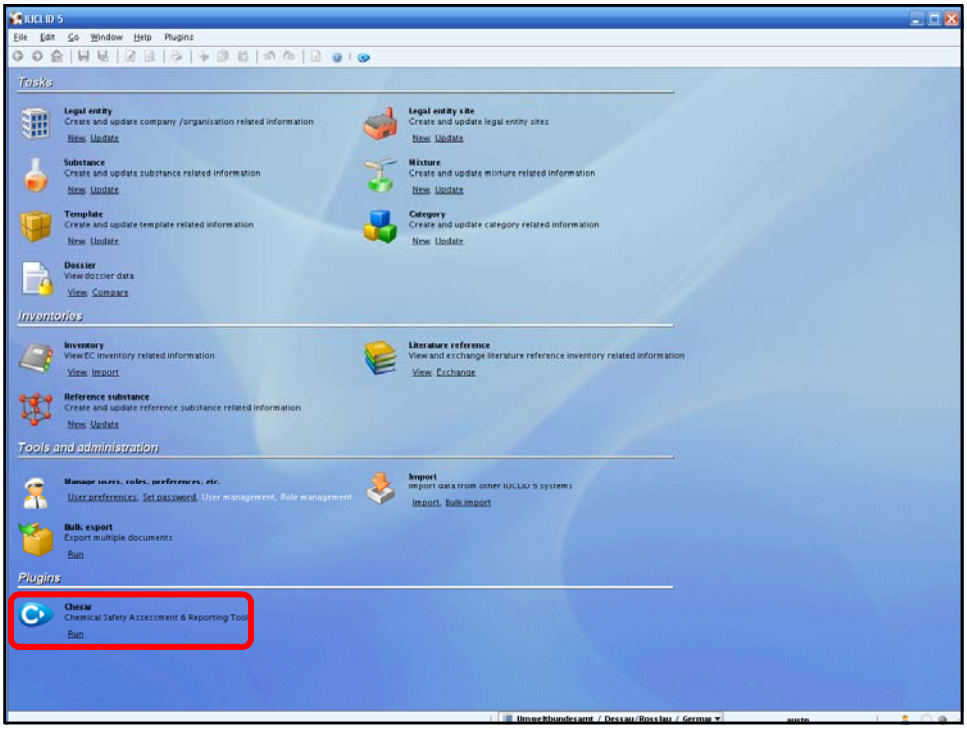
- Chesar inkl. EUSES 2.1
- ECETOC TRA version 2

