Safety Data Sheet dated 19/01/2023 version 1 Attention: the numbering restarts from 1.



## SECTION 1: Identification of the substance/mixture and of the company/undertaking

#### 1.1. Product identifier

Mixture identification:

Trade name: MGO LIME 15%, FLOW LIME 15% MGO Trade code: 175 UFI: 31G0-H0AT-T00U-EA3Q

#### 1.2. Relevant identified uses of the substance or mixture and uses advised against

Recommended use: Calcium oxide and calcium magnesium oxide mixture

## Refer to the uses identified in table 1 of the annex to this SDS.

#### 1.3. Details of the supplier of the safety data sheet

Company: FASSA Srl

Via Lazzaris, 3 - 31027 Spresiano (TV) - ITALY Tel. +39 0422 7222 Fax +39 0422 887509

Responsable: laboratorio.spresiano@fassabortolo.it

#### 1.4. Emergency telephone number

NHS 111

#### **SECTION 2: Hazards identification**



#### 2.1. Classification of the substance or mixture

#### Regulation (EC) n. 1272/2008 (CLP)

Skin Irrit. 2 Causes skin irritation.

Eye Dam. 1 Causes serious eye damage.

STOT SE 3 May cause respiratory irritation.

Adverse physicochemical, human health and environmental effects:

No other hazards

#### 2.2. Label elements

Regulation (EC) No 1272/2008 (CLP):

#### **Pictograms and Signal Words**



#### Hazard statements

- H315 Causes skin irritation.
- H318 Causes serious eye damage.
- H335 May cause respiratory irritation.

#### **Precautionary statements**

P101	If medical advice is needed, have product container or label at hand.
P102	Keep out of reach of children.
P261	Avoid breathing dust.
P280	Wear protective gloves and eye/face protection.
P302+P352	IF ON SKIN: Wash with plenty of water.
P304+P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305+P351+P33 8	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310	Immediately call a POISON CENTER/doctor.

P501

#### **Contains:**

calcium oxide

calcium magnesium oxide (Dolomitic lime)

#### Special provisions according to Annex XVII of REACH and subsequent amendments:

None.

#### 2.3. Other hazards

No PBT, vPvB or endocrine disruptor substances present in concentration >= 0.1%

No other hazards

#### **SECTION 3: Composition/information on ingredients**

3.1. Substances

N.A.

#### 3.2. Mixtures

Mixture identification: MGO LIME 15%, FLOW LIME 15% MGO

#### Hazardous components within the meaning of the CLP regulation and related classification:

Qty	Name	Ident. Numb.	Classification	Registration Number
≥50 - <80 %	calcium oxide		Skin Irrit. 2, H315; Eye Dam. 1, H318; STOT SE 3, H335	01-2119475325-36-xxxx
≥30 - <50 %	calcium magnesium oxide (Dolomitic lime)		Skin Irrit. 2, H315; Eye Dam. 1, H318; STOT SE 3, H335	01-2119474202-47-xxxx

#### **SECTION 4: First aid measures**

#### 4.1. Description of first aid measures

In case of skin contact:

Remove contaminated clothing immediatley and dispose off safely.

Areas of the body that have - or are only even suspected of having - come into contact with the product must be rinsed immediately with plenty of running water and possibly with soap.

OBTAIN IMMEDIATE MEDICAL ATTENTION.

In case of eyes contact:

After contact with the eyes, rinse with water with the eyelids open for a sufficient length of time, then consult an opthalmologist immediately.

Protect uninjured eye.

In case of Ingestion:

Do not induce vomiting, get medical attention showing the SDS and label hazardous.

In case of Inhalation:

Remove casualty to fresh air and keep warm and at rest.

In case of inhalation, consult a doctor immediately and show him packing or label.

#### 4.2. Most important symptoms and effects, both acute and delayed

The symptoms and effects are as expected from the hazards as shown in section 2.

Calcium magnesium oxide by the oral, dermal or inhalation route is without acute toxicity. It is classified as irritating to the skin and respiratory system and poses a risk of serious damage to eyes. There is no cause for concern regarding harmful systemic effects given that local effects (pH effect) are the main health risks.

There are no known delayed effects. Consult a doctor for all exposures, unless minor.

#### 4.3. Indication of any immediate medical attention and special treatment needed

In case of accident or unwellness, seek medical advice immediately (show directions for use or safety data sheet if possible).

#### **SECTION 5: Firefighting measures**

#### 5.1. Extinguishing media

#### Suitable extinguishing media:

CO2, powder extinguisher, foam, water spray.

Extinguishing media which must not be used for safety reasons:

Water jet.

#### 5.2. Special hazards arising from the substance or mixture

Burning produces heavy smoke.

Do not inhale explosion and/or combustion gases (carbon monoxide, carbon dioxide, nitrogen oxides).

Calcium magnesium oxide reacts with water and generates heat. This may cause a risk due to contact with flammable materials.

#### Avoid humidification.

#### 5.3. Advice for firefighters

Use suitable breathing apparatus .

Collect contaminated fire extinguishing water separately. This must not be discharged into drains.

Move undamaged containers from immediate hazard area if it can be done safely.

#### **SECTION 6: Accidental release measures**

#### 6.1. Personal precautions, protective equipment and emergency procedures

Wear personal protection equipment.

Wear breathing apparatus if exposed to vapours/dusts/aerosols.

Provide adequate ventilation.

Use appropriate respiratory protection.

See protective measures under point 7 and 8.

Prevent the product from entering the sewer system, surface water or ground water.

#### 6.2. Environmental precautions

Do not allow to enter into soil/subsoil. Do not allow to enter into surface water or drains.

In case of gas escape or of entry into waterways, soil or drains, inform the responsible authorities.

#### 6.3. Methods and material for containment and cleaning up

Material suitable for collection: inert absorbent material (e.g. sand, vermiculite)

After the product has been recovered, rinse the area and materials involved with water.

Retain contaminated washing water and dispose it.

## 6.4. Reference to other sections

See also section 8 and 13

Information on personal protection and disposal is given in sections 8 and 13.

#### **SECTION 7: Handling and storage**

#### 7.1. Precautions for safe handling

Avoid contact with skin and eyes, inhalation of vapours and mists.

Use localized ventilation system.

Don't use empty container before they have been cleaned.

Before making transfer operations, assure that there aren't any incompatible material residuals in the containers.

Before handling the product, consult all the other sections of this safety data sheet. Avoid leakage of the product into the environment. Do not eat, drink or smoke during use. Remove any contaminated clothes and personal protective equipment before entering places in which people eat.

Store only in the original container. Store the containers sealed, in a well ventilated place away from direct sunlight. Keep containers away from any incompatible materials, see section 10 for details.

Advice on general occupational hygiene:

Contamined clothing should be changed before entering eating areas.

Do not eat or drink while working.

See also section 8 for recommended protective equipment.

#### 7.2. Conditions for safe storage, including any incompatibilities

Keep away from food, drink and feed.

The substance must be stored in a dry place. Avoid contact with air or moisture. Bulk storage should be in purpose-designed silos. Keep away from acids, significant quantities of paper, straw, and nitro compounds. Keep out of reach of children. Do not use aluminium for transport or storage if there is a risk of contact with water.

Incompatible materials:

See chapter 10.5

Instructions as regards storage premises:

Adequately ventilated premises.

## 7.3. Specific end use(s)

Recommendation(s)

See chapter 1.2

Industrial sector specific solutions:

None in particular

#### SECTION 8: Exposure controls/personal protection

#### 8.1. Control parameters

#### **Community Occupational Exposure Limits (OEL)**

		OEL Country Type	Long Term Long Term Short Term B mg/m3 ppm mg/m3 ppm	ehaviour Notes
calcium CAS: 13	oxide 05-78-8	ACGIH	2.000	URT irr
Date	19/01/2023	Production Name	MGO LIME 15%. FLOW LIME 15% MGO	Page n.

	EU		1	4.000		Respirable fraction
	MAK	AUSTRIA	1.000	4.000		Inhalable fraction
	VLEP	BELGIUM	1.000	4.000		Respirable fraction
	VLEP	FRANCE	1.000	4.000	Indicative	Respirable fraction
	AGW	GERMANY	1.000	2.000		Inhalable fraction
	MAK	GERMANY	1.000	2.000		Inhalable fraction
	ÁК	HUNGARY	5.000	5.000		
	VLEP	ITALY	1.000	4.000		Inhalable fraction
	NDS	POLAND	2.000	6.000		Inhalable fraction
	NDS	POLAND	1.000	4.000		Respirable fraction
	VLEP	ROMANIA	1.000	4.000		Respirable fraction
	VLA	SPAIN	1.000	4.000		
	SUVA	SWITZERLAN D	1.000	4.000		Inhalable fraction
	WEL	U.K.	2.000			Respirable fraction
	WEL	U.K.	1.000			Inhalable fraction
	VLE	PORTUGAL	1.000	4.000		Respirable fraction
	TLV	CZECHIA	1.000	4.000		Respirable fraction
calcium magnesium oxide (Dolomitic lime) CAS: 37247-91-9	EU		1.000	4.000		Respirable fraction

## Predicted No Effect Concentration (PNEC) values

calcium oxide CAS: 1305-78-8	PNEC Limit 0.37 mg/l	<b>Exposure</b> <b>Route</b> Fresh Water	Exposure Frequency	Remark
	0.24 mg/l	Marine water		
	2.27 mg/l	Microorganisms in sewage treatments		
	817.4 mg/kg	Soil (agricultural)		
calcium magnesium oxide (Dolomitic lime) CAS: 37247-91-9	0.32 mg/cm2			
	702 mg/kg	Soil (agricultural)		
	0.21 mg/cm2	Marine water		
	1.95 mg/cm2	Microorganisms in sewage treatments		

## Derived No Effect Level (DNEL) values

	 Worker Profess ional		Exposure Route	Exposure Frequency Remark
calcium oxide CAS: 1305-78-8	4 mg/m3	4 mg/m3	Human Inhalation	Short Term, local effects
	1 mg/m3	1 mg/m3	Human Inhalation	Long Term, local effects
calcium magnesium oxide (Dolomitic lime) CAS: 37247-91-9	4 mg/m3	4 mg/m3	Human Inhalation	Short Term, local effects

#### 8.2. Exposure controls

Provide adequate ventilation. Where reasonably practicable, this should be achieved by the use of local exhaust ventilation and good general extraction.

To control potential exposure, avoid generating dust. Appropriate protective equipment is also recommended. Eye protection equipment (e.g. goggles or wide-vision full goggles) must be worn, unless potential contact with the eye can be excluded by the nature and type of application (e.g. closed process). Additionally, appropriate face protection, protective clothing and safety shoes must be worn.

Refer to the relevant exposure scenario, given in the annex/available from your supplier.

#### APPROPRIATE TECHNICAL DEVICES

If user operations generate dust or fumes, use process enclosures, local ventilation systems, or other technical devices to keep airborne particle levels below recommended exposure limits.

#### ENVIRONMENTAL EXPOSURE CONTROLS

All ventilation systems should be filtered before being discharged into the atmosphere. Avoid releasing into the environment. Contain the spillage. Any major spillage into watercourses must be reported to the environmental protection agency or other regulatory body.

Detailed explanations of risk management measures to adequately control environmental exposure can be found in the relevant exposure scenario, available from your supplier. For further detailed information, refer to the annex of this SDS.

Eye protection:

Use close fitting safety goggles, don't use eye lens.

#### EYE PROTECTION

Wear hermetic protective goggles (see standard EN 166).

Protection for skin:

Use suitable clothing that provides complete protection to the skin according to activity and exposure (EN 14605/EN 13982), e.g. overall, apron, safety shoes, suitable clothing.

#### SKIN PROTECTION

Wear category III professional long-sleeved overalls and safety footwear (see Regulation 2016/425 and standard EN ISO 20344). After removing protective clothing, wash the body with soap and water.

Protection for hands:

There is no material or combination of materials for gloves that can guarantee unlimited resistance to any individual chemical or combination of chemicals.

For prolonged or repeated handling, use chemical resistant gloves.

HAND PROTECTION

In the case of prolonged contact with the product, protect the hands with penetration-resistant work gloves (see standard EN 374). Work glove material must be chosen according to the process in which the product is being used and the products that may form. Latex gloves may cause sensitivity reactions.

Use protective gloves that provides comprehensive protection, e.g. P.V.C., neoprene or rubber.

The choice of suitable gloves does not only depend on the material, but also on other quality characteristics that vary from one manufacturer to another and on the manner and times according to which the mixture is used.

#### Respiratory protection:

As the use of adequate technical equipment must always take priority over personal protective equipment, make sure the workplace is well ventilated through effective local aspiration.

When choosing personal protective equipment, ask your chemical substance supplier for advice.

Personal protective equipment must be CE marked, confirming that it complies with current standards and regulations.

Use respiratory protection where ventilation is insufficient or exposure is prolonged.

Environmental exposure controls:

See point 6.2

Hygienic and Technical measures See section 7.

## SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties Appearance: Solid Color: whitish Odour: Odourless Melting point / freezing point: N.D. Initial boiling point and boiling range: N.D. Flammability: Non-flammable Upper/lower flammability or explosive limits: N.D. Flash point: N.A. Auto-ignition temperature: N.D. Decomposition temperature: N.D. pH: >=12.00<=13.00 (Internal method ) Kinematic viscosity: N.A. Relative density: N.A. Vapour density: N.A. Vapour pressure: N.D. Solubility in water: Reacts Solubility in oil: N.A. Partition coefficient (n-octanol/water): N.A.

#### Particle characteristics:

Based on the available data, the product does not contain nanomaterials.

## 9.2. Other information

Conductivity: N.A. Explosive properties: N.D. Oxidizing properties: N.D. Evaporation rate: N.A.

#### **SECTION 10: Stability and reactivity**

#### 10.1. Reactivity

Stable under normal conditions

Calcium magnesium oxide reacts exothermically with water to form calcium dihydroxide.

#### 10.2. Chemical stability

Stable under normal conditions

Under normal conditions of use and storage (dry conditions), calcium magnesium oxide is stable.

#### 10.3. Possibility of hazardous reactions

Because of heat or fire the preparation can release carbon oxides and vapours which may be harmful to health.