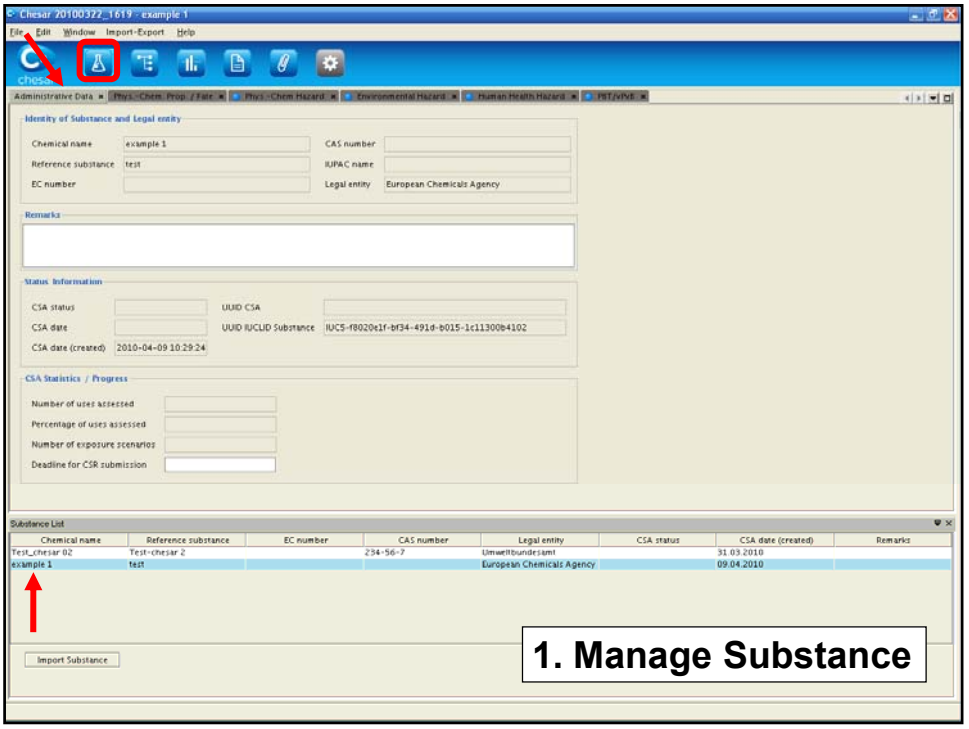
Chesar-Tool

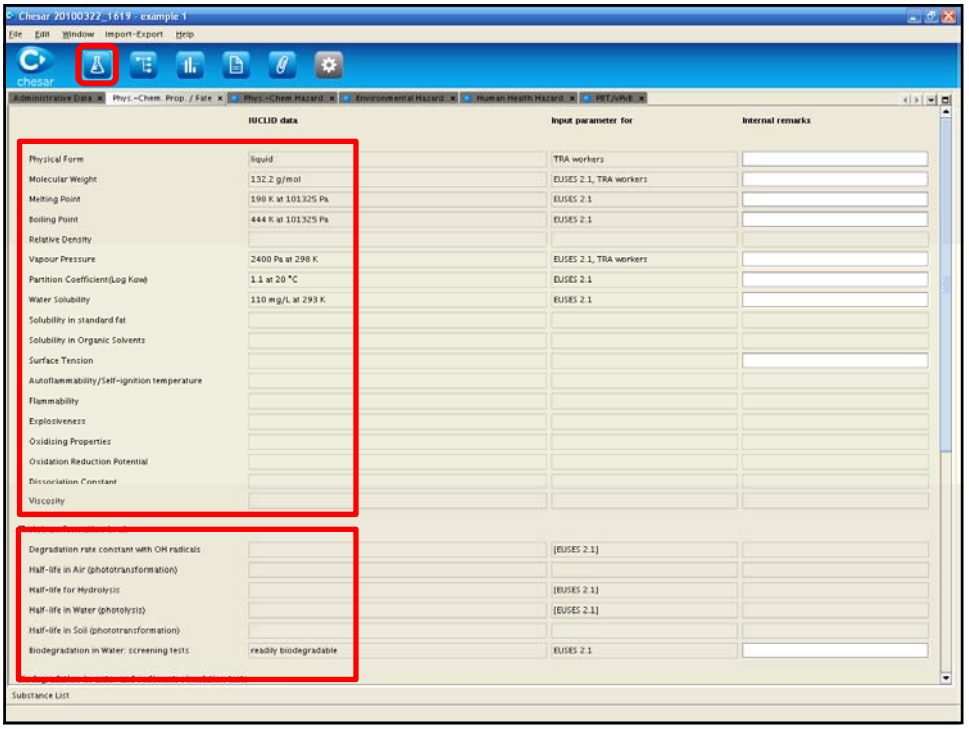
Umwelt Bundes Amt

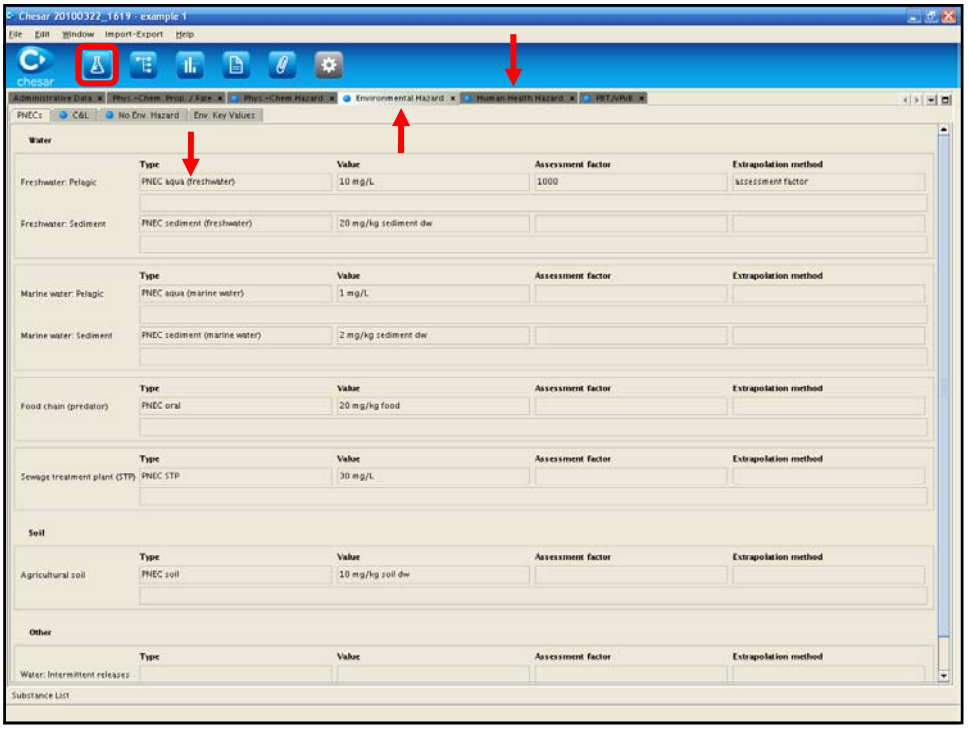


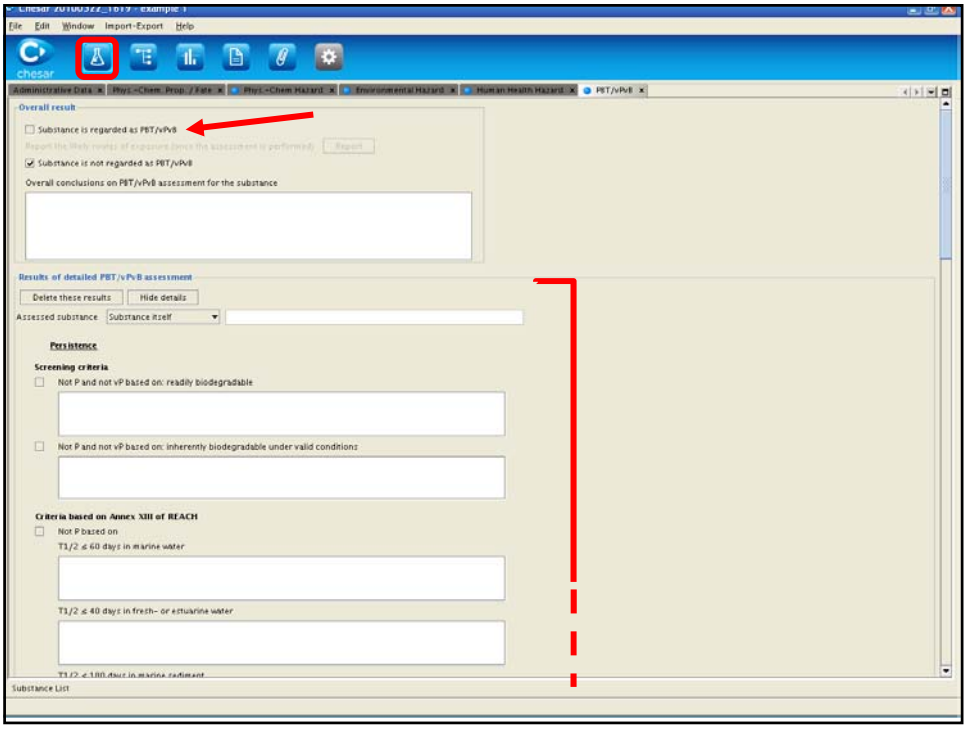
Source: ECHA, verändert

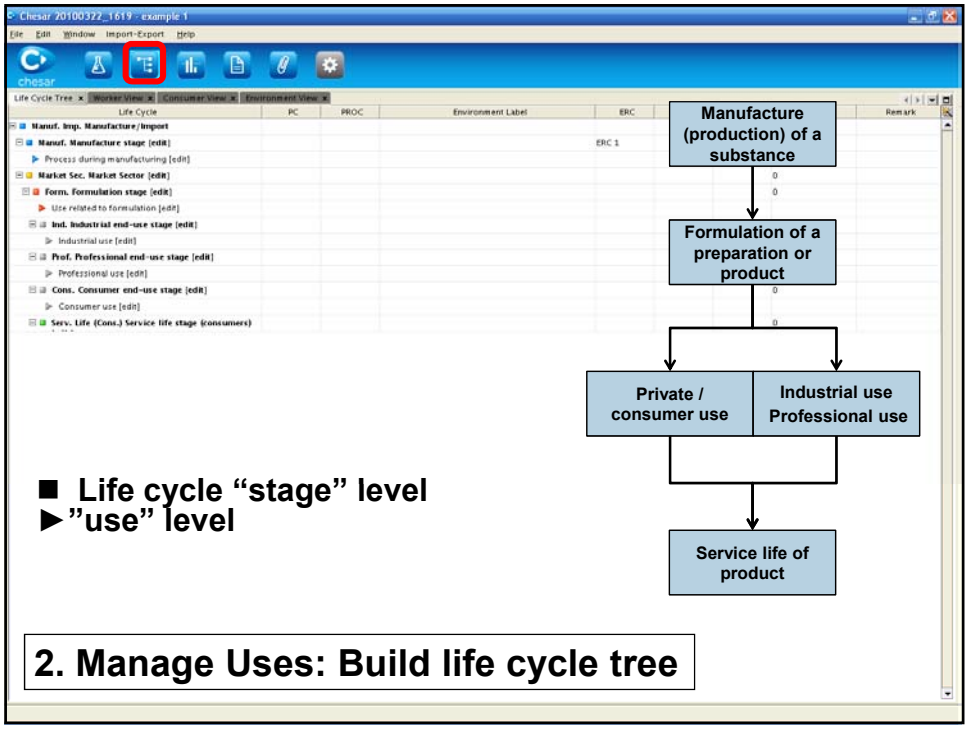


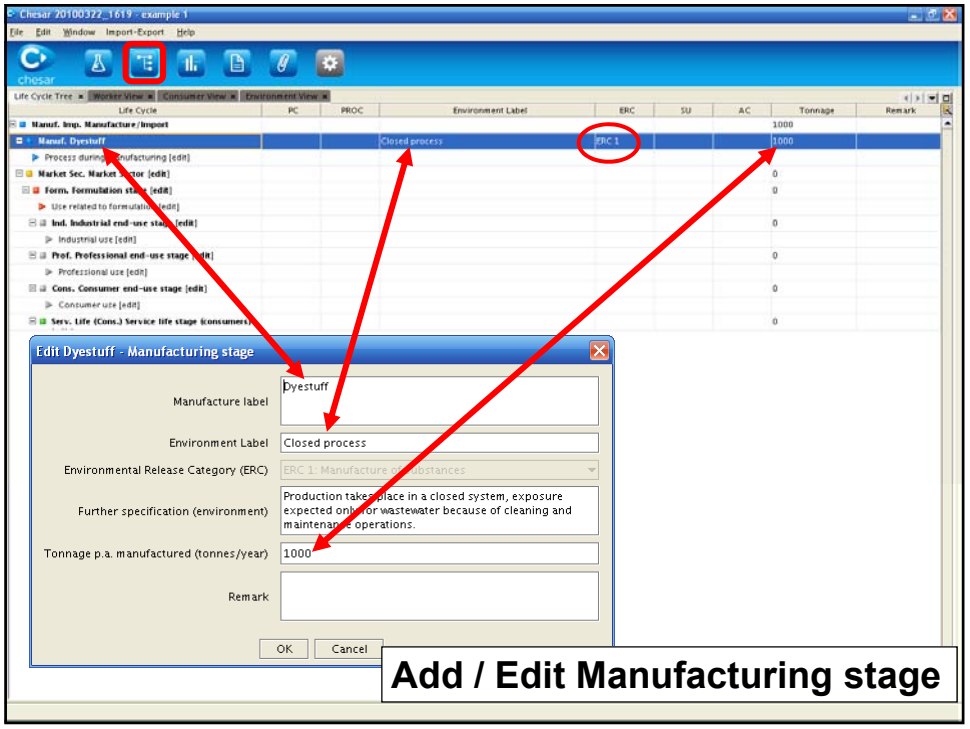

Chesar 20100322_1619 : example 1
File Edit Window Import-Export Help
Administrative Data
Phys.-Chem. Prop. / Fate
Phys.-Chem Hazard
Environmental Hazard
Human Health Hazard
PBT/vPvB
Identity of Substance and Legal entity
Chemical name example 1
Reference substance test
EC number
CAS number
IUPAC name
Legal entity European Chemicals Agency
Remarks
Status Information
CSA status
CSA date
CSA date (created) 2010-04-09 10:29:24
UUID CSA
UUID IUCLID Substance IUC5-f8020e1f-bf34-491d-b015-1c11300b4102
CSA Statistics / Progress
Number of uses accessed
Percentage of uses assessed
Number of exposure scenarios
Deadline for CSR submission
Substance List
Chemical name
Reference substance
EC number
CAS number
Legal entity
CSA status
CSA date (created)
Remarks
Test_chesar 02
Test-chesar 2
234-56-7
Umweltbundesamt
31.03.2010
example 1
test
European Chemicals Agency
09.04.2010
Import Substance
1. Manage Substance