#### 10.4. Conditions to avoid

Keep away from heat sources.

Minimise exposure to air and moisture to avoid degradation.

#### 10.5. Incompatible materials

None in particular.

Calcium magnesium oxide reacts exothermically with water to form calcium dihydroxide: CaO.MgO + H2O  $\rightarrow$  Ca(OH)2 + MgO + 1155 kJ/kg CaO

Calcium magnesium oxide reacts exothermically with acids to form calcium and magnesium salts.

In the presence of moisture, calcium magnesium oxide reacts with aluminium and brass to form hydrogen: CaO.MgO + 2 Al + 7 H2O  $\rightarrow$  MgO + Ca(Al (OH)4)2 + 3 H2

See chapter 10.3

#### **10.6.** Hazardous decomposition products

No hazardous decomposition products when stored and handled correctly.

See chapter 5.2

#### None.

Further information: calcium magnesium oxide absorbs moisture and carbon dioxide from air to form calcium magnesium carbonate (dolomite), a common material in nature: Ca0.MgO +  $2CO2 \rightarrow CaCO3.Mg CO3 + H2O$ 

#### SECTION 11: Toxicological information

#### 11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008

#### Toxicological Information of the Preparation

a) acute toxicity	Not classified
	Based on available data, the classification criteria are not met
b) skin corrosion/irritation	The product is classified: Skin Irrit. 2(H315)
c) serious eye damage/irritation	The product is classified: Eye Dam. 1(H318)
d) respiratory or skin sensitisation	Not classified
	Based on available data, the classification criteria are not met
e) germ cell mutagenicity	Not classified
	Based on available data, the classification criteria are not met
f) carcinogenicity	Not classified
	Based on available data, the classification criteria are not met
g) reproductive toxicity	Not classified
	Based on available data, the classification criteria are not met
h) STOT-single exposure	The product is classified: STOT SE 3(H335)
i) STOT-repeated exposure	Not classified
	Based on available data, the classification criteria are not met
j) aspiration hazard	Not classified

Toxicological information on main components of the mixture:									
calcium oxide	a) acute toxicity	LD50 Oral Rat > 2000 mg/kg	Calcium hydrate						
		LD50 Skin Rabbit > 2500 mg/kg	Calcium hydrate						
calcium magnesium (Dolomitic lime)	oxide a) acute toxicity	LD50 Oral Rat > 2000 mg/kg							

#### 11.2. Information on other hazards

#### Endocrine disrupting properties:

No endocrine disruptor substances present in concentration >= 0.1%

Calcium magnesium oxide is classified as irritating to the skin and respiratory system and poses a risk of serious damage to eyes. The occupational exposure limit for prevention of local sensory irritation and reduction of lung function parameters as critical effects is OEL (8h) = 1 mg/m<sup>3</sup> respirable dust (see calcium oxide)

#### ABSORPTION

The primary health effect of calcium magnesium oxide is local irritation caused by the pH shift. Absorption is not, therefore, a relevant parameter for assessing the effects of the substance.

#### ACUTE TOXICITY

Calcium magnesium oxide is not acutely toxic. A study on acute skin effects with calcium magnesium oxide is considered to be scientifically unwarranted (insignificant skin absorption)

Dermal No data available By inhalation No data available Classification for acute toxicity is not warranted. For irritant effects on the respiratory system, see below.

#### IRRITATION/CORROSION

Calcium oxide poses a risk of serious damage to eyes (eye irritation studies (in vivo, rabbit)). By read-across, the results are also applicable to calcium magnesium oxide.

Calcium oxide is irritating to the skin (in vivo, rabbit). By read-across, the results are also applicable to calcium magnesium oxide.

From human data, it can be concluded that CaO is irritating to the respiratory system. By read-across, the results are also applicable to calcium magnesium oxide. Based on experimental results of similar substances, calcium magnesium oxide must be classified as irritating to the skin [skin irritation 2 (H315 - Causes skin irritation)] and severely irritating to eyes [eye damage 1 (H318 - Causes serious eye damage)].

As summarised and as recommended by the SCOEL (Anonymous, 2008), based on the data obtained on humans, by read-across from similar substances such as CaO and Ca(OH)2, it is proposed to classify calcium magnesium oxide as irritating to the respiratory system [STOT SE 3 (H335 - May cause respiratory irritation)].

#### SENSITISATION

No data available. Calcium magnesium oxide is not considered to be a skin sensitiser, based on the nature of the effect (pH shift) and the importance of calcium for human nutrition. Classification for sensitisation is not warranted.

#### STOT - REPEATED EXPOSURE

The toxicity of calcium and magnesium via the oral route is demonstrated by the higher tolerable upper intake levels (UL) for adults determined by the Scientific Committee on Food (SCF) of UL = 2500 mg/d, corresponding to 36 mg/kg bw/d (70 kg person) for calcium, and UL = 250 mg/d, corresponding to 3.6 mg/kg bw/d (70 kg person) for magnesium. The toxicity of CaO via the dermal route is not considered as relevant in view of the anticipated insignificant absorption through the skin and due to the fact that local irritation is the primary health effect (pH shift). The toxicity of CaO by inhalation (local effect, irritation of mucous membranes) has been determined by the Scientific Committee on Occupational Exposure Limits (SCOEL) as an 8h TWA of 1 mg/m<sup>3</sup> respirable dust.

Classification of CaOMgO for toxicity from prolonged exposure is not therefore required.

#### MUTAGENICITY

There is no indication of genotoxic/mutagenic effects for either calcium dihydroxide or other calcium or magnesium salts from in vitro studies (gene mutation in bacteria) In view of the omnipresence and essential nature of calcium and magnesium and of the physiological non-relevance of any pH shift induced by calcium magnesium oxide in aqueous media, CaOMgO is obviously devoid of any genotoxic potential. Classification for genotoxicity is not warranted.

#### CARCINOGENICITY

Neither calcium (administered as Ca-lactate) nor magnesium (administered as Mg-chloride) is carcinogenic (experimental results, rat/mouse). The pH effect of calcium magnesium oxide does not pose any carcinogenic risk.

Human epidemiological data confirm that calcium magnesium oxide is devoid of any carcinogenic potential. Classification for carcinogenicity is not warranted.

#### REPRODUCTIVE TOXICITY

Neither calcium (administered as Ca-carbonate) nor magnesium (administered as Mg-sulphate) is toxic for reproduction (experimental results, mouse/rat).

The pH effect does not pose any risk to reproduction.

Human epidemiological data confirm that calcium magnesium oxide is devoid of any potential for reproductive toxicity.

In both animal studies and human clinical studies conducted on different calcium salts, no effect on reproductive and developmental toxicity was identified. Also refer to the Scientific Committee on Food (Anonymous, 2006).

Calcium magnesium oxide is not therefore toxic for reproduction and/or development.

Classification for reproductive toxicity according to Regulation (EC) 1272/2008 is not required.

#### **SECTION 12: Ecological information**

Adopt good working practices, so that the product is not released into the environment.

#### 12.1. Toxicity

Eco-Toxicological Information:

#### List of Eco-Toxicological properties of the product

Not classified for environmental hazards.

No data available for the product

List of Eco-Toxicological properties of the components								
Ident. Numb.	Ecotox Data							
CAS: 1305-78-8 - EINECS: 215- 138-9	a) Aquatic acute toxicity: LC50 Freshwater fish 50.6 mg/l 96h							
	a) Aquatic acute toxicity: EC50 Freshwater invertebrates 49.1 mg/l 48h							
	a) Aquatic acute toxicity: EC50 Freshwater algae 184.57 mg/l 72h							
	a) Aquatic acute toxicity: LC50 Marine water fish 457 mg/l 96h							
	a) Aquatic acute toxicity: LC50 Marine water invertebrates 158 mg/l 96h							
	b) Aquatic chronic toxicity : NOEC Marine water invertebrates 32 mg/l $$ - $$ 14d $$							
	b) Aquatic chronic toxicity: NOEC Freshwater algae 48 mg/l 72h							
	d) Terrestrial toxicity: NOEC Soil macroorganisms 2000 mg/kg							
	d) Terrestrial toxicity: NOEC Soil microorganisms 12000 mg/kg							
	e) Plant toxicity : NOEC 1080 mg/kg							
CAS: 37247-91- 9 - EINECS: 253-425-0	a) Aquatic acute toxicity : LC50 Freshwater fish 50.6 mg/l 96h							
	a) Aquatic acute toxicity: LC50 Marine water fish 457 mg/l 96h							
	a) Aquatic acute toxicity: EC50 Freshwater invertebrates 49.1 mg/l 48h							
	a) Aquatic acute toxicity: LC50 Marine water invertebrates 158 mg/l 96h							
	b) Aquatic chronic toxicity : NOEC Marine water invertebrates 32 mg/l $$ - $$ 14d $$							
	a) Aquatic acute toxicity: EC50 Freshwater algae 184.57 mg/l 72h							
	a) Aquatic acute toxicity: NOEC Freshwater algae 48 mg/l 72h							
	Ident. Numb. CAS: 1305-78-8 - EINECS: 215- 138-9 CAS: 37247-91- 9 - EINECS:							

#### 12.2. Persistence and degradability

Calcium oxide and calcium magnesium oxide react with water and/or carbon dioxide to form calcium dihydroxide and/or calcium carbonate, respectively. These are moderately soluble substances and therefore have a low mobility in most soils; they are also used as fertilisers.

N.A.

#### 12.3. Bioaccumulative potential

N.A.

#### 12.4. Mobility in soil

N.A.

#### 12.5. Results of PBT and vPvB assessment

On the basis of available data, the product does not contain any PBT/vPvB in percentage  $\geq$  0.1%.

#### 12.6. Endocrine disrupting properties

No endocrine disruptor substances present in concentration >= 0.1%

12.7. Other adverse effects

N.A.

#### **SECTION 13: Disposal considerations**

#### 13.1. Waste treatment methods

Recover, if possible. Send to authorised disposal plants or for incineration under controlled conditions. In so doing, comply with the local and national regulations currently in force.

Do not allow it to enter drains or watercourses.

Processing, use of or contamination by this product may change the waste management options.

Dispose of containers contaminated by the product in accordance with local or national legal provisions.

#### **SECTION 14: Transport information**

Not classified as dangerous in the meaning of transport regulations.

#### 14.1. UN number or ID number

N.A.

#### 14.2. UN proper shipping name

IATA-Technical name: CALCIUM OXIDE IMDG-Technical name: CALCIUM OXIDE N.A.

#### 14.3. Transport hazard class(es)

N.A.

IATA-Class: 8

IMDG-Class: 8

#### 14.4. Packing group

N.A. IATA-Packing group: III IMDG-Packing group: -

#### 14.5. Environmental hazards

N.A.

IMDG-EMS: -

#### 14.6. Special precautions for user

N.A.

Road and Rail (ADR-RID):

ADR-Label: N.A. -

ADR - Hazard identification number: -

ADR-Transport category (Tunnel restriction code):

Air (IATA):

IATA-Passenger Aircraft: 860 IATA-Cargo Aircraft: 864 IATA-Label: 8

IATA-Subsidiary hazards: -

IATA-Erg: 8L

IATA-Special Provisions: A803

#### N.A. Sea (IMDG):

IMDG-Stowage Code: -

IMDG-Stowage Note: -

IMDG-Subsidiary hazards: -

IMDG-Special Provisions: 960

N.A.

#### 14.7. Maritime transport in bulk according to IMO instruments

N.A.

#### **SECTION 15: Regulatory information**

## 15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Dir. 98/24/EC (Risks related to chemical agents at work) Dir. 2000/39/EC (Occupational exposure limit values) Directive 2010/75/EU Regulation (EC) n. 1907/2006 (REACH) Regulation (EC) n. 1272/2008 (CLP) Regulation (EC) n. 790/2009 (ATP 1 CLP) and (EU) n. 758/2013 Regulation (EU) n. 2020/878 Regulation (EU) n. 286/2011 (ATP 2 CLP) Regulation (EU) n. 618/2012 (ATP 3 CLP) Regulation (EU) n. 487/2013 (ATP 4 CLP) Regulation (EU) n. 944/2013 (ATP 5 CLP) Regulation (EU) n. 605/2014 (ATP 6 CLP) Regulation (EU) n. 2015/1221 (ATP 7 CLP) Regulation (EU) n. 2016/918 (ATP 8 CLP) Regulation (EU) n. 2016/1179 (ATP 9 CLP)

Regulation (EU) n. 2017/776 (ATP 10 CLP) Regulation (EU) n. 2018/669 (ATP 11 CLP) Regulation (EU) n. 2018/1480 (ATP 13 CLP) Regulation (EU) n. 2019/521 (ATP 12 CLP) Regulation (EU) n. 2020/217 (ATP 14 CLP) Regulation (EU) n. 2020/1182 (ATP 15 CLP) Regulation (EU) n. 2021/643 (ATP 16 CLP) Regulation (EU) n. 2021/849 (ATP 17 CLP) Regulation (EU) n. 2022/692 (ATP 18 CLP)

## Restrictions related to the product or the substances contained according to Annex XVII Regulation (EC) 1907/2006 (REACH) and subsequent modifications:

Restrictions related to the product: None.

Restrictions related to the substances contained: None.

Provisions related to directive EU 2012/18 (Seveso III):

None

Regulation (EU) No 649/2012 (PIC regulation)

No substances listed

#### German Water Hazard Class.

1: Low hazard to waters

#### SVHC Substances:

On the basis of available data, the product does not contain any SVHC in percentage  $\geq 0.1\%$ .

National regulations: Water Endangerment Class 1 (Germany)

#### 15.2. Chemical safety assessment

No Chemical Safety Assessment has been carried out for the mixture.

#### **SECTION 16: Other information**

Code	Description	
H315	Causes skin irritation.	
H318	Causes serious eye damage.	
H335	May cause respiratory irritation.	
Code	Hazard class and hazard category	Description
<b>Code</b> 3.2/2	Hazard class and hazard category Skin Irrit. 2	Description Skin irritation, Category 2
	5,	•

Classification and procedure used to derive the classification for mixtures according to Regulation (EC) 1272/2008 [CLP]: Classification according to Regulation Classification procedure

(EC) Nr. 1272/2008	Classification procedu
3.2/2	Calculation method
3.3/1	Calculation method
3.8/3	Calculation method

This document was prepared by a competent person who has received appropriate training.