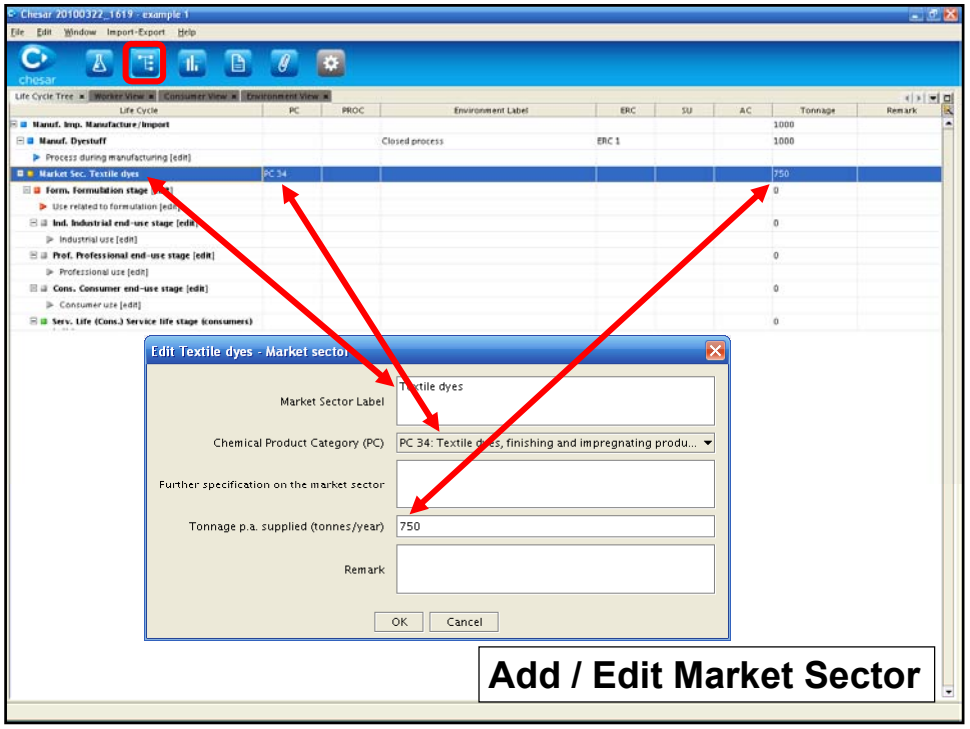

Chesar 20100322_1619 : example 1
File Edit Window Import-Export Help
Administrative Data
Phys.-Chem. Prop. / Fate
Phys.-Chem Hazard
Environmental Hazard
Human Health Hazard
PBT/vPvB
IUCLID data
Input parameter for
Internal remarks
Physical Form liquid TRA workers
Molecular Weight 132.2 g/mol EUSES 2.1, TRA workers
Melting Point 198 K at 101325 Pa EUSES 2.1
Boiling Point 444 K at 101325 Pa EUSES 2.1
Relative Density
Vapour Pressure 2400 Pa at 298 K EUSES 2.1, TRA workers
Partition Coefficient(Log Kow) 1.1 at 20 °C EUSES 2.1
Water Solubility 110 mg/L at 293 K EUSES 2.1
Solubility in standard fat
Solubility in Organic Solvents
Surface Tension
Autoflammability/Self-ignition temperature
Flammability
Explosiveness
Oxidising Properties
Oxidation Reduction Potential
Dissociation Constant
Viscosity
Degradation rate constant with OH radicals [EUSES 2.1]
Half-life in Air (phototransformation)
Half-life for Hydrolysis [EUSES 2.1]
Half-life in Water (photolysis) [EUSES 2.1]
Half-life in Soil (phototransformation)
Biodegradation in Water: screening tests readily biodegradable EUSES 2.1
Substance List

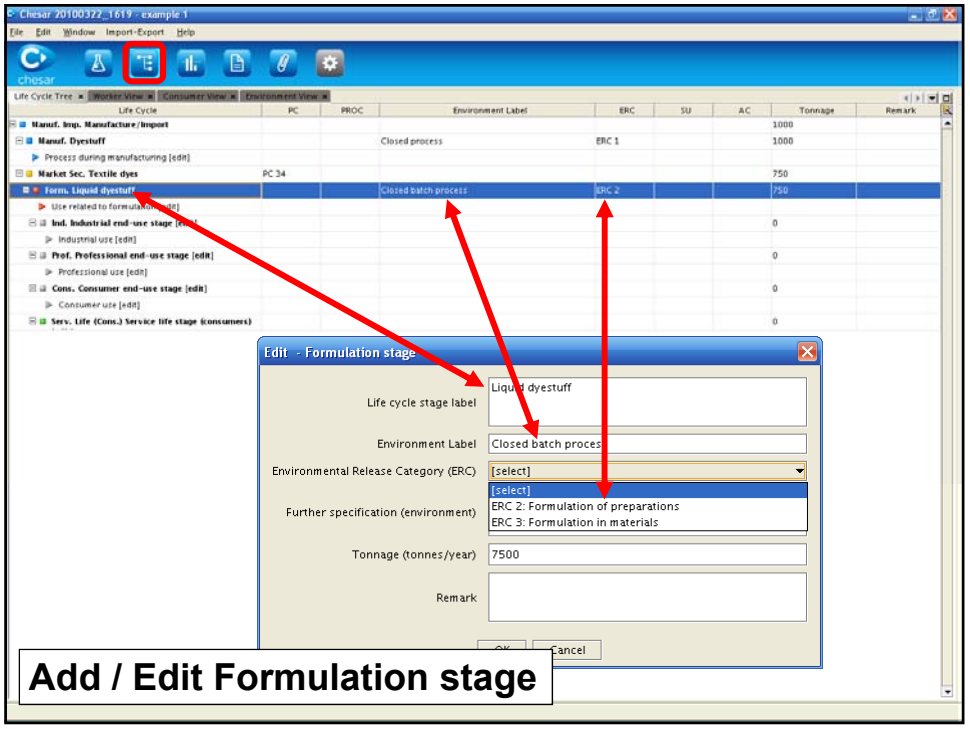

Chesar 20100322_1619 : example 1
File Edit Window Import-Export Help
chesar
Administrative Data
Phys.-Chem. Prop. / Fate
Phys.-Chem Hazard
Environmental Hazard
Human Health Hazard
PBT/vPvB
PNECs
C&L
No Env. Hazard
Env. Key Values
Water
Type
Value
Assessment factor
Extrapolation method
Freshwater: Pelagic
PNEC aqua (freshwater)
10 mg/L
1000
assessment factor
Freshwater: Sediment
PNEC sediment (freshwater)
20 mg/kg sediment dw
Marine water: Pelagic
PNEC aqua (marine water)
1 mg/L
Marine water: Sediment
PNEC sediment (marine water)
2 mg/kg sediment dw
Food chain (predator)
PNEC oral
20 mg/kg food
Sewage treatment plant (STP)
PNEC STP
30 mg/L
Soil
Agricultural soil
PNEC soil
10 mg/kg soil dw
Other
Water: Intermittent releases
Substance List

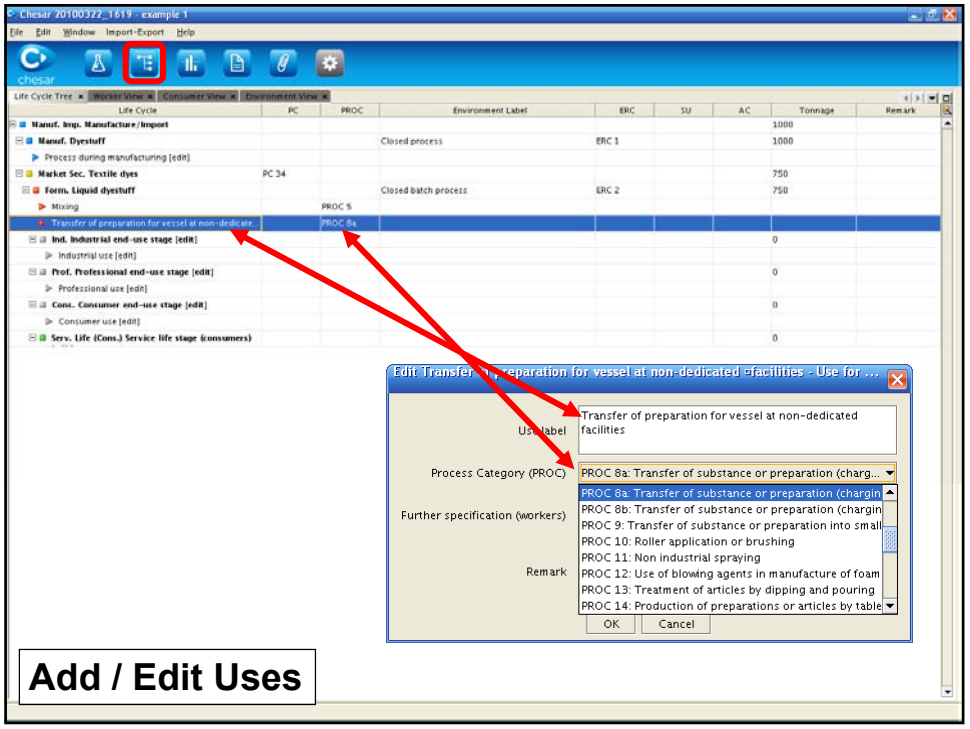

File Edit Window Import-Export Help
chesar
PBT/vPvB
Overall result
Substance is regarded as PBT/vPvB
Substance is not regarded as PBT/vPvB
Overall conclusions on PBT/vPvB assessment for the substance
Results of detailed PBT/vPvB assessment
Delete these results
Hide details
Assessed substance
Substance itself
Persistence
Screening criteria
Not P and not vP based on: readily biodegradable
Not P and not vP based on: inherently biodegradable under valid conditions
Criteria based on Annex XIII of REACH
Not P based on
T1/2 ≤ 60 days in marine water
T1/2 ≤ 40 days in fresh- or estuarine water
Substance List


Manufacture (production) of a substance
Formulation of a preparation or product
Private / consumer use
Industrial use
Professional use
Service life of product
■ Life cycle “stage” level
►”use” level
2. Manage Uses: Build life cycle tree

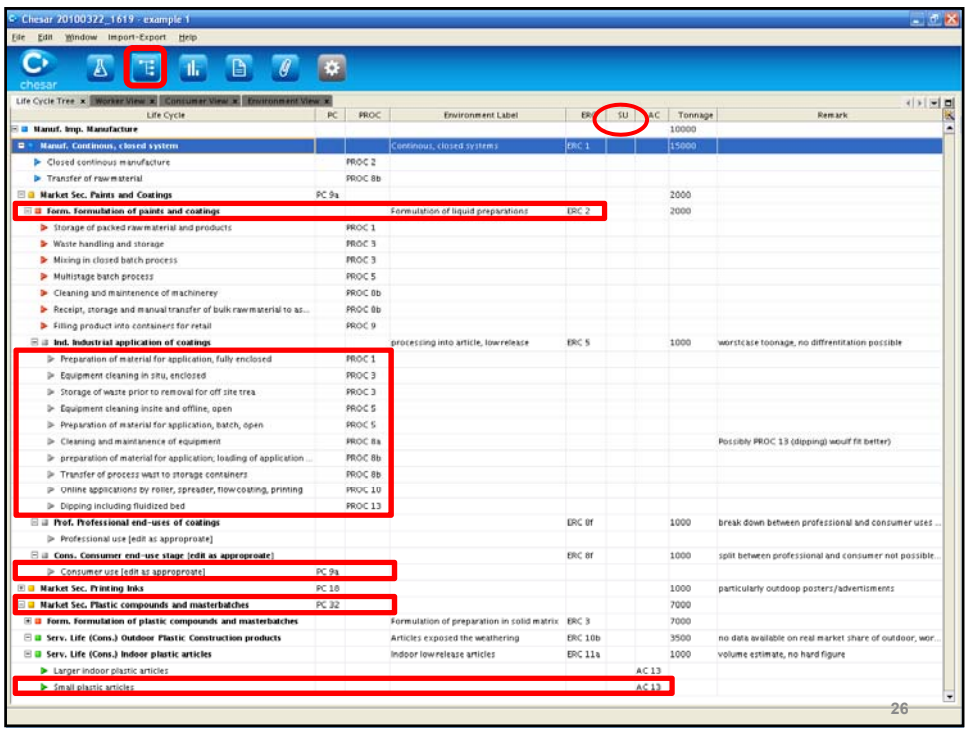

Edit Dyestuff - Manufacturing stage
Manufacture label
Dyestuff
Environment Label
Closed process
Environmental Release Category (ERC)
Further specification (environment)
Production takes place in a closed system, exposure expected only for wastewater because of cleaning and maintenance operations.
Tonnage p.a. manufactured (tonnes/year)
1000
Remark
OK
Cancel
Add / Edit Manufacturing stage

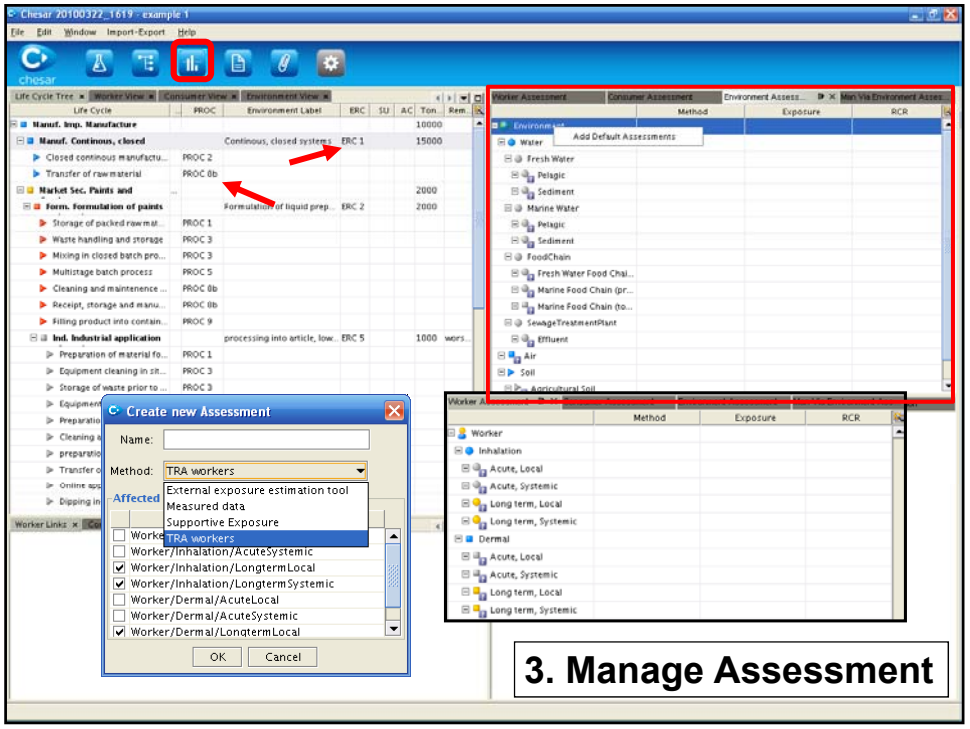

Chesar 20100322_1619 - example 1
File Edit Window Import-Export Help
Life Cycle Tree
Worker View
Consumer View
Environment View
Life Cycle
PC
PROC
Environment Label
ERC
SU
AC
Tonnage
Remark
Manuf. Imp. Manufacture/Import 1000
Manuf. Dyestuff Closed process ERC 1 1000
Process during manufacturing [edit]
Market Sec. Textile dyes PC 34 750
Form. Formulation stage [edit] 0
Use related to formulation [edit]
Ind. Industrial end-use stage [edit] 0
Industrial use [edit]
Prof. Professional end-use stage [edit] 0
Professional use [edit]
Cons. Consumer end-use stage [edit] 0
Consumer use [edit]
Serv. Life (Cons.) Service life stage (consumers) 0
Edit Textile dyes - Market sector
Market Sector Label
Textile dyes
Chemical Product Category (PC)
PC 34: Textile dyes, finishing and impregnating produ...
Further specification on the market sector
Tonnage p.a. supplied (tonnes/year)
750
Remark
OK
Cancel
Add / Edit Market Sector