Main bibliographic sources:

ECDIN - Environmental Chemicals Data and Information Network - Joint Research Centre, Commission of the European Communities

SAX'S DANGEROUS PROPERTIES OF INDUSTRIAL MATERIALS - Eight Edition - Van Nostrand Reinold

Safety data sheets of raw materials suppliers.

CCNL - Appendix 1

The information contained herein is based on our state of knowledge at the above-specified date. It refers solely to the product indicated and constitutes no guarantee of particular quality.

It is the duty of the user to ensure that this information is appropriate and complete with respect to the specific use intended.

This MSDS cancels and replaces any preceding release.

Legend to abbreviations and acronyms used in the safety data sheet:

ACGIH: American Conference of Governmental Industrial Hygienists

ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road.

AND: European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways

ATE: Acute Toxicity Estimate

ATEmix: Acute toxicity Estimate (Mixtures)

BCF: Biological Concentration Factor **BEI:** Biological Exposure Index BOD: Biochemical Oxygen Demand CAS: Chemical Abstracts Service (division of the American Chemical Society). CAV: Poison Center CE: European Community CLP: Classification, Labeling, Packaging. CMR: Carcinogenic, Mutagenic and Reprotoxic COD: Chemical Oxygen Demand COV: Volatile Organic Compound CSA: Chemical Safety Assessment CSR: Chemical Safety Report DMEL: Derived Minimal Effect Level DNEL: Derived No Effect Level. DPD: Dangerous Preparations Directive DSD: Dangerous Substances Directive EC50: Half Maximal Effective Concentration ECHA: European Chemicals Agency EINECS: European Inventory of Existing Commercial Chemical Substances. ES: Exposure Scenario GefStoffVO: Ordinance on Hazardous Substances, Germany. GHS: Globally Harmonized System of Classification and Labeling of Chemicals. IARC: International Agency for Research on Cancer IATA: International Air Transport Association. IATA-DGR: Dangerous Goods Regulation by the "International Air Transport Association" (IATA). IC50: half maximal inhibitory concentration ICAO: International Civil Aviation Organization. ICAO-TI: Technical Instructions by the "International Civil Aviation Organization" (ICAO). IMDG: International Maritime Code for Dangerous Goods. INCI: International Nomenclature of Cosmetic Ingredients. IRCCS: Scientific Institute for Research, Hospitalization and Health Care KAFH: KAFH KSt: Explosion coefficient. LC50: Lethal concentration, for 50 percent of test population. LD50: Lethal dose, for 50 percent of test population. LDLo: Leathal Dose Low N.A.: Not Applicable N/A: Not Applicable N/D: Not defined/ Not available NA: Not available NIOSH: National Institute for Occupational Safety and Health NOAEL: No Observed Adverse Effect Level OSHA: Occupational Safety and Health Administration. PBT: Persistent, Bioaccumulative and Toxic PGK: Packaging Instruction PNEC: Predicted No Effect Concentration. **PSG:** Passengers RID: Regulation Concerning the International Transport of Dangerous Goods by Rail. STEL: Short Term Exposure limit. STOT: Specific Target Organ Toxicity. TLV: Threshold Limiting Value. TWATLV: Threshold Limit Value for the Time Weighted Average 8 hour day. (ACGIH Standard). vPvB: Very Persistent, Very Bioaccumulative. WGK: German Water Hazard Class.



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## **APPENDIX: EXPOSURE SCENARIOS**

The current document includes all relevant occupational and environmental exposure scenarios (ES) for the production and use of calcium oxide as required under the REACH Regulation (Regulation (EC) No 1907/2006). For the development of the ES the Regulation and the relevant REACH Guidance have been considered. For the description of the covered uses and processes, the "R.12 – Use descriptor system" guidance (Version: 2, March 2010, ECHA-2010-G-05-EN), for the description and implementation of risk management measures (RMM) the "R.13 – Risk management measures" guidance (Version: 1.1, May 2008), for the occupational exposure estimation the "R.14 – Occupational exposure estimation" guidance (Version: 2, May 2010, ECHA-2010-G-09-EN) and for the actual environmental exposure assessment the "R.16 – Environmental Exposure Assessment" (Version: 2, May 2010, ECHA-10-G-06-EN) was used.

## Methodology used for environmental exposure assessment

The environmental exposure scenarios only address the assessment at the local scale, including municipal sewage treatment plants (STPs) or industrial waste water treatment plants (WWTPs) when applicable, for industrial and professional uses as any effects that might occur is expected to take place on a local scale.

## 1) Industrial uses (local scale)

The exposure and risk assessment is only relevant for the aquatic environment, when applicable including STPs/WWTPs, as emissions in the industrial stages mainly apply to (waste) water. The aquatic effect and risk assessment only deal with the effect on organisms/ecosystems due to possible pH changes related to OH<sup>-</sup> discharges. The exposure assessment for the aquatic environment only deals with the possible pH changes in STP effluent and surface water related to the OH<sup>-</sup> discharges at the local scale and is performed by assessing the resulting pH impact: the surface water pH should not increase above 9 (In general, most aquatic organisms can tolerate pH values in the range of 6-9).

Risk management measures related to the environment aim to avoid discharging calcium oxide solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. Discharges should be carried out such that pH changes in receiving surface waters are minimised. The effluent pH is normally measured and can be neutralised easily, as often required by national laws.

## 2) Professional uses (local scale)

The exposure and risk assessment is only relevant for the aquatic and terrestrial environment. The aquatic effect and risk assessment is determined by the pH effect. Nevertheless, the classical risk characterisation ratio (RCR), based on PEC (predicted environmental concentration) and PNEC (predicted no effect concentration) is calculated. The professional uses on a local scale refer to applications on agricultural or urban soil. The environmental exposure is assessed based on data and a modelling tool. The modelling FOCUS/ Exposit tool is used to assess terrestrial and aquatic exposure (typically conceived for biocidal applications).

Details and scaling approach indications are reported in the specific scenarios.



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#### Methodology used for occupational exposure assessment

By definition an exposure scenario (ES) has to describe under which operational conditions (OC) and risk management measure (RMMs) the substance can be handled safely. This is demonstrated if the estimated exposure level is below the respective derived no-effect level (DNEL), which is expressed in the risk characterisation ratio (RCR).

For workers, the repeated dose DNEL for inhalation as well as the acute DNEL for inhalation are based on the respective recommendations of the scientific committee on occupational exposure limits (SCOEL) being 1 mg/m<sup>3</sup> and 4 mg/m<sup>3</sup>, respectively.

In cases where neither measured data nor analogous data are available, occupational exposure is assessed with the aid of a modelling tool. At the first tier screening level, the MEASE tool (<u>http://www.ebrc.de/mease.html</u>) is used to assess inhalation exposure according to the ECHA guidance (R.14).

Since the SCOEL recommendation refers to <u>respirable dust</u> while the exposure estimates in MEASE reflect the <u>inhalable</u> fraction, an additional safety margin is inherently included in the exposure scenarios below when MEASE has been used to derive exposure estimates.

#### Methodology used for consumer exposure assessment

By definition an ES has to describe under which conditions the substances, preparation or articles can be handled safely. In cases where neither measured data nor analogous data are available, exposure is assessed with the aid of a modelling tool.

For consumers, the repeated dose DNEL for inhalation as well as the acute DNEL for inhalation are based on the respective recommendations of the Scientific Committee on Occupational Exposure Limits (SCOEL), being 1 mg/m<sup>3</sup> and 4 mg/m<sup>3</sup>, respectively.

For inhalation exposure to powders the data, derived from van Hemmen (van Hemmen, 1992: Agricultural pesticide exposure data bases for risk assessment. Rev Environ Contam Toxicol. 126: 1-85.), has been used to calculate the inhalation exposure. The inhalation exposure for consumers is estimated at 15  $\mu$ g/hr or 0.25  $\mu$ g/min. For larger tasks the inhalation exposure is expected to be higher. A factor of 10 is suggested when the product amount exceeds 2.5 kg, resulting in the inhalation exposure of 150  $\mu$ g/hr. To convert these values in mg/m<sup>3</sup> a default value of 1.25 m<sup>3</sup>/hr for the breathing volume under light working conditions will be assumed (van Hemmen, 1992) giving 12  $\mu$ g/m<sup>3</sup> for small tasks and 120  $\mu$ g/m<sup>3</sup> for larger tasks.

When the preparation or substance is applied in granular form or as tablets, reduced exposure to dust was assumed. To take this into account if data about particle size distribution and attrition of the granule are lacking, the model for powder formulations is used, assuming a reduction in dust formation by 10 % according to Becks and Falks (Manual for the authorisation of pesticides. Plant protection products. Chapter 4 Human toxicology; risk operator, worker and bystander, version 1.0., 2006).

For dermal exposure and exposure to the eye a qualitative approach has been followed, as no DNEL could be derived for this route due to the irritating properties of calcium oxide. Oral exposure was not assessed as this is not a foreseeable route of exposure regarding the uses addressed.



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Since the SCOEL recommendation refers to respirable dust while the exposure estimates by the model from van Hemmen reflect the inhalable fraction, an additional safety margin is inherently included in the exposure scenarios below, i.e. the exposure estimates are very conservative.

The exposure assessment of calcium oxide professional and industrial and consumer use is performed and organized based on several scenarios. An overview of the scenarios and the coverage of substance life cycle is presented in Table 1.



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## **Table 1:** Overview on exposure scenarios and coverage of substance life cycle

			lde use	ntifi es	ed	Resultin g life cycle stage	Identified Use			Chemical Product Category (PC)		Process	Article categor y (AC)	Environmental release category (ERC)
ES number	Exposure scenario title	Manufacture	Formulation	End use	Consumer	Service life (for articles)	Linked to Iden		category (PROC)					
9.1	Manufacture and industrial uses of aqueous solutions of lime substances	x	x	x		x	1	3; 1, 2a, 2b, 4, 5, 6a, 6 9, 10, 11, 12, 13, 14, 17, 18, 19, 20, 23, 24	b, 7, 8, 15, 16,	1, 2, 3, 7, 8, 9a, 9b, 11 14, 15, 16, 17, 18, 19, 20 24, 25, 26, 27, 28, 29, 30 33, 34, 35, 36, 37, 38, 3	0, 21, 23, 0, 31, 32,	1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19	5, 6, 7, 8,	1, 2, 3, 4, 5, 6a, 6b, 6c, 6d, 7, 12a, 12b, 10a, 10b, 11a, 11b
9.2	Manufacture and industrial uses of low dusty solids/powders of lime substances	x	x	x		x	2	3; 1, 2a, 2b, 4, 5, 6a, 6i 9, 10, 11, 12, 13, 14, 17, 18, 19, 20, 23, 24	b, 7, 8, 15, 16,	1, 2, 3, 7, 8, 9a, 9b, 11 14, 15, 16, 17, 18, 19, 20 24, 25, 26, 27, 28, 29, 30 33, 34, 35, 36, 37, 38, 3	0, 21, 23, 0, 31, 32,	1, 2, 3, 4, 5, 6, 7, 8a, 8b, 9, 10, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 25, 26, 27a, 27b	5, 6, 7, 8,	6c, 6d, 7, 12a, 12b,
9.3	Manufacture and industrial uses of medium dusty solids/powders of lime substances		x	x		x	3	3; 1, 2a, 2b, 4, 5, 6a, 6i 9, 10, 11, 12, 13, 14, 17, 18, 19, 20, 23, 24		1, 2, 3, 7, 8, 9a, 9b, 11 14, 15, 16, 17, 18, 19, 20 24, 25, 26, 27, 28, 29, 30 33, 34, 35, 36, 37, 38, 3	0, 21, 23, 0, 31, 32,	1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 13, 14, 15, 16, 17, 18, 19, 22, 23, 24, 25, 26, 27a, 27b	5, 6, 7, 8,	6c, 6d, 7, 12a, 12b,



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			lde use	ntifie es	ed	Resultin g life cycle stage	Identified Use				Process	Article	Environmental
ES number	Exposure scenario title	Manufacture	Formulation	End use	Consumer	Service life (for articles)	Linked to Iden		Chemical Category (PC)	Product	category (PROC)	categor y (AC)	release category (ERC)
9.4	Manufacture and industrial uses of high dusty solids/powders of lime substances	x	x	x		x	4	3; 1, 2a, 2b, 4, 5, 6a, 6b, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 23, 24	1, 2, 3, 7, 8, 9a, 9b, 14, 15, 16, 17, 18, 19 24, 25, 26, 27, 28, 29 33, 34, 35, 36, 37, 38	, 20, 21, 23, , 30, 31, 32,	1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 13, 14, 15, 16, 17, 18, 19, 22, 23, 24, 25, 26, 27a, 27b	5, 6, 7, 8,	6c, 6d, 7, 12a, 12b,
9.5	Manufacture and industrial uses of massive objects containing lime substances	x	x	x		x	5	3; 1, 2a, 2b, 4, 5, 6a, 6b, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 23, 24	1, 2, 3, 7, 8, 9a, 9b, 14, 15, 16, 17, 18, 19 24, 25, 26, 27, 28, 29 33, 34, 35, 36, 37, 38	, 20, 21, 23, , 30, 31, 32,	6, 14, 21, 22, 23, 24, 25	5, 6, 7, 8,	1, 2, 3, 4, 5, 6a, 6b, 6c, 6d, 7, 12a, 12b, 10a, 10b, 11a, 11b
9.6	Professional uses of aqueous solutions of lime substances		x	x		х	6	22; 1, 5, 6a, 6b, 7, 10, 11, 12, 13, 16, 17, 18, 19, 20, 23, 24	1, 2, 3, 7, 8, 9a, 9b, 14, 15, 16, 17, 18, 19 24, 25, 26, 27, 28, 29 33, 34, 35, 36, 37, 38	, 20, 21, 23, , 30, 31, 32,	2, 3, 4, 5, 8a, 8b, 9, 10, 12, 13, 15, 16, 17, 18, 19	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 13	2, 8a, 8b, 8c, 8d, 8e, 8f