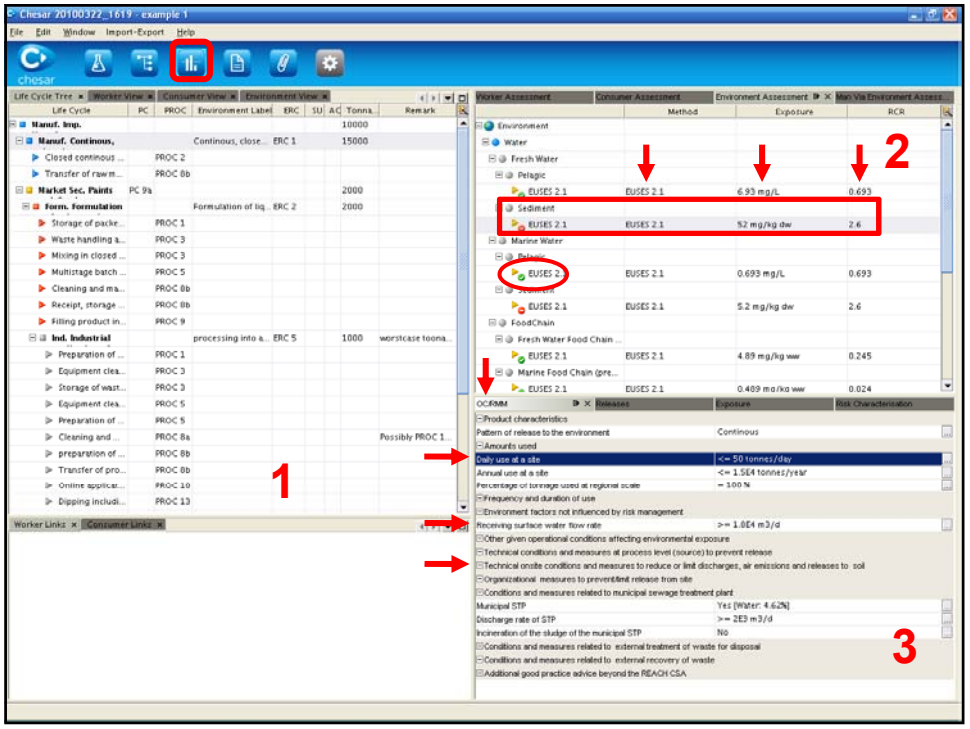

Chesar 20100322_1619 - example 1
File Edit Window Import-Export Help
Life Cycle Tree
Worker View
Consumer View
Environment View
Life Cycle
PC
PROC
Environment Label
ERC
SU
AC
Tonnage
Remark
Manuf. Imp. Manufacture/Import 1000
Manuf. Dyestuff Closed process ERC 1 1000
Process during manufacturing [edit]
Market Sec. Textile dyes PC 34 750
Form. Liquid dyestuff Closed batch process ERC 2 750
Use related to formulation [edit]
Ind. Industrial end-use stage [edit] 0
Industrial use [edit]
Prof. Professional end-use stage [edit] 0
Professional use [edit]
Cons. Consumer end-use stage [edit] 0
Consumer use [edit]
Serv. Life (Cons.) Service life stage (consumers) 0
Edit - Formulation stage
Life cycle stage label
Liquid dyestuff
Environment Label
Closed batch process
Environmental Release Category (ERC)
[select]
[select]
ERC 2: Formulation of preparations
ERC 3: Formulation in materials
Further specification (environment)
Tonnage (tonnes/year)
7500
Remark
Cancel
Add / Edit Formulation stage



Add / Edit Uses




Create new Assessment
Name:
Method:
TRA workers
External exposure estimation tool
Measured data
Supportive Exposure
TRA workers
Affected
Worker/Inhalation/AcuteSystemic
Worker/Inhalation/LongtermLocal
Worker/Inhalation/LongtermSystemic
Worker/Dermal/AcuteLocal
Worker/Dermal/AcuteSystemic
Worker/Dermal/LongtermLocal
OK
Cancel
3. Manage Assessment

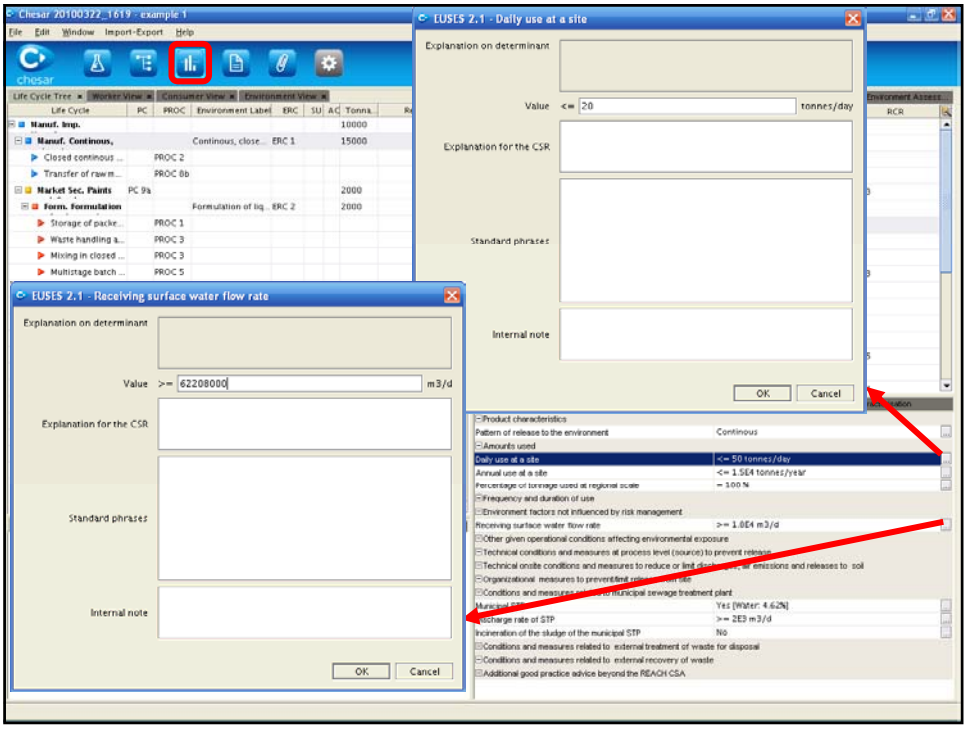

1
2
3

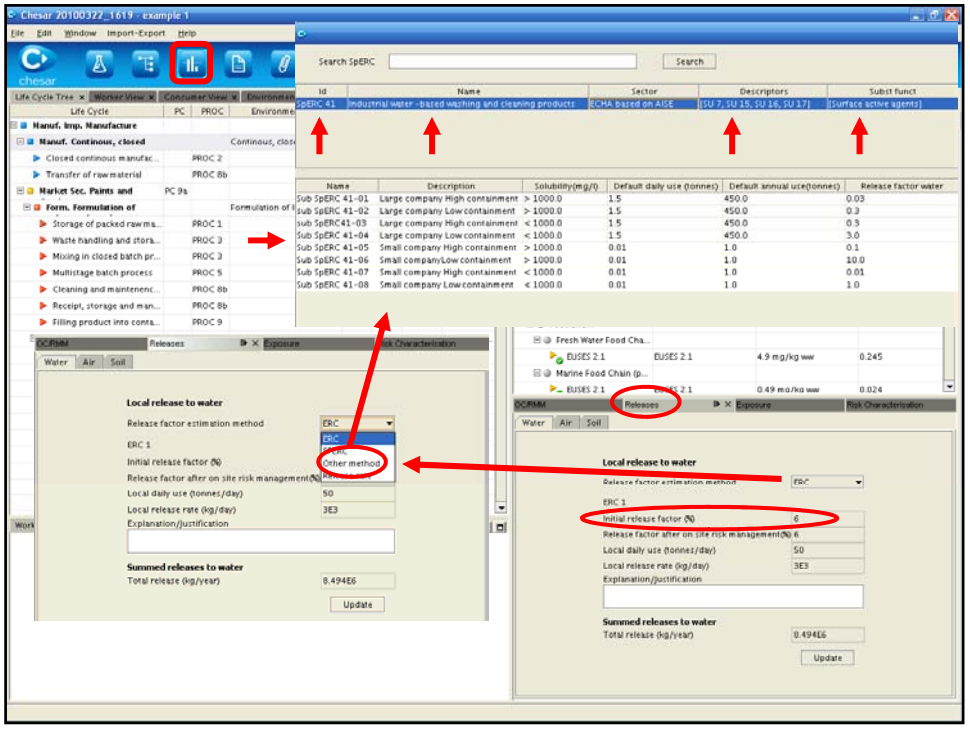
Verfeinerung der Expositionsbewertung: Emissionen reduzieren