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			lde use	entifi es	ed	Resultin g life cycle stage	tified Use				Process	Article	Environmental
ES number	Exposure scenario title	Manufacture	Formulation	End use	Consumer	Service life (for articles)	Linked to Identified Use	Sector of category (SU)	use	Chemical Produc Category (PC)	t category (PROC)	categor y (AC)	release category (ERC)
9.7	Professional uses of low dusty solids/powders of lime substances		x	x		x	7	22; 1, 5, 6a, 6b, 7, 10, 11 13, 16, 17, 18, 19, 20, 23	l, 12, 3, 24	1, 2, 3, 7, 8, 9a, 9b, 11, 12, 1 14, 15, 16, 17, 18, 19, 20, 21, 2 24, 25, 26, 27, 28, 29, 30, 31, 3 33, 34, 35, 36, 37, 38, 39, 40	3, 10, 12, 15, 16, 17, 10, 12, 15, 16, 17	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 13	2, 8a, 8b, 8c, 8d, 8e, 8f
9.8	Professional uses of medium dusty solids/powders of lime substances		x	x		x	8	22; 1, 5, 6a, 6b, 7, 10, 11 13, 16, 17, 18, 19, 20, 23	I, 12, 3, 24	1, 2, 3, 7, 8, 9a, 9b, 11, 12, 1 14, 15, 16, 17, 18, 19, 20, 21, 2 24, 25, 26, 27, 28, 29, 30, 31, 3 33, 34, 35, 36, 37, 38, 39, 40	3, 2, 3, 4, 3, 60, 60, 9, 3, 10, 12, 15, 16, 17	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 13	2, 8a, 8b, 8c, 8d, 8e, 8f, 9a, 9b
9.9	Professional uses of high dusty solids/powders of lime substances		x	×		x	9	22; 1, 5, 6a, 6b, 7, 10, 11 13, 16, 17, 18, 19, 20, 23	I, 12, 3, 24	1, 2, 3, 7, 8, 9a, 9b, 11, 12, 1 14, 15, 16, 17, 18, 19, 20, 21, 2 24, 25, 26, 27, 28, 29, 30, 31, 3 33, 34, 35, 36, 37, 38, 39, 40	<sup>3,</sup> 5, 2, 3, 4, 5, 8a, 8b, 9, 7, 10, 13, 15, 16, 17, 7, 18, 19, 25, 26	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 13	2, 8a, 8b, 8c, 8d, 8e, 8f



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			lde use	entifi es	ed	Resultin g life cycle stage	tified Use			Process	Article	Environmental
ES number	Exposure scenario title	Manufacture	Formulation	End use	Consumer	Service life (for articles)	Linked to Identified Use	Sector of use category (SU)	Chemical Product Category (PC)	category (PROC)	categor y (AC)	release category (ERC)
9.10	Professional use of lime substances in soil treatment		x	x			10	22	9b	5, 8b, 11, 26		2, 8a, 8b, 8c, 8d, 8e, 8f
9.11	Professional uses of articles/containe rs containing lime substances			x		x	11	22; 1, 5, 6a, 6b, 7, 10, 11, 12, 13, 16, 17, 18, 19, 20, 23, 24		0, 21, 24, 25	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 13	10a, 11a, 11b, 12a, 12b
9.12	Consumer use of building and construction material (DIY)				x		х	21	9b, 9a			8
9.13	Consumer use of CO <sub>2</sub> absorbent in breathing apparatuses				x		х	21	2			8



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			lde use	ntifi es		Resultin g life cycle stage				Process	Article	Environmental
ES number	Exposure scenario title	Manufacture	Formulation	End use	Consumer	Service life (for articles)	Linked to Identified	Sector of use category (SU)	Chemical Product Category (PC)	category (PROC)	categor	release category (ERC)
9.14	Consumer use of garden lime/fertilizer				x		х	21	20, 12			8e
9.15	Consumer use of lime substances as water treatment chemicals in aquaria				x		х	21	20, 37			8
9.16	Consumer use of cosmetics containing lime substances				x		x	21	39			8



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## ES number 9.1: Manufacture and industrial uses of aqueous solutions of lime substances

Exposure Scenario	o Format (1) addressing uses carried o	out by workers				
1. Title						
Free short title	Manufacture and industrial uses of aqueous soluti	ons of lime substances				
Systematic title based on use descriptor	SU3, SU1, SU2a, SU2b, SU4, SU5, SU6a, SU6b, SU7, SU8, SU9, SU10, SU11, SU12, SU13, SU14, SU15, SU16, SU17, SU18, SU19, SU20, SU23, SU24 PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18, PC19, PC20, PC21, PC23, PC24, PC25, PC26, PC27, PC28, PC29, PC30, PC31, PC32, PC33, PC34, PC35, PC36, PC37, PC38, PC39, PC40 AC1, AC2, AC3, AC4, AC5, AC6, AC7, AC8, AC10, AC11, AC13 (appropriate PROCs and ERCs are given in Section 2 below)					
Processes, tasks and/or activities covered	Processes, tasks and/or activities covered are des	scribed in Section 2 below.				
Assessment Method	The assessment of inhalation exposure is based of	on the exposure estimation tool MEASE.				
2. Operational con	ditions and risk management measure	es a la companya de l				
PROC/ERC	REACH definition	Involved tasks				
PROC 1	Use in closed process, no likelihood of exposure					
PROC 2	Use in closed, continuous process with					
PROC 3	occasional controlled exposure Use in closed batch process (synthesis or formulation)					
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises					
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)					
PROC 7	Industrial spraying					
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities					
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities					
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	Further information is provided in the ECHA Guidance on information requirements and chemical safety assessment, Chapter R.12: Use				
PROC 10	Roller application or brushing	descriptor system (ECHA-2010-G-05-EN).				
PROC 12	Use of blowing agents in manufacture of foam					
PROC 13	Treatment of articles by dipping and pouring					
PROC 14	Production of preparations or articles by tabletting, compression, extrusion, pelletisation					
PROC 15	Use as laboratory reagent					
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected					
PROC 17	Lubrication at high energy conditions and in partly open process					
PROC 18	Greasing at high energy conditions					
PROC 19	Hand-mixing with intimate contact and only PPE available					
ERC 1-7, 12	Manufacture, formulation and all types of industrial uses					
ERC 10, 11	Wide-dispersive outdoor and indoor use of long- life articles and materials					



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2.1 Control of worl	2.1 Control of workers exposure						
Product characteristic							
According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. Whereas in hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, high abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. The spraying of aqueous solutions (PROC7 and 11) is assumed to be involved with a medium emission.							
PROC	Used in preparation?	Content in preparation	Physical form	Emission potential			
PROC 7	not restricted		aqueous solution	medium			
All other applicable PROCs	not restricted		aqueous solution	very low			
Amounts used							
combination of the scale		sidered to influence the vs. Professional) and lev insic emission potential.					
Frequency and duration	n of use/exposure						
PROC	Duration of exposure						
PROC 7	≤ 240 minutes						
All other applicable PROCs	480 minutes (not restrict	ed)					
Human factors not influ	uenced by risk managen	nent					
The shift breathing volun	ne during all process step	s reflected in the PROCs i	s assumed to be 10 m <sup>3</sup> /sl	nift (8 hours).			
Other given operationa	I conditions affecting w	orkers exposure					
		allurgical processes, oper occupational exposure as					
Technical conditions a	nd measures at process	level (source) to prever	nt release				
Risk management meas required in the processes		(e.g. containment or segr	regation of the emission s	source) are generally not			
Technical conditions a	nd measures to control	dispersion from source	towards the worker				
PROC	Level of separation	Localised controls (LC)	Efficiency of LC (according to MEASE)	Further information			
PROC 7	Any potentially required separation of workers from the emission source is indicated above under	local exhaust ventilation	78 %	-			
PROC 19	"Frequency and duration of exposure". A reduction of exposure duration can be	not applicable	na	-			
All other applicable PROCs	achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with relevant exposure.	not required	na	-			
Organisational measur	es to prevent /limit relea	ses, dispersion and exp	osure				
Organisational measures to prevent /limit releases, dispersion and exposure Avoid inhalation or ingestion. General occupational hygiene measures are required to ensure a safe handling of the substance. These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), no eating and smoking at the workplace, the wearing of standard working clothes and shoes unless otherwise stated below. Shower and change clothes at end of work shift. Do not wear contaminated clothing at home. Do not blow dust off with compressed air.							



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PROC	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further persona protective equipment (PPE)			
PROC 7	FFP1 mask	APF=4	Since calcium oxide is classified as irritating to	Eye protection equipment (e.g goggles or visors) mus be worn, unless potential contact with the eye can be			
All other applicable PROCs Any RPE as defined ab	not required na skin, the use of exclude protective gloves is and typ mandatory for all (i.e. cld process steps. Addition protection clothing shoes a be worn						
(compare with "duration of exposure" above) should reflect the additional physiological stress for the worker due to the breathing resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the wearing of RPE. For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the face properly and securely. The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and the management of their correct use in the workplace. Therefore, they should define and document a suitable policy for a respiratory protective device programme including training of the workers. An overview of the APFs of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE.							
2.2 Control of envi	ronmental exposur	e					
Amounts used							
The daily and annual an exposure.	mount per site (for point	sources) is not consider	ed to be the main deterr	minant for environmenta			
Frequency and duratio	n of use						
Intermittent (< 12 time pe	er year) or continuous use	/release					
Environment factors no	ot influenced by risk ma	nagement					
Flow rate of receiving su	rface water: 18000 m³/day	y					
Other given operationa	I conditions affecting er	vironmental exposure					
Effluent discharge rate: 2	2000 m³/day						
Technical onsite condi	tions and measures to r	educe or limit discharge	es, air emissions and rel	eases to soil			
surface water, in case su introduction into open wa waters are minimised (e. 9. This is also reflected	uch discharges are expec aters is required. In genera g. through neutralisation).	ment aim to avoid dischar ted to cause significant pl al discharges should be ca In general most aquatic c andard OECD tests with ction section.	H changes. Regular contr rried out such that pH cha organisms can tolerate pH	rol of the pH value during inges in receiving surface I values in the range of 6			
Conditions and measures related to waste							
Conditions and measu	res related to waste						



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3. Exposure estimation	ation and reference	to its source				
Occupational exposure	)					
The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium oxide of 1 mg/m <sup>3</sup> (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.						
PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)		
PROC 1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19	MEASE	< 1 mg/m³ (0.001 – 0.66)	skin, dermal exposure ha			
Environmental exposu	re					
effect and risk assessment only deal with the effect on organisms/ecosystems due to possible pH changes related to OH- discharges, being the toxicity of Ca2+ is expected to be negligible compared to the (potential) pH effect. Only the local scale is being addressed, including municipal sewage treatment plants (STPs) or industrial waste water treatment plants (WWTPs) when applicable, both for production and industrial use as any effects that might occur would be expected to take place on a local scale. The high water solubility and very low vapour pressure indicate that lime substance will be found predominantly in water. Significant emissions or exposure to air are not expected due to the low vapour pressure of lime substance. Significant emissions or exposure to the terrestrial environment are not expected either for this exposure scenario. The exposure assessment for the aquatic environment will therefore only deal with the possible pH changes in STP effluent and surface water related to the OH- discharges at the local scale. The exposure assessment is approached by assessing the resulting pH impact: the surface water pH should not increase above 9.						
Environmental emissions	neutralised, the discharg receiving water. The pH easily as often required b		bstance production sites r measured very frequently	nay impact the pH in the and can be neutralised		
Exposure concentration in waste water treatment plant (WWTP)	is no biological treatmen normally not be treated i control of acid wastewate	ubstance production is an it. Therefore, wastewater n biological waste water to er streams that are treated	streams from lime substa reatment plants (WWTPs) d in biological WWTPs.	nce production sites will , but can be used for pH		
Exposure concentration in aquatic pelagic compartment	negligible. When lime is capacity of the water. Th In general the buffer cap the equilibrium between (CO32-).	emitted to surface water, rejected to surface wate higher the buffer capac acity preventing shifts in a carbon dioxide (CO2), th	r, the pH may increase, ity of the water, the lower acidity or alkalinity in natur e bicarbonate ion (HCO3	depending on the buffer the effect on pH will be. ral waters is regulated by -) and the carbonate ion		
Exposure concentration in sediments		ent is not included in this ubstance is emitted to th				
Exposure concentrations in soil and groundwater	The terrestrial compartm be relevant.	ent is not included in this	exposure scenario, becau	se it is not considered to		
Exposure concentration in atmospheric compartment	substance: when emitted reaction with CO2 (or	not included in this CS/ to air as an aerosol in wa other acids), into HC/ e washed out from the air nd up in soil and water.	ater, lime substance is neu O3- and Ca2+. Subsec	utralised as a result of its quently, the salts (e.g.		
Exposure concentration relevant for the food chain (secondary poisoning)	Bioaccumulation in orga poisoning is therefore no	nisms is not relevant for t required.	lime substance: a risk as	sessment for secondary		



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#### 4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

#### Occupational exposure

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. This has to be done by showing that they limit the inhalation and dermal exposure to a level below the respective DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (<u>www.ebrc.de/mease.html</u>) to estimate the associated exposure. The dustiness of the substance used can be determined according to the MEASE glossary. For example, substances with a dustiness less than 2.5 % according to the Rotating Drum Method (RDM) are defined as "low dusty", substances with a dustiness less than 10 % (RDM) are defined as "medium dusty" and substances with a dustiness less than 10 % (RDM) are defined as "medium dusty".

#### DNEL<sub>inhalation</sub>: 1 mg/m<sup>3</sup> (as respirable dust)

Important note: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m<sup>3</sup>. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).

#### Environmental exposure

If a site does not comply with the conditions stipulated in the safe use ES, it is recommended to apply a tiered approach to perform a more site-specific assessment. For that assessment, the following stepwise approach is recommended.

**Tier 1**: retrieve information on effluent pH and the contribution of the lime substance on the resulting pH. Should the pH be above 9 and be predominantly attributable to lime, then further actions are required to demonstrate safe use.

**Tier 2a**: retrieve information on receiving water pH after the discharge point. The pH of the receiving water shall not exceed the value of 9. If the measures are not available, the pH in the river can be calculated as follows:

$$pHriver = Log \left[ \frac{Qeffluent * 10^{pHeffluent} + Qriverupstream * 10^{pHupstream}}{Qriverupstream + Qeffluent} \right]$$
(Eq 1)

Where:

Q effluent refers to the effluent flow (in m³/day)

Q river upstream refers to the upstream river flow (in m<sup>3</sup>/day)

pH effluent refers to the pH of the effluent

pH upstream river refers to the pH of the river upstream of the discharge point

Please note that initially, default values can be used:

- Q river upstream flows: use the 10th of existing measurements distribution or use default value of 18000 m<sup>3</sup>/day
- Q effluent: use default value of 2000 m³/day
- The upstream pH is preferably a measured value. If not available, one can assume a neutral pH of 7 if this can be justified.

Such equation has to be seen as a worst case scenario, where water conditions are standard and not case specific.

**Tier 2b**: Equation 1 can be used to identify which effluent pH causes an acceptable pH level in the receiving body. In order to do so, pH of the river is set at value 9 and pH of the effluent is calculated accordingly (using default values as reported previously, if necessary). As temperature influences lime solubility, pH effluent might require to be adjusted on a case-by-case basis. Once the maximum admissible pH value in the effluent is established, it is assumed that the OH- concentrations are all dependent on lime discharge and that there is no buffer capacity conditions to consider (this is a unrealistic worst case scenario, which can be modified where information is available). Maximum load of lime that can be annually rejected without negatively affecting the pH of the receiving water is calculated assuming chemical equilibrium. OH- expressed as moles/litre are multiplied by average flow of the effluent and then divided by the molar mass of the lime substance.

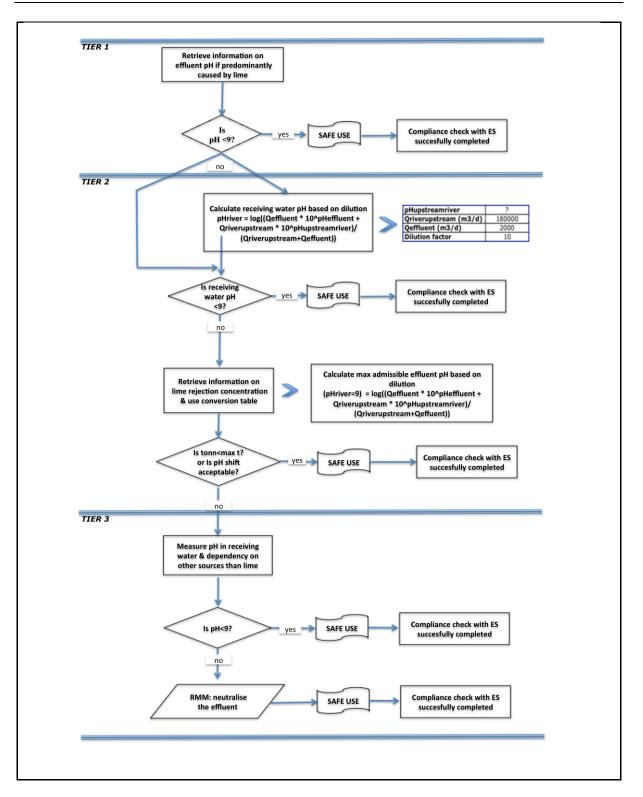
**Tier 3**: measure the pH in the receiving water after the discharge point. If pH is below 9, safe use is reasonably demonstrated and the ES ends here. If pH is found to be above 9, risk management measures have to be implemented: the effluent has to undergo neutralisation, thus ensuring safe use of lime during production or use phase.



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## ES number 9.2: Manufacture and industrial uses of low dusty solids/powders of lime substances

Exposure Scenario	o Format (1) addressing uses carried o	out by workers			
1. Title					
Free short title	Manufacture and industrial uses of low dusty solid	s/powders of lime substances			
Systematic title based on use descriptor         SU3, SU1, SU2a, SU2b, SU4, SU5, SU6a, SU6b, SU7, SU8, SU9, SU10, SU11, SU12, SU13, SU15, SU16, SU17, SU18, SU19, SU20, SU23, PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC19, PC20, PC21, PC23, PC24, PC25, PC26, PC27, PC28, PC29, PC30, PC31, PC32, PC34, PC35, PC36, PC37, PC38, PC39, AC1, AC2, AC3, AC4, AC5, AC6, AC7, AC8, AC10, AC11, AC13 (appropriate PROCs and ERCs are given in Section 2 below)					
Processes, tasks and/or activities covered	Processes, tasks and/or activities covered are des	cribed in Section 2 below.			
Assessment Method	The assessment of inhalation exposure is based o	on the exposure estimation tool MEASE.			
2. Operational con	ditions and risk management measure	es			
PROC/ERC	REACH definition	Involved tasks			
PROC 1	Use in closed process, no likelihood of exposure				
PROC 2	Use in closed, continuous process with occasional controlled exposure				
PROC 3	Use in closed batch process (synthesis or formulation)				
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises				
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)				
PROC 6	Calendering operations				
PROC 7	Industrial spraying				
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities				
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities	Guidance on information requirements and			
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	chemical safety assessment, Chapter R.12: Use descriptor system (ECHA-2010-G-05-EN).			
PROC 10	Roller application or brushing				
PROC 13	Treatment of articles by dipping and pouring				
PROC 14	Production of preparations or articles by tabletting, compression, extrusion, pelletisation				
PROC 15	Use as laboratory reagent				
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected				
PROC 17	Lubrication at high energy conditions and in partly open process				
PROC 18	Greasing at high energy conditions				
PROC 19	Hand-mixing with intimate contact and only PPE available				
PROC 21	Low energy manipulation of substances bound in materials and/or articles				



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•				
PROC 22	Potentially closed processing operations with minerals/metals at elevated temperature Industrial setting			
PROC 23	Open processing and transfer operations with minerals/metals at elevated temperature			
PROC 24	High (mechanical) energy work-up of substances bound in materials and/or articles			
PROC 25	Other hot work operations with metals			
PROC 26	Handling of solid inorganic substances at ambient temperature			
PROC 27a	Production of metal powders (hot processes)			
PROC 27b	Production of metal powders (wet processes)			
ERC 1-7, 12	Manufacture, formulation and all types of industrial uses			
ERC 10, 11 Wide-dispersive outdoor and indoor use of long life articles and materials				

2.1 Control of workers exposure

#### **Product characteristic**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. Whereas in hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, high abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential.

PROC	Used in preparation?	Content in preparation	Physical form	Emission potential			
PROC 22, 23, 25, 27a	not restricted		solid/powder, molten	high			
PROC 24	not restricted		solid/powder	high			
All other applicable PROCs	not restricted		solid/powder	low			
Amounts used							

Amounts used

The actual tonnage handled per shift is not considered to influence the exposure as such for this scenario. Instead, the combination of the scale of operation (industrial vs. Professional) and level of containment/automation (as reflected in the PROC) is the main determinant of the process intrinsic emission potential.

Frequency and duration of use/exposure

PROC	Duration of exposure						
PROC 22	≤ 240 minutes						
All other applicable 480 minutes (not restricted)							
Human factors not influenced by risk management							

The shift breathing volume during all process steps reflected in the PROCs is assumed to be 10 m³/shift (8 hours).

Other given operational conditions affecting workers exposure

Operational conditions like process temperature and process pressure are not considered relevant for occupational exposure assessment of the conducted processes. In process steps with considerably high temperatures (i.e. PROC 22, 23, 25), the exposure assessment in MEASE is however based on the ratio of process temperature and melting point. As the associated temperatures are expected to vary within the industry the highest ratio was taken as a worst case assumption for the exposure estimation. Thus all process temperatures are automatically covered in this exposure scenario for PROC 22, 23 and PROC 25.

Technical conditions and measures at process level (source) to prevent release

Risk management measures at the process level (e.g. containment or segregation of the emission source) are generally not required in the processes.



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Technical conditions and measures to control dispersion from source towards the worker           Deco         Localised         controls         Efficiency         of         LC         -				
PROC	Level of separation	Localised controls (LC)	Efficiency of LC (according to MEASE)	Further information
PROC 7, 17, 18	Any potentially required separation of workers from the emission	general ventilation	17 %	-
PROC 19	from the emission source is indicated above under	not applicable	na	-
PROC 22, 23, 24, 25, 26, 27a	"Frequency and duration of exposure".	local exhaust ventilation	78 %	-
All other applicable PROCs	A reduction of exposure duration can be achieved, for example, by the installation of	reduction of exposure ration can be hieved, for example, the installation of ntilated (positive essure) control rooms by removing the orker from workplaces volved with relevant	na	-
Organisational measur	es to prevent /limit relea	ses, dispersion and exp	oosure	
These measures involve eating and smoking at the	Avoid inhalation or ingestion. General occupational hygiene measures are required to ensure a safe handling of the substance. These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), no eating and smoking at the workplace, the wearing of standard working clothes and shoes unless otherwise stated below. Shower and change clothes at end of work shift. Do not wear contaminated clothing at home. Do not blow dust off with compressed air.			
Conditions and measured	res related to personal p	protection, hygiene and	health evaluation	
PROC	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further personal protective equipment (PPE)
PROC 22, 24, 27a	FFP1 mask	APF=4		Eye protection equipment (e.g. goggles or visors) must
All other applicable PROCs	not required	na	Since calcium oxide is classified as irritating to skin, the use of protective gloves is mandatory for all process steps.	be worn, unless potential contact with the eye can be excluded by the nature and type of application (i.e. closed process). Additionally, face protection, protective clothing and safety
				be worn as appropriate.
(compare with "duration of resistance and mass of considered that the work For reasons as given ab- the use of RPE), (ii) have hair). The recommended contours of the face prop The employer and self-ed devices and the manage policy for a respiratory pr	of exposure" above) should the RPE itself, due to the ter's capability of using too ove, the worker should the e suitable facial characteri I devices above which rely berly and securely. Employed persons have le ement of their correct use rotective device programm	d reflect the additional phy he increased thermal stre- ols and of communicating prefore be (i) healthy (esp istics reducing leakages b on a tight face seal will no egal responsibilities for the in the workplace. There he including training of the		orker due to the breathing d. In addition, it shall be earing of RPE. problems that may affect n view of scars and facial tection unless they fit the of respiratory protective and document a suitable
(compare with "duration of resistance and mass of considered that the work For reasons as given about the use of RPE), (ii) have hair). The recommended contours of the face prop The employer and self-ed devices and the manage policy for a respiratory pr An overview of the APFs	of exposure" above) should the RPE itself, due to the ter's capability of using too ove, the worker should the e suitable facial characteri I devices above which rely berly and securely. Employed persons have le ement of their correct use rotective device programm	d reflect the additional phy he increased thermal stre- ols and of communicating erefore be (i) healthy (esp istics reducing leakages b on a tight face seal will no egal responsibilities for the in the workplace. There he including training of the ing to BS EN 529:2005) ca	visiological stress for the work are reduced during the mean are reduced during the work becially in view of medical between face and mask (in ot provide the required pro e maintenance and issue offore, they should define a	be worn as appropriate. el: The duration of work orker due to the breathing d. In addition, it shall be earing of RPE. problems that may affect or view of scars and facial tection unless they fit the of respiratory protective and document a suitable
(compare with "duration of resistance and mass of considered that the work For reasons as given about the use of RPE), (ii) have hair). The recommended contours of the face prop The employer and self-ed devices and the manage policy for a respiratory pr An overview of the APFs	of exposure" above) should the RPE itself, due to the er's capability of using too ove, the worker should the e suitable facial characterial devices above which rely perly and securely. employed persons have le ement of their correct use rotective device programm of different RPE (accordi	d reflect the additional phy he increased thermal stre- ols and of communicating erefore be (i) healthy (esp istics reducing leakages b on a tight face seal will no egal responsibilities for the in the workplace. There he including training of the ing to BS EN 529:2005) ca	visiological stress for the works by enclosing the head are reduced during the were becally in view of medical between face and mask (ir bot provide the required pro- e maintenance and issue offere, they should define a e workers.	be worn as appropriate. el: The duration of work orker due to the breathing d. In addition, it shall be earing of RPE. problems that may affect or view of scars and facial tection unless they fit the of respiratory protective and document a suitable

Frequency and duration of use

Intermittent (< 12 time per year) or continuous use/release



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#### Environment factors not influenced by risk management

Flow rate of receiving surface water: 18000 m³/day

Other given operational conditions affecting environmental exposure

Effluent discharge rate: 2000 m³/day

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Risk management measures related to the environment aim to avoid discharging lime solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The justification for this risk management measure can be found in the introduction section.

#### Conditions and measures related to waste

Solid industrial waste of lime should be reused or discharged to the industrial wastewater and further neutralized if needed.

#### 3. Exposure estimation and reference to its source

#### Occupational exposure

The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium oxide of 1 mg/m<sup>3</sup> (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.

PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment Dermal exposure estimate (RCR)
PROC 1, 2, 3, 4, 5, 6, 7, 8a, 8b, 9, 10, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 25, 26, 27a, 27b	MEASE <1 mg/m³ (0.01 – 0.83) skin, derma as technica has not be		Since calcium oxide is classified as irritating to skin, dermal exposure has to be minimised as fa as technically feasible. A DNEL for dermal effect has not been derived. Thus, dermal exposure i not assessed in this exposure scenario.