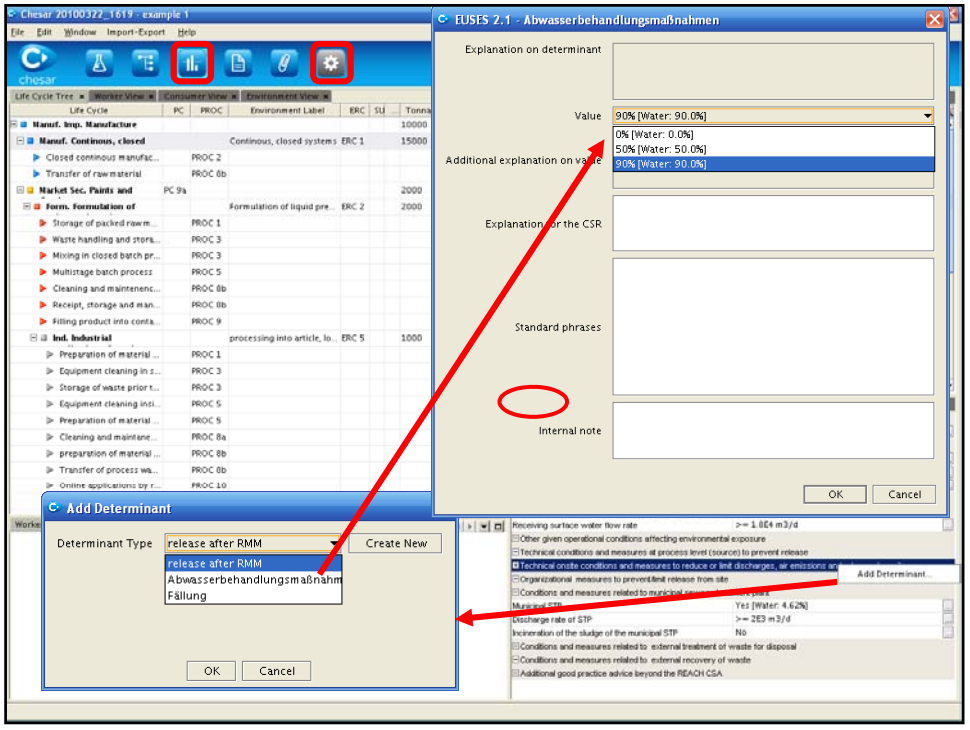
- OC verfeinern
  - **Tägliche Verwendungsmenge reduzieren**
  - pattern of release to the environment ändern
- **Verfeinerte Emissionsfaktoren verwenden** (SPERCs, gemessene Daten)
- **RMM einfügen** / verfeinern
- Umgebungsbedingungen überprüfen / anpassen:
  - Receiving surface water flow rate vergrößern
  - discharge rate of STP ändern

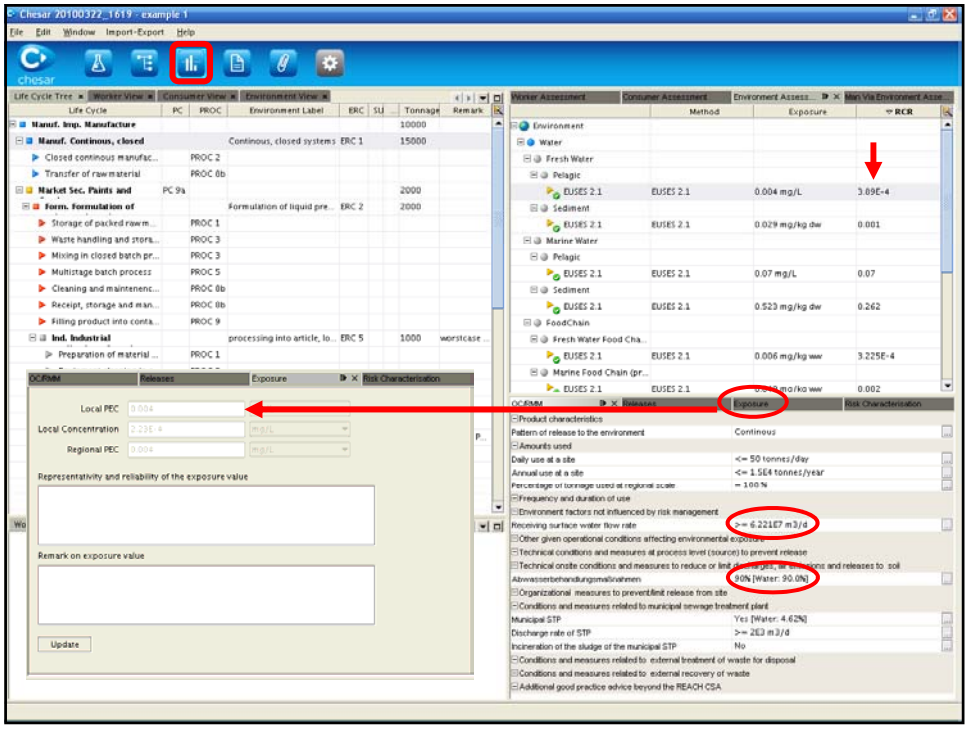
$$E_{local\ IU,\ env.\ comp.\ j} = Q_{daily,\ IU} \times RF_{IU,\ env.\ comp.\ j} \times (1-F_{RMM})$$

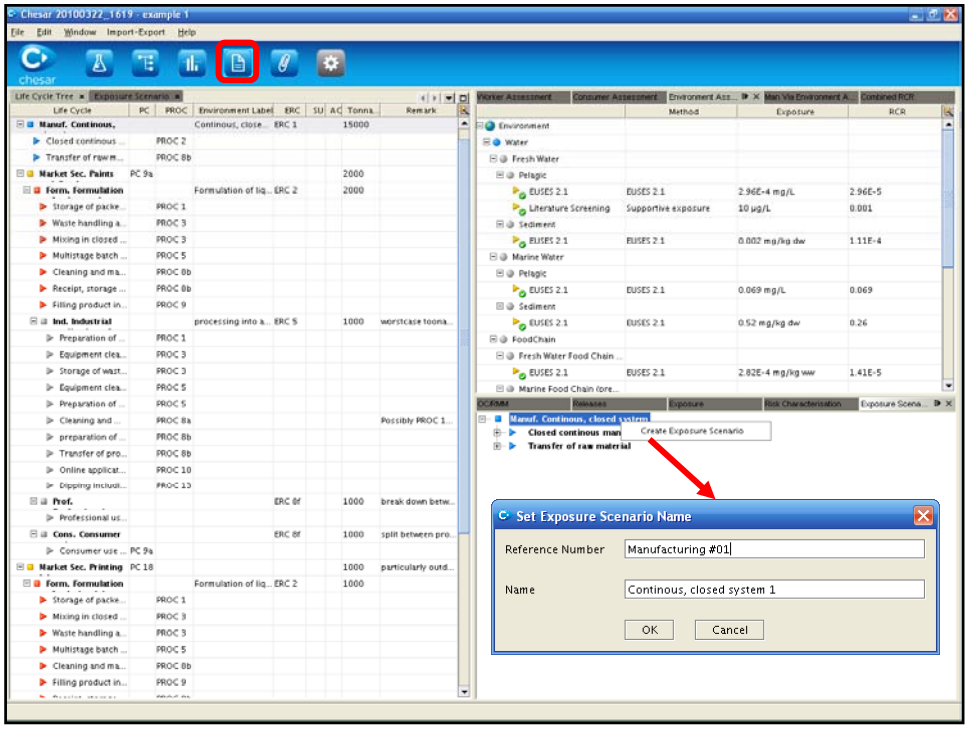
E_{local}: lokale Emissionen, env. comp. j: Umweltkompartiment j, F_{RMM}: Effizienz einer RMM, IU: identified use, RF: release factor, Q_{daily}: tägliche Verwendungsmenge