#### **Environmental emissions**

The environmental exposure assessment is only relevant for the aquatic environment, when applicable including STPs/WWTPs, as emissions of calcium oxide in the different life-cycle stages (production and use) mainly apply to (waste) water. The aquatic effect and risk assessment only deal with the effect on organisms/ecosystems due to possible pH changes related to OH-discharges, being the toxicity of Ca2+ is expected to be negligible compared to the (potential) pH effect. Only the local scale is being addressed, including municipal sewage treatment plants (STPs) or industrial waste water treatment plants (WWTPs) when applicable, both for production and industrial use as any effects that might occur would be expected to take place on a local scale. The high water solubility and very low vapour pressure indicate that calcium oxide will be found predominantly in water. Significant emissions or exposure to air are not expected due to the low vapour pressure of calcium oxide. Significant emissions or exposure to the terrestrial environment are not expected either for this exposure scenario. The exposure assessment for the aquatic environment will therefore only deal with the possible pH changes in STP effluent and surface water related to the OH- discharges at the local scale. The exposure assessment is approached by assessing the resulting pH impact: the surface water pH should not increase above 9.

the bullabe mater pri one	
Environmental emissions	The production of calcium oxide can potentially result in an aquatic emission and locally increase the calcium oxide concentration and affect the pH in the aquatic environment. When the pH is not neutralised, the discharge of effluent from calcium oxide production sites may impact the pH in the receiving water. The pH of effluents is normally measured very frequently and can be neutralised easily as often required by national laws.
Exposure	Waste water from calcium oxide production is an inorganic wastewater stream and therefore there is
concentration in	no biological treatment. Therefore, wastewater streams from calcium oxide production sites will
waste water treatment	normally not be treated in biological waste water treatment plants (WWTPs), but can be used for pH
plant (WWTP)	control of acid wastewater streams that are treated in biological WWTPs.
Exposure	When calcium oxide is emitted to surface water, sorption to particulate matter and sediment will be negligible. When lime is rejected to surface water, the pH may increase, depending on the buffer
concentration in	capacity of the water. The higher the buffer capacity of the water, the lower the effect on pH will be.
aquatic pelagic	In general the buffer capacity preventing shifts in acidity or alkalinity in natural waters is regulated by
compartment	the equilibrium between carbon dioxide (CO2), the bicarbonate ion (HCO3-) and the carbonate ion
	(CO32-).
Exposure	The sediment compartment is not included in this ES, because it is not considered relevant for calcium
concentration in	oxide: when calcium oxide is emitted to the aquatic compartment, sorption to sediment particles is
sediments	negligible.



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Exposure concentrations in soil and groundwater	The terrestrial compartment is not included in this exposure scenario, because it is not considered to be relevant.		
Exposure concentration in atmospheric compartment	The air compartment is not included in this CSA because it is considered not relevant for calcium oxide: when emitted to air as an aerosol in water, calcium oxide is neutralised as a result of its reaction with CO2 (or other acids), into HCO3- and Ca2+. Subsequently, the salts (e.g. calcium(bi)carbonate) are washed out from the air and thus the atmospheric emissions of neutralised calcium oxide largely end up in soil and water.		
Exposure concentration relevant for the food chain (secondary poisoning)	Bioaccumulation in organisms is not relevant for calcium oxide: a risk assessment for secondary poisoning is therefore not required.		
4. Guidance to DU	to evaluate whether he works inside the boundaries set by the ES		
Occupational exposure	s		
met or the downstream measures are adequate. respective DNEL (given If measured data are (www.ebrc.de/mease.htm according to the MEASE Method (RDM) are define	boundaries set by the ES if either the proposed risk management measures as described above are user can demonstrate on his own that his operational conditions and implemented risk management This has to be done by showing that they limit the inhalation and dermal exposure to a level below the that the processes and activities in question are covered by the PROCs listed above) as given below. not available, the DU may make use of an appropriate scaling tool such as MEASE nl) to estimate the associated exposure. The dustiness of the substance used can be determined glossary. For example, substances with a dustiness less than 2.5 % according to the Rotating Drum ed as "low dusty", substances with a dustiness less than 10 % (RDM) are defined as "medium dusty" ustiness ≥10 % are defined as "high dusty".		
	g/m <sup>3</sup> (as respirable dust)		

Important note: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m<sup>3</sup>. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).



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#### **Environmental exposure**

If a site does not comply with the conditions stipulated in the safe use ES, it is recommended to apply a tiered approach to perform a more site-specific assessment. For that assessment, the following stepwise approach is recommended.

**Tier 1**: retrieve information on effluent pH and the contribution of the calcium oxide on the resulting pH. Should the pH be above 9 and be predominantly attributable to lime, then further actions are required to demonstrate safe use.

**Tier 2a**: retrieve information on receiving water pH after the discharge point. The pH of the receiving water shall not exceed the value of 9. If the measures are not available, the pH in the river can be calculated as follows:

$$pHriver = Log \left[ \frac{Qeffluent * 10^{pHeffluent} + Qriverupstream * 10^{pHupstream}}{Qriverupstream + Qeffluent} \right]$$
(Eq 1)

Where:

Q effluent refers to the effluent flow (in m³/day)

Q river upstream refers to the upstream river flow (in m<sup>3</sup>/day)

pH effluent refers to the pH of the effluent

pH upstream river refers to the pH of the river upstream of the discharge point

Please note that initially, default values can be used:

- Q river upstream flows: use the 10th of existing measurements distribution or use default value of 18000 m<sup>3</sup>/day
- Q effluent: use default value of 2000 m<sup>3</sup>/day
- The upstream pH is preferably a measured value. If not available, one can assume a neutral pH of 7 if this can be justified.

Such equation has to be seen as a worst case scenario, where water conditions are standard and not case specific.

**Tier 2b**: Equation 1 can be used to identify which effluent pH causes an acceptable pH level in the receiving body. In order to do so, pH of the river is set at value 9 and pH of the effluent is calculated accordingly (using default values as reported previously, if necessary). As temperature influences lime solubility, pH effluent might require to be adjusted on a case-by-case basis. Once the maximum admissible pH value in the effluent is established, it is assumed that the OH- concentrations are all dependent on lime discharge and that there is no buffer capacity conditions to consider (this is a unrealistic worst case scenario, which can be modified where information is available). Maximum load of lime that can be annually rejected without negatively affecting the pH of the receiving water is calculated assuming chemical equilibrium. OH- expressed as moles/litre are multiplied by average flow of the effluent and then divided by the molar mass of the calcium oxide.

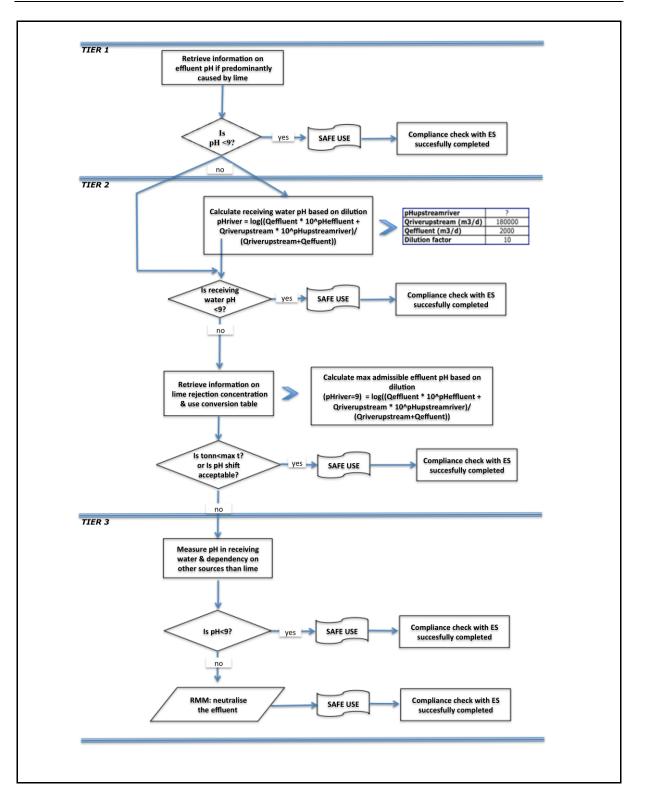
**Tier 3**: measure the pH in the receiving water after the discharge point. If pH is below 9, safe use is reasonably demonstrated and the ES ends here. If pH is found to be above 9, risk management measures have to be implemented: the effluent has to undergo neutralisation, thus ensuring safe use of lime during production or use phase.



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# ES number 9.3: Manufacture and industrial uses of medium dusty solids/powders of lime substances

Exposure Scenario	o Format (1) addressing uses carried o	out by workers		
1. Title				
Free short title	Manufacture and industrial uses of medium dusty solids/powders of lime substances			
Systematic title based on use descriptor	SU3, SU1, SU2a, SU2b, SU4, SU5, SU6a, SU6b, SU7, SU8, SU9, SU10, SU11, SU12, SU13, SU14,         SU15,       SU16,       SU17,       SU18,       SU19,       SU20,       SU23,       SU24         PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18,       PC19, PC20, PC21, PC23, PC24, PC25, PC26, PC27, PC28, PC29, PC30, PC31, PC32, PC33,       PC34,       PC35,       PC36,       PC37,       PC38,       PC39,       PC40         AC1, AC2, AC3, AC4, AC5, AC6, AC7, AC8, AC10, AC11, AC13       (appropriate PROCs and ERCs are given in Section 2 below)       PC30, PC3			
Processes, tasks and/or activities covered				
Assessment Method	The assessment of inhalation exposure is based o	on the exposure estimation tool MEASE.		
2. Operational con	ditions and risk management measure	95		
PROC/ERC	REACH definition	Involved tasks		
PROC 1	Use in closed process, no likelihood of exposure			
PROC 2	Use in closed, continuous process with occasional controlled exposure			
PROC 3	Use in closed batch process (synthesis or formulation)			
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises			
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)			
PROC 7	Industrial spraying			
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities			
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities			
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	Further information is provided in the ECHA Guidance on information requirements and chemical safety assessment, Chapter R.12: Use		
PROC 10	Roller application or brushing	descriptor system (ECHA-2010-G-05-EN).		
PROC 13	Treatment of articles by dipping and pouring			
PROC 14	Production of preparations or articles by tabletting, compression, extrusion, pelletisation			
PROC 15	Use as laboratory reagent			
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected			
PROC 17	Lubrication at high energy conditions and in partly open process	ī		
PROC 18	Greasing at high energy conditions			
PROC 19	Hand-mixing with intimate contact and only PPE available			
PROC 22	Potentially closed processing operations with minerals/metals at elevated temperature Industrial setting			
PROC 23	Open processing and transfer operations with minerals/metals at elevated temperature			



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PROC 24	High (mechanical) energy work-up of substances bound in materials and/or articles				
PROC 25	Other hot work operations with metals				
PROC 26	Handling of solid inorganic substances at ambient temperature				
PROC 27a	Production of metal powders (hot processes)				
PROC 27b	Production of metal powders (wet processes)				
ERC 1-7, 12	Manufacture, formulation and all types of industrial uses				
ERC 10, 11	Wide-dispersive outdoor life articles and materials	and indoor use of long-			
2.1 Control of wor	kers exposure				
Product characteristic					
is reflected by an assign at ambient temperature temperature based, takir	approach, the substance ment of a so-called fugaci the fugacity is based on th ng into account the proces d on the level of abrasion	ity class in the MEASE too he dustiness of that subst s temperature and the me instead of the substance i	ol. For operations conduct ance. Whereas in hot me elting point of the substan	ted with solid substances tal operations, fugacity is ce. As a third group, high	
PROC	Used in preparation?	Content in preparation	Physical form	Emission potential	
PROC 22, 23, 25, 27a	not restricted	<b>P: 0 P al a l a l</b>	solid/powder, molten	high	
PROC 24	not restricted		solid/powder	high	
All other applicable PROCs	not restricted		solid/powder	medium	
Amounts used					
combination of the scale PROC) is the main deter	ndled per shift is not con e of operation (industrial minant of the process intr	vs. Professional) and lev			
Frequency and duratio	n of use/exposure				
PROC	Duration of exposure				
PROC 7, 17, 18, 19, 22	≤ 240 minutes				
All other applicable PROCs	480 minutes (not restricted	480 minutes (not restricted)			
Human factors not infl	uenced by risk managen	nent			
The shift breathing volur	ne during all process step	s reflected in the PROCs	is assumed to be 10 m <sup>3</sup> /sl	hift (8 hours).	
Other given operationa	I conditions affecting w	orkers exposure			
Operational conditions like process temperature and process pressure are not considered relevant for occupational exposure assessment of the conducted processes. In process steps with considerably high temperatures (i.e. PROC 22, 23, 25), the exposure assessment in MEASE is however based on the ratio of process temperature and melting point. As the associated temperatures are expected to vary within the industry the highest ratio was taken as a worst case assumption for the exposure estimation. Thus all process temperatures are automatically covered in this exposure scenario for PROC 22, 23 and PROC 25.					
Technical conditions and measures at process level (source) to prevent release					
Risk management measures at the process level (e.g. containment or segregation of the emission source) are generally not required in the processes.					
Technical conditions and measures to control dispersion from source towards the worker					
PROC	Level of separation	Localised controls (LC)	Efficiency of LC (according to MEASE)	Further information	
PROC 1, 2, 15, 27b	Any potentially required	not required	na	-	
PROC 3, 13, 14	separation of workers from the emission	general ventilation	17 %	-	
PROC 19	source is indicated above under not applicable na -			-	
All other applicable PROCs	"Frequency and local exhaust 78 % -				
	A reduction of exposure		1		



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Version: Draft Version September 2010 1.0/EN **Revision date: February 2013** Printing Date: May 2015 duration can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with relevant exposure. Organisational measures to prevent /limit releases, dispersion and exposure Avoid inhalation or ingestion. General occupational hygiene measures are required to ensure a safe handling of the substance. These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), no eating and smoking at the workplace, the wearing of standard working clothes and shoes unless otherwise stated below. Shower and change clothes at end of work shift. Do not wear contaminated clothing at home. Do not blow dust off with compressed air. Conditions and measures related to personal protection, hygiene and health evaluation Specification of RPE efficiency Further personal Specification of respiratory protective equipment (RPE) PROC (assigned protection protective equipment gloves factor, APF) (PPE) PROC 4, 5, 7, 8a, 8b, 9, Eye protection 10, 16, 17, 18, 19, 22, FFP1 mask APF=4 equipment (e.g. 24, 27a goggles or visors) must be worn, unless Since calcium oxide is potential contact with classified as irritating to the eye can be excluded by the nature the skin, use of protective gloves and type of application is All other applicable (i.e. closed process). not required mandatory na for all PROCs process steps. Additionally, face protection, protective clothing and safety shoes are required to be worn as appropriate. Any RPE as defined above shall only be worn if the following principles are implemented in parallel: The duration of work (compare with "duration of exposure" above) should reflect the additional physiological stress for the worker due to the breathing resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the wearing of RPE. For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the face properly and securely. The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and the management of their correct use in the workplace. Therefore, they should define and document a suitable policy for a respiratory protective device programme including training of the workers. An overview of the APFs of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE. 2.2 Control of environmental exposure Amounts used The daily and annual amount per site (for point sources) is not considered to be the main determinant for environmental exposure Frequency and duration of use Intermittent (< 12 time per year) or continuous use/release Environment factors not influenced by risk management Flow rate of receiving surface water: 18000 m3/day Other given operational conditions affecting environmental exposure Effluent discharge rate: 2000 m3/day



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Technical onsite condi	tions and measures to re	educe or limit discharge	s, air emissions and rele	eases to soil
surface water, in case su introduction into open wa waters are minimised (e. 9. This is also reflected	ures related to the environ uch discharges are expect ters is required. In genera g. through neutralisation). I in the description of sta an be found in the introdu	ted to cause significant pl I discharges should be ca In general most aquatic c andard OECD tests with	H changes. Regular contro rried out such that pH cha organisms can tolerate pH	ol of the pH value during nges in receiving surface values in the range of 6-
Conditions and measu	res related to waste			
Solid industrial waste of	lime should be reused or o	discharged to the industria	al wastewater and further	neutralized if needed.
3. Exposure estimation	ation and reference	to its source		
Occupational exposure	•			
The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium oxide of 1 mg/m <sup>3</sup> (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.				
PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)
PROC 1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 13, 14, 15, 16, 17, 18, 19, 22, 23, 24, 25, 26, 27a, 27b	MEASE	< 1 mg/m³ (0.01 – 0.88)	skin, dermal exposure ha as technically feasible. A	classified as irritating to as to be minimised as far DNEL for dermal effects hus, dermal exposure is osure scenario.
Environmental emissio	ns			
discharges, being the toy being addressed, includ when applicable, both fo local scale. The high wa water. Significant emissi emissions or exposure assessment for the aqua related to the OH- discha the surface water pH sho Environmental	calcium oxide concentra	to be negligible compared atment plants (STPs) or atment plants (STPs) or atment plants (STPs) or at vapour pressure indicate and expected due to the ment are not expected ore only deal with the poss e exposure assessment is an oxide can potentially rest ation and affect the pH is	I to the (potential) pH effect industrial waste water tree might occur would be exp that calcium oxide will be low vapour pressure of c either for this exposure sible pH changes in STP e approached by assessing sult in an aquatic emission n the aquatic environme	ct. Only the local scale is atment plants (WWTPs) ected to take place on a e found predominantly in alcium oxide. Significant scenario. The exposure ffluent and surface water g the resulting pH impact: and locally increase the nt. When the pH is not
emissions	neutralised, the discharge of effluent from calcium oxide production sites may impact the pH in the receiving water. The pH of effluents is normally measured very frequently and can be neutralised easily as often required by national laws.			
Exposure concentration in waste water treatment plant (WWTP)	Waste water from calcium oxide production is an inorganic wastewater stream and therefore there is no biological treatment. Therefore, wastewater streams from calcium oxide production sites will normally not be treated in biological waste water treatment plants (WWTPs), but can be used for pH control of acid wastewater streams that are treated in biological WWTPs.			
Exposure concentration in aquatic pelagic compartment	When calcium oxide is emitted to surface water, sorption to particulate matter and sediment will be negligible. When lime is rejected to surface water, the pH may increase, depending on the buffer capacity of the water. The higher the buffer capacity of the water, the lower the effect on pH will be. In general the buffer capacity preventing shifts in acidity or alkalinity in natural waters is regulated by the equilibrium between carbon dioxide (CO2), the bicarbonate ion (HCO3-) and the carbonate ion (CO32–).			
Exposure concentration in sediments	The sediment compartment is not included in this ES, because it is not considered relevant for calcium oxide: when calcium oxide is emitted to the aquatic compartment, sorption of to sediment particles is negligible.			
Exposure concentrations in soil and groundwater	The terrestrial compartm be relevant.	ent is not included in this	exposure scenario, becau	se it is not considered to



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Exposure concentration in atmospheric compartment	The air compartment is not included in this CSA becaus oxide: when emitted to air as an aerosol in water, calcium of with CO2 (or other acids), into HCO3- and Ca2+. Subseq are washed out from the air and thus the atmospheric em end up in soil and water.	oxide is neutralised as a result of its reaction uently, the salts (e.g. calcium(bi)carbonate)		
Exposure concentration relevant for the food chain (secondary poisoning)	Bioaccumulation in organisms is not relevant for calcium oxide: a risk assessment for secondary			
4. Guidance to DU	to evaluate whether he works inside the bo	undaries set by the ES		
Occupational exposure	3			
met or the downstream measures are adequate. respective DNEL (given If measured data are (www.ebrc.de/mease.htr according to the MEASE Method (RDM) are defin	a boundaries set by the ES if either the proposed risk mana user can demonstrate on his own that his operational con. This has to be done by showing that they limit the inhalatio that the processes and activities in question are covered b not available, the DU may make use of an app <u>nl</u> ) to estimate the associated exposure. The dustiness of glossary. For example, substances with a dustiness less ed as "low dusty", substances with a dustiness less than 1 ustiness ≥10 % are defined as "high dusty".	ditions and implemented risk management on and dermal exposure to a level below the by the PROCs listed above) as given below. Dropriate scaling tool such as MEASE of the substance used can be determined than 2.5 % according to the Rotating Drum		
DNEL <sub>inhalation</sub> : 1 mg/m <sup>3</sup> (as respirable dust)				
exists at a level of 4 mg, acute DNEL is therefore term exposure estimates	has to be aware of the fact that apart from the long-term D /m <sup>3</sup> . By demonstrating a safe use when comparing exposu also covered (according to R.14 guidance, acute exposure s by a factor of 2). When using MEASE for the derivation d only be reduced to half-shift as a risk management mean	are estimates with the long-term DNEL, the e levels can be derived by multiplying long- of exposure estimates, it is noted that the		



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#### **Environmental exposure**

If a site does not comply with the conditions stipulated in the safe use ES, it is recommended to apply a tiered approach to perform a more site-specific assessment. For that assessment, the following stepwise approach is recommended.

**Tier 1**: retrieve information on effluent pH and the contribution of the calcium oxide on the resulting pH. Should the pH be above 9 and be predominantly attributable to lime, then further actions are required to demonstrate safe use.

**Tier 2a**: retrieve information on receiving water pH after the discharge point. The pH of the receiving water shall not exceed the value of 9. If the measures are not available, the pH in the river can be calculated as follows:

$$pHriver = Log \left[ \frac{Qeffluent * 10^{pHeffluent} + Qriverupstream * 10^{pHupstream}}{Qriverupstream + Qeffluent} \right]$$
Eq 1)

Where:

Q effluent refers to the effluent flow (in m³/day)

Q river upstream refers to the upstream river flow (in m<sup>3</sup>/day)

pH effluent refers to the pH of the effluent

pH upstream river refers to the pH of the river upstream of the discharge point

Please note that initially, default values can be used:

- Q river upstream flows: use the 10th of existing measurements distribution or use default value of 18000 m<sup>3</sup>/day
- Q effluent: use default value of 2000 m<sup>3</sup>/day
- The upstream pH is preferably a measured value. If not available, one can assume a neutral pH of 7 if this can be justified.

Such equation has to be seen as a worst case scenario, where water conditions are standard and not case specific.

**Tier 2b**: Equation 1 can be used to identify which effluent pH causes an acceptable pH level in the receiving body. In order to do so, pH of the river is set at value 9 and pH of the effluent is calculated accordingly (using default values as reported previously, if necessary). As temperature influences lime solubility, pH effluent might require to be adjusted on a case-by-case basis. Once the maximum admissible pH value in the effluent is established, it is assumed that the OH- concentrations are all dependent on lime discharge and that there is no buffer capacity conditions to consider (this is a unrealistic worst case scenario, which can be modified where information is available). Maximum load of lime that can be annually rejected without negatively affecting the pH of the receiving water is calculated assuming chemical equilibrium. OH- expressed as moles/litre are multiplied by average flow of the effluent and then divided by the molar mass of the calcium oxide.

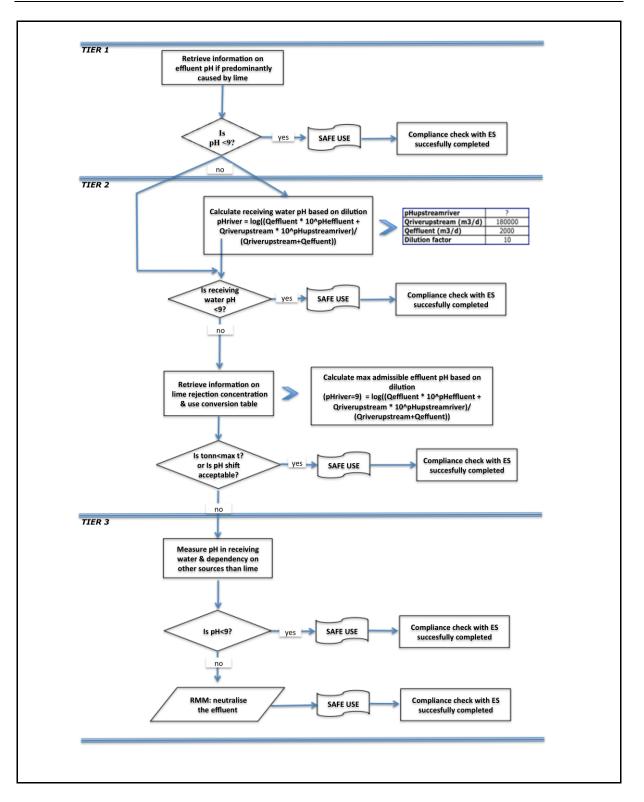
**Tier 3**: measure the pH in the receiving water after the discharge point. If pH is below 9, safe use is reasonably demonstrated and the ES ends here. If pH is found to be above 9, risk management measures have to be implemented: the effluent has to undergo neutralisation, thus ensuring safe use of lime during production or use phase.



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# ES number 9.4: Manufacture and industrial uses of high dusty solids/powders of lime substances

Exposure Scenario Format (1) addressing uses carried out by workers				
1. Title				
Free short title	Manufacture and industrial uses of high dusty solid	ds/powders of lime substances		
Systematic title based on use descriptor	SU3, SU1, SU2a, SU2b, SU4, SU5, SU6a, SU6b, SU7, SU8, SU9, SU10, SU11, SU12, SU13, SU14,         SU15,       SU16,       SU17,       SU18,       SU19,       SU20,       SU23,       SU24         PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18,       PC19, PC20, PC21, PC23, PC24, PC25, PC26, PC27, PC28, PC29, PC30, PC31, PC32, PC33,         PC34,       PC35,       PC36,       PC37,       PC38,       PC39,       PC40         AC1, AC2, AC3, AC4, AC5, AC6, AC7, AC8, AC10, AC11, AC13       (appropriate PROCs and ERCs are given in Section 2 below)       PC30, PC30, PC31, PC32, PC30, PC31, PC32, PC33, PC30, PC31, PC32, PC33, PC30, PC31, PC32, PC30, PC30, PC31, PC32, PC30, PC30, PC31, PC32, PC30, PC30, PC30, PC31, PC32, PC30, PC30, PC30, PC30, PC31, PC30, PC			
Processes, tasks and/or activities covered	Processes, tasks and/or activities covered are des	cribed in Section 2 below.		
Assessment Method	The assessment of inhalation exposure is based of	on the exposure estimation tool MEASE.		
2. Operational con	ditions and risk management measure	es		
PROC/ERC	REACH definition	Involved tasks		
PROC 1	Use in closed process, no likelihood of exposure			
PROC 2	Use in closed, continuous process with occasional controlled exposure			
PROC 3	Use in closed batch process (synthesis or formulation)			
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises			
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)			
PROC 7	Industrial spraying			
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities			
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities			
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	Further information is provided in the ECHA Guidance on information requirements and chemical safety assessment, Chapter R.12: Use		
PROC 10	Roller application or brushing	descriptor system (ECHA-2010-G-05-EN).		
PROC 13	Treatment of articles by dipping and pouring			
PROC 14	Production of preparations or articles by tabletting, compression, extrusion, pelletisation			
PROC 15	Use as laboratory reagent			
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected			
PROC 17	Lubrication at high energy conditions and in partly open process			
PROC 18	Greasing at high energy conditions			
PROC 19	Hand-mixing with intimate contact and only PPE available			
PROC 22	Potentially closed processing operations with minerals/metals at elevated temperature Industrial setting			
PROC 23	Open processing and transfer operations with minerals/metals at elevated temperature			



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PROC 24	High (mechanical) energy work-up of substances bound in materials and/or articles			
PROC 25	Other hot work operations with metals			
PROC 26	Handling of solid inorganic substances at ambient temperature			
PROC 27a	Production of metal power	ders (hot processes)		
PROC 27b	Production of metal power	ders (wet processes)		
ERC 1-7, 12	Manufacture, formulation industrial uses			
ERC 10, 11	Wide-dispersive outdoor life articles and materials			
2.1 Control of worl	kers exposure			
Product characteristic				
is reflected by an assign at ambient temperature t temperature based, takin	approach, the substance ment of a so-called fugaci the fugacity is based on the g into account the proces on the level of abrasion i	ty class in the MEASE too ne dustiness of that substa s temperature and the me nstead of the substance in	bl. For operations conduct ance. Whereas in hot met elting point of the substand	ted with solid substances tal operations, fugacity is ce. As a third group, high
PROC	Used in preparation?	Content in preparation	Physical form	Emission potential
PROC 22, 23, 25, 27a	not restricted		solid/powder, molten	high
All other applicable PROCs	not restricted		solid/powder	high
Amounts used				
combination of the scale	ndled per shift is not con- e of operation (industrial minant of the process intri	vs. Professional) and lev		
Frequency and duration	n of use/exposure			
PROC	Duration of exposure			
PROC 7, 8a, 17, 18, 19, 22	≤ 240 minutes			
All other applicable PROCs	480 minutes (not restricted)			
Human factors not influenced by risk management				
The shift breathing volume during all process steps reflected in the PROCs is assumed to be 10 m³/shift (8 hours).				
Other given operational conditions affecting workers exposure				
Operational conditions like process temperature and process pressure are not considered relevant for occupational exposure assessment of the conducted processes. In process steps with considerably high temperatures (i.e. PROC 22, 23, 25), the exposure assessment in MEASE is however based on the ratio of process temperature and melting point. As the associated temperatures are expected to vary within the industry the highest ratio was taken as a worst case assumption for the exposure estimation. Thus all process temperatures are automatically covered in this exposure scenario for PROC 22, 23 and PROC 25.				
Technical conditions a	nd measures at process	level (source) to prever	nt release	
Risk management meas required in the processes	ures at the process level s.	(e.g. containment or segr	regation of the emission s	source) are generally not