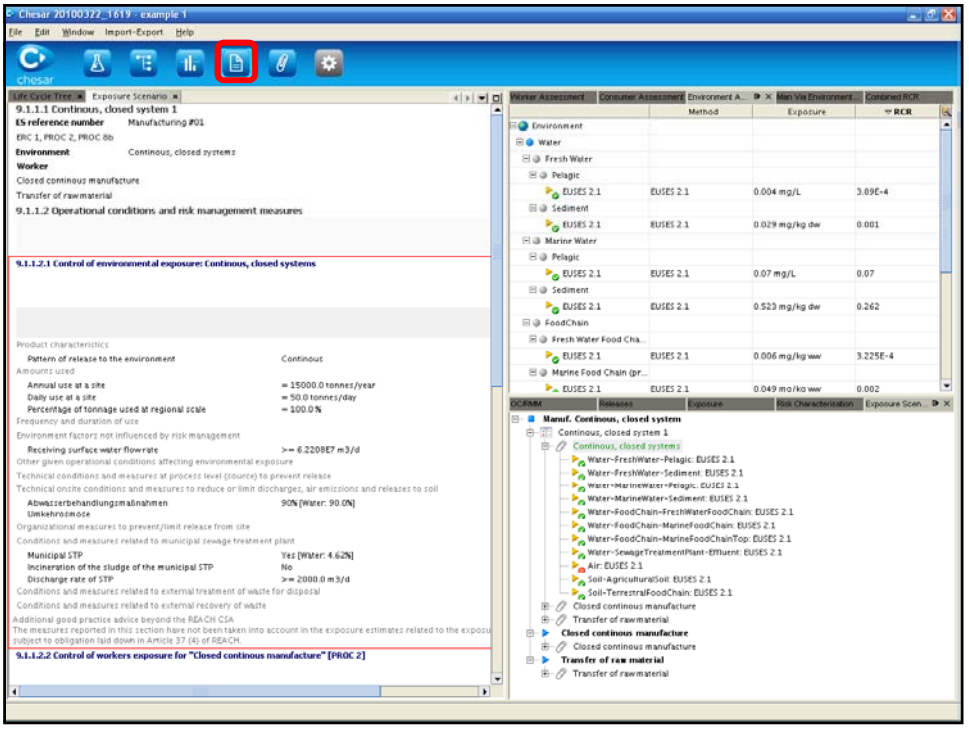



Search SpERC
Search
Local release to water
Release factor estimation method
ERC
Other method
Initial release factor (%)
Release factor after on site risk management(%)
Local daily use (tonnes/day)
50
Local release rate (kg/day)
3E3
Explanation/justification
Summed releases to water
Total release (kg/year)
8.494E6
Update


EUSES 2.1 - Abwasserbehandlungsmaßnahmen
Explanation on determinant
Value
90% [Water: 90.0%]
0% [Water: 0.0%]
50% [Water: 50.0%]
90% [Water: 90.0%]
Additional explanation on value
Explanation for the CSR
Standard phrases
Internal note
OK
Cancel
Add Determinant
Determinant Type
release after RMM
Create New
release after RMM
Abwasserbehandlungsmaßnahm
Fällung
OK
Cancel

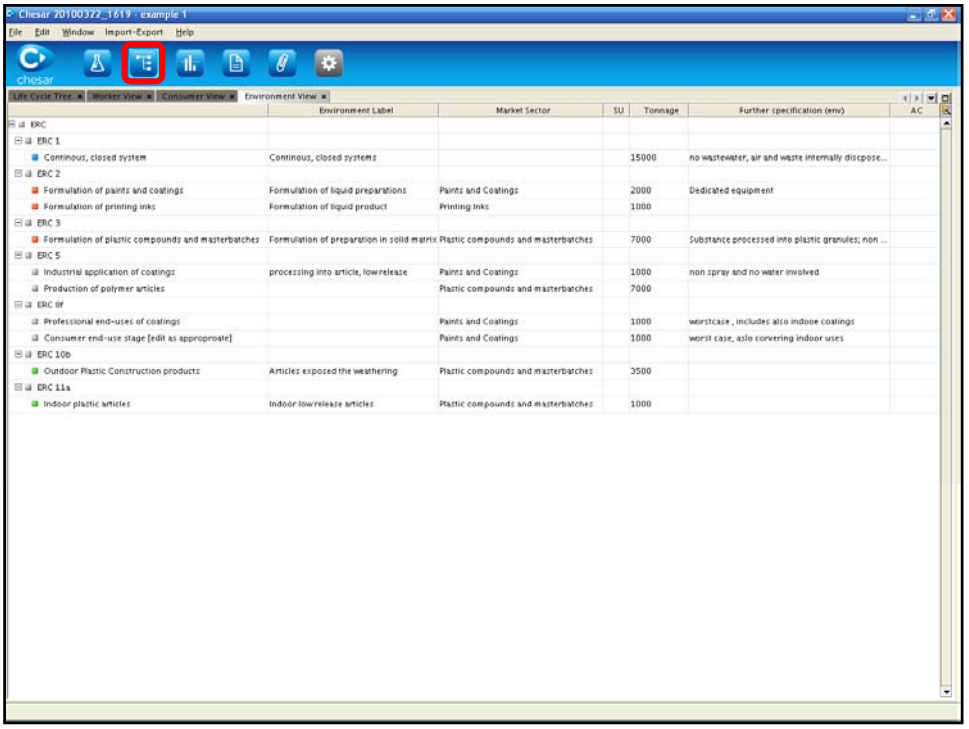

Chesar 20100322_1619 - example 1
File Edit Window Import-Export Help
chesar
Life Cycle Tree
Worker View
Consumer View
Environment View
Life Cycle
PC
PROC
Environment Label
ERC
SU
Tonnage
Remark
Manuf. Imp. Manufacture
Manuf. Continous, closed
Closed continous manufac...
Transfer of raw material
Market Sec. Paints and
Form. Formulation of
Storage of packed raw m...
Waste handling and stora...
Mixing in closed batch pr...
Multistage batch process
Cleaning and maintenanc...
Receipt, storage and man...
Filling product into conta...
Ind. Industrial
Preparation of material ...
Continous, closed systems
Formulation of liquid pre...
processing into article, lo...
worstcase ...
Worker Assessment
Consumer Assessment
Environment Assess...
Man Via Environment Asse...
Method
Exposure
RCR
Environment
Water
Fresh Water
Pelagic
EUSES 2.1
0.004 mg/L
3.89E-4
Sediment
0.029 mg/kg dw
0.001
Marine Water
0.07 mg/L
0.07
0.523 mg/kg dw
0.262
FoodChain
Fresh Water Food Cha...
0.006 mg/kg ww
3.225E-4
Marine Food Chain (pr...
0.002
OCFRMM
Releases
Exposure
Risk Characterisation
Local PEC
Local Concentration
Regional PEC
Representativity and reliability of the exposure value
Remark on exposure value
Update
Product characteristics
Pattern of release to the environment
Continous
Amounts used
Daily use at a site
<= 50 tonnes/day
Annual use at a site
<= 1.5E4 tonnes/year
Frequency and duration of use
Environment factors not influenced by risk management
Receiving surface water flow rate
>= 6.221E7 m3/d
Technical conditions and measures at process level (source) to prevent release
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil
Abwasserbehandlungsmaßnahmen
90% [Water: 90.0%]
Organizational measures to prevent/limit release from site
Conditions and measures related to municipal sewage treatment plant
Municipal STP
Yes [Water: 4.62%]
Discharge rate of STP
>= 2E3 m3/d
Incineration of the sludge of the municipal STP
No
Conditions and measures related to external treatment of waste for disposal
Conditions and measures related to external recovery of waste
Additional good practice advice beyond the REACH CSA

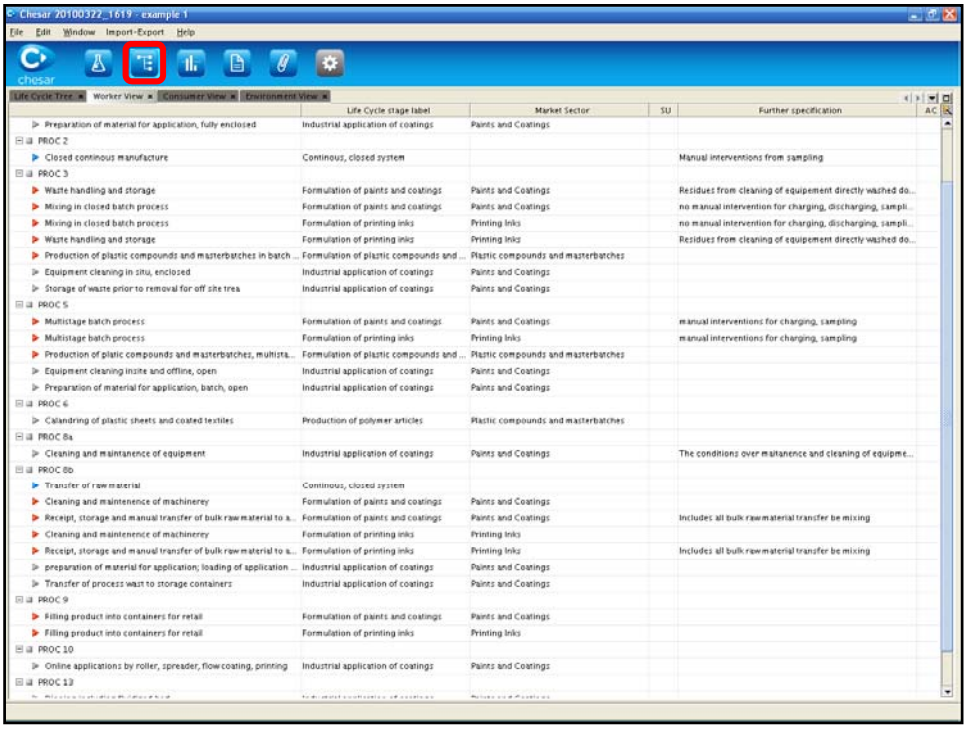

Chesar 20100322_1619 - example 1
File Edit Window Import-Export Help
chesar
Life Cycle Tree
Exposure Scenario
Life Cycle
PC
PROC
Environment Label
ERC
SU
AC
Tonna...
Remark
Manuf. Continous,
Closed continous ...
Transfer of raw m...
Market Sec. Paints
Form. Formulation
Storage of packe...
Waste handling a...
Mixing in closed ...
Multistage batch ...
Cleaning and ma...
Receipt, storage ...
Filling product in...
Ind. Industrial
Preparation of ...
Equipment clea...
Storage of wast...
Equipment clea...
Preparation of ...
Cleaning and ...
preparation of ...
Transfer of pro...
Online applicat...
Dipping includi...
Prof.
Professional us...
Cons. Consumer
Consumer use ...
Market Sec. Printing
Form. Formulation
Storage of packe...
Mixing in closed ...
Waste handling a...
Multistage batch ...
Cleaning and ma...
Filling product in...
Continous, close...
Formulation of liq...
processing into a...
Formulation of liq...
Possibly PROC 1...
break down betw...
split between pro...
particularly outd...
Worker Assessment
Consumer Assessment
Environment Ass...
Man Via Environment A...
Combined RCR
Method
Exposure
RCR
Environment
Water
Fresh Water
Pelagic
EUSES 2.1
2.96E-4 mg/L
2.96E-5
Literature Screening
Supportive exposure
10 µg/L
0.001
Sediment
0.002 mg/kg dw
1.11E-4
Marine Water
0.069 mg/L
0.069
0.52 mg/kg dw
0.26
FoodChain
Fresh Water Food Chain ...
2.82E-4 mg/kg ww
1.41E-5
Marine Food Chain (ore...
OCFRMM
Releases
Exposure
Risk Characterisation
Exposure Scena...
Manuf. Continous, closed system
Closed continous man
Transfer of raw material
Create Exposure Scenario
Set Exposure Scenario Name
Reference Number
Manufacturing #01
Name
Continous, closed system 1
OK
Cancel



Umwelt Bundes Amt

Vielen Dank für Ihre Aufmerksamkeit


Chesar 20100322_1619 - example 1
File Edit Window Import-Export Help
chesar
Life Cycle Tree
Worker View
Consumer View
Environment View
Environment Label
Market Sector
SU
Tonnage
Further specification (env)
AC
ERC
ERC 1
Continous, closed system
Continous, closed systems
15000
no wastewater, air and waste internally discpose...
ERC 2
Formulation of paints and coatings
Formulation of liquid preparations
Paints and Coatings
2000
Dedicated equipment
Formulation of printing inks
Formulation of liquid product
Printing Inks
1000
ERC 3
Formulation of plastic compounds and masterbatches
Formulation of preparation in solid matrix
Plastic compounds and masterbatches
7000
Substance processed into plastic granules; non ...
ERC 5
Industrial application of coatings
processing into article, low release
Paints and Coatings
1000
non spray and no water involved
Production of polymer articles
Plastic compounds and masterbatches
7000
ERC 8f
Professional end-uses of coatings
Paints and Coatings
1000
worstcase , includes also indoor coatings
Consumer end-use stage [edit as approproate]
Paints and Coatings
1000
worst case, aslo corvering indoor uses
ERC 10b
Outdoor Plastic Construction products
Articles exposed the weathering
Plastic compounds and masterbatches
3500
ERC 11a
Indoor plastic articles
Indoor low release articles
Plastic compounds and masterbatches
1000


Chesar 20100322_1619 - example 1
File Edit Window Import-Export Help
chesar
Life Cycle Tree
Worker View
Consumer View
Environment View
Life Cycle stage label
Market Sector
SU
Further specification
AC
Preparation of material for application, fully enclosed
Industrial application of coatings
Paints and Coatings
PROC 2
Closed continous manufacture
Continous, closed system
Manual interventions from sampling
PROC 3
Waste handling and storage
Formulation of paints and coatings
Paints and Coatings
Residues from cleaning of equipement directly washed do...
Mixing in closed batch process
Formulation of paints and coatings
Paints and Coatings
no manual intervention for charging, discharging, sampli...
Mixing in closed batch process
Formulation of printing inks
Printing Inks
no manual intervention for charging, discharging, sampli...
Waste handling and storage
Formulation of printing inks
Printing Inks
Residues from cleaning of equipement directly washed do...
Production of plastic compounds and masterbatches in batch ...
Formulation of plastic compounds and ...
Plastic compounds and masterbatches
Equipment cleaning in situ, enclosed
Industrial application of coatings
Paints and Coatings
Storage of waste prior to removal for off site trea
Industrial application of coatings
Paints and Coatings
PROC 5
Multistage batch process
Formulation of paints and coatings
Paints and Coatings
manual interventions for charging, sampling
Multistage batch process
Formulation of printing inks
Printing Inks
manual interventions for charging, sampling
Production of platic compounds and masterbatches, multista...
Formulation of plastic compounds and ...
Plastic compounds and masterbatches
Equipment cleaning insite and offline, open
Industrial application of coatings
Paints and Coatings
Preparation of material for application, batch, open
Industrial application of coatings
Paints and Coatings
PROC 6
Calandring of plastic sheets and coated textiles
Production of polymer articles
Plastic compounds and masterbatches
PROC 8a
Cleaning and maintanence of equipment
Industrial application of coatings
Paints and Coatings
The conditions over maitanence and cleaning of equipme...
PROC 8b
Transfer of raw material
Continous, closed system
Cleaning and maintenence of machinerey
Formulation of paints and coatings
Paints and Coatings
Receipt, storage and manual transfer of bulk raw material to a...
Formulation of paints and coatings
Paints and Coatings
Includes all bulk raw material transfer be mixing
Cleaning and maintenence of machinerey
Formulation of printing inks
Printing Inks
Receipt, storage and manual transfer of bulk raw material to a...
Formulation of printing inks
Printing Inks
Includes all bulk raw material transfer be mixing
preparation of material for application; loading of application ...
Industrial application of coatings
Paints and Coatings
Transfer of process wast to storage containers
Industrial application of coatings
Paints and Coatings
PROC 9
Filling product into containers for retail
Formulation of paints and coatings
Paints and Coatings
Filling product into containers for retail
Formulation of printing inks
Printing Inks
PROC 10
Online applications by roller, spreader, flow coating, printing
Industrial application of coatings
Paints and Coatings
PROC 13