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Technical conditions and measures to control dispersion from source towards the worker				
PROC	Level of separation	Localised controls (LC)	Efficiency of LC (according to MEASE)	Further information
PROC 1	Any potentially required	not required	na	-
PROC 2, 3	separation of workers	general ventilation	17 %	-
PROC 7	from the emission source is indicated	integrated local exhaust ventilation	84 %	-
PROC 19	above under	not applicable	na	-
All other applicable PROCs	"Frequency and duration of exposure". A reduction of exposure duration can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with relevant exposure.	local exhaust ventilation	78 %	-
Organisational measur	es to prevent /limit relea	ses, dispersion and exp	osure	-
These measures involve eating and smoking at the and change clothes at er	e good personal and hous e workplace, the wearing on a of work shift. Do not we	I hygiene measures are re ekeeping practices (i.e. re f standard working clothes ar contaminated clothing	egular cleaning with suital and shoes unless otherw at home. Do not blow dus	ble cleaning devices), no ise stated below. Shower
Conditions and measu		protection, hygiene and	health evaluation	
PROC	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further personal protective equipment (PPE)
PROC 1, 2, 3, 23, 25, 27b	not required	na		Eye protection equipment (e.g.
PROC 4, 5, 7, 8a, 8b, 9, 17, 18,	FFP2 mask	APF=10		goggles or visors) must be worn, unless
PROC 10, 13, 14, 15, 16, 22, 24, 26, 27a	FFP1 mask	APF=4	Since calcium oxide is classified as irritating to	potential contact with the eye can be
PROC 19	FFP3 mask	APF=20	skin, the use of protective gloves is mandatory for all process steps.	excluded by the nature and type of application (i.e. closed process). Additionally, face protection, protective clothing and safety shoes are required to be worn as appropriate.
Any RPE as defined above shall only be worn if the following principles are implemented in parallel: The duration of work (compare with "duration of exposure" above) should reflect the additional physiological stress for the worker due to the breathing resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the wearing of RPE. For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the face properly and securely. The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and the management of their correct use in the workplace. Therefore, they should define and document a suitable policy for a respiratory protective device programme including training of the workers. An overview of the APFs of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE.				
2.2 Control of envi	ronmental exposur	е		
Amounts used				
The daily and annual amount per site (for point sources) is not considered to be the main determinant for environmental exposure.				

Frequency and duration of use

Intermittent (< 12 time per year) or continuous use/release



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#### Environment factors not influenced by risk management

Flow rate of receiving surface water: 18000 m³/day

Other given operational conditions affecting environmental exposure

Effluent discharge rate: 2000 m³/day

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Risk management measures related to the environment aim to avoid discharging lime solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The justification for this risk management measure can be found in the introduction section.

#### Conditions and measures related to waste

Solid industrial waste of lime should be reused or discharged to the industrial wastewater and further neutralized if needed.

#### 3. Exposure estimation and reference to its source

#### Occupational exposure

The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium oxide of 1 mg/m<sup>3</sup> (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.

PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)
PROC 1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 13, 14, 15, 16, 17, 18, 19, 22, 23, 24, 25, 26, 27a, 27b	MEASE	<1 mg/m³ (0.01 – 0.96)		hus, dermal exposure is

#### **Environmental emissions**

The environmental exposure assessment is only relevant for the aquatic environment, when applicable including STPs/WWTPs, as emissions of calcium oxide in the different life-cycle stages (production and use) mainly apply to (waste) water. The aquatic effect and risk assessment only deal with the effect on organisms/ecosystems due to possible pH changes related to OH-discharges, being the toxicity of Ca2+ is expected to be negligible compared to the (potential) pH effect. Only the local scale is being addressed, including municipal sewage treatment plants (STPs) or industrial waste water treatment plants (WWTPs) when applicable, both for production and industrial use as any effects that might occur would be expected to take place on a local scale. The high water solubility and very low vapour pressure indicate that calcium oxide will be found predominantly in water. Significant emissions or exposure to air are not expected due to the low vapour pressure of calcium oxide. Significant emissions or exposure to the terrestrial environment are not expected either for this exposure scenario. The exposure related to the OH- discharges at the local scale. The exposure assessment is approached by assessing the resulting pH impact: the surface water pH should not increase above 9.

the ballabe water pri one	
Environmental emissions	The production of calcium oxide can potentially result in an aquatic emission and locally increase the calcium oxide concentration and affect the pH in the aquatic environment. When the pH is not neutralised, the discharge of effluent from calcium oxide production sites may impact the pH in the receiving water. The pH of effluents is normally measured very frequently and can be neutralised easily as often required by national laws.
Exposure	Waste water from calcium oxide production is an inorganic wastewater stream and therefore there is
concentration in	no biological treatment. Therefore, wastewater streams from calcium oxide production sites will
waste water treatment	normally not be treated in biological waste water treatment plants (WWTPs), but can be used for pH
plant (WWTP)	control of acid wastewater streams that are treated in biological WWTPs.
Exposure concentration in aquatic pelagic compartment	When calcium oxide is emitted to surface water, sorption to particulate matter and sediment will be negligible. When lime is rejected to surface water, the pH may increase, depending on the buffer capacity of the water. The higher the buffer capacity of the water, the lower the effect on pH will be. In general the buffer capacity preventing shifts in acidity or alkalinity in natural waters is regulated by the equilibrium between carbon dioxide (CO2), the bicarbonate ion (HCO3-) and the carbonate ion (CO32-).
Exposure concentration in sediments	The sediment compartment is not included in this ES, because it is not considered relevant for calcium oxide: when calcium oxide is emitted to the aquatic compartment, sorption of to sediment particles is negligible.



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Exposure concentrations in soil and groundwater	The terrestrial compartment is not included in this exposure scenario, because it is not considered to be relevant.			
Exposure concentration in atmospheric compartment	The air compartment is not included in this CSA because it is considered not relevant for calcium oxide: when emitted to air as an aerosol in water, calcium oxide is neutralised as a result of its reaction with CO2 (or other acids), into HCO3- and Ca2+. Subsequently, the salts (e.g. calcium(bi)carbonate) are washed out from the air and thus the atmospheric emissions of neutralised calcium oxide largely end up in soil and water.			
Exposure concentration relevant for the food chain (secondary poisoning)	Bioaccumulation in organisms is not relevant for calcium oxide: a risk assessment for secondary			
4. Guidance to DU	to evaluate whether he works inside the boundaries set by the ES			
Occupational exposure				
The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. This has to be done by showing that they limit the inhalation and dermal exposure to a level below the respective DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (www.ebrc.de/mease.html) to estimate the associated exposure. The dustiness of the substance used can be determined according to the MEASE glossary. For example, substances with a dustiness less than 2.5 % according to the Rotating Drum Method (RDM) are defined as "low dusty", substances with a dustiness less than 10 % (RDM) are defined as "medium dusty" and substances with a dustiness ≥10 % are defined as "high dusty".				
Method (RDM) are defin	ed as "low dusty", substances with a dustiness less than 10 % (RDM) are defined as "medium dusty"			

Important note: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m<sup>3</sup>. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).



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#### **Environmental exposure**

If a site does not comply with the conditions stipulated in the safe use ES, it is recommended to apply a tiered approach to perform a more site-specific assessment. For that assessment, the following stepwise approach is recommended.

**Tier 1**: retrieve information on effluent pH and the contribution of the calcium oxide on the resulting pH. Should the pH be above 9 and be predominantly attributable to lime, then further actions are required to demonstrate safe use.

**Tier 2a**: retrieve information on receiving water pH after the discharge point. The pH of the receiving water shall not exceed the value of 9. If the measures are not available, the pH in the river can be calculated as follows:

$$pHriver = Log \left[ \frac{Qeffluent * 10^{pHeffluent} + Qriverupstream * 10^{pHupstream}}{Qriverupstream + Qeffluent} \right]$$
(Eq 1)

Where:

Q effluent refers to the effluent flow (in m<sup>3</sup>/day)

Q river upstream refers to the upstream river flow (in m³/day)

pH effluent refers to the pH of the effluent

pH upstream river refers to the pH of the river upstream of the discharge point

Please note that initially, default values can be used:

- Q river upstream flows: use the 10th of existing measurements distribution or use default value of 18000 m³/day
- Q effluent: use default value of 2000 m³/day
- The upstream pH is preferably a measured value. If not available, one can assume a neutral pH of 7 if this can be justified.

Such equation has to be seen as a worst case scenario, where water conditions are standard and not case specific.

**Tier 2b**: Equation 1 can be used to identify which effluent pH causes an acceptable pH level in the receiving body. In order to do so, pH of the river is set at value 9 and pH of the effluent is calculated accordingly (using default values as reported previously, if necessary). As temperature influences lime solubility, pH effluent might require to be adjusted on a case-by-case basis. Once the maximum admissible pH value in the effluent is established, it is assumed that the OH- concentrations are all dependent on lime discharge and that there is no buffer capacity conditions to consider (this is a unrealistic worst case scenario, which can be modified where information is available). Maximum load of lime that can be annually rejected without negatively affecting the pH of the receiving water is calculated assuming chemical equilibrium. OH- expressed as moles/litre are multiplied by average flow of the effluent and then divided by the molar mass of the calcium oxide.

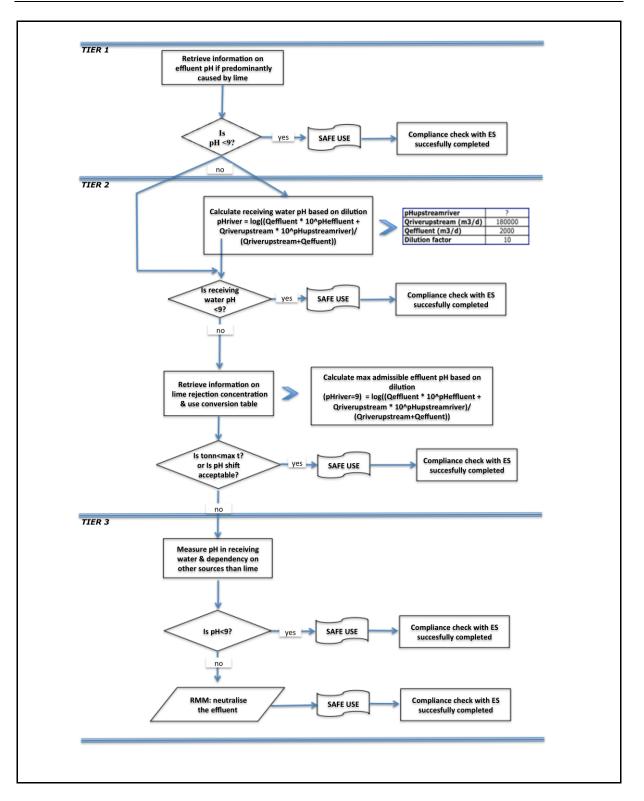
**Tier 3**: measure the pH in the receiving water after the discharge point. If pH is below 9, safe use is reasonably demonstrated and the ES ends here. If pH is found to be above 9, risk management measures have to be implemented: the effluent has to undergo neutralisation, thus ensuring safe use of lime during production or use phase.



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# ES number 9.5: Manufacture and industrial uses of massive objects containing lime substances

Exposure Scenario	o Format (1) addressing uses carried o	out by workers		
1. Title				
Free short title	Manufacture and industrial uses of massive objects containing lime substances			
Systematic title based on use descriptor	SU3, SU1, SU2a, SU2b, SU4, SU5, SU6a, SU6b, SU7, SU8, SU9, SU10, SU11, SU12, SU13, SU14,         SU15,       SU16,       SU17,       SU18,       SU19,       SU20,       SU23,       SU24         PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18,       PC19, PC20, PC21, PC23, PC24, PC25, PC26, PC27, PC28, PC29, PC30, PC31, PC32, PC33,       PC34,       PC35,       PC36,       PC37,       PC38,       PC39,       PC40         AC1, AC2, AC3, AC4, AC5, AC6, AC7, AC8, AC10, AC11, AC13       (appropriate PROCs and ERCs are given in Section 2 below)       PC30, PC3			
Processes, tasks and/or activities covered	Processes, tasks and/or activities covered are des	cribed in Section 2 below.		
Assessment Method	The assessment of inhalation exposure is based of	on the exposure estimation	n tool MEASE.	
2. Operational con	ditions and risk management measure	es		
PROC/ERC	REACH definition	Involved tasks		
PROC 6	Calendering operations			
PROC 14	Production of preparations or articles by tabletting, compression, extrusion, pelletisation			
PROC 21	Low energy manipulation of substances bound in materials and/or articles	Low energy manipulation of substances bound in		
PROC 22	Potentially closed processing operations with minerals/metals at elevated temperature Industrial setting			
PROC 23	Open processing and transfer operations with minerals/metals at elevated temperature			
PROC 24	High (mechanical) energy work-up of substances bound in materials and/or articles	descriptor system (ECHA-2010-G-05-EN).		
PROC 25	Other hot work operations with metals			
ERC 1-7, 12	Manufacture, formulation and all types of industrial uses			
ERC 10, 11	Wide-dispersive outdoor and indoor use of long- life articles and materials			
2.1 Control of workers exposure				
Product characteristic				
According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. Whereas in hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, high abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential.				
PROC	Used in preparation? Content in preparation	Physical form	Emission potential	
PROC 22, 23,25	not restricted	massive objects, molten	high	
PROC 24	not restricted	massive objects	high	
All other applicable PROCs	not restricted massive objects very low			
Amounts used				
combination of the scale	Idled per shift is not considered to influence the e of operation (industrial vs. Professional) and lev minant of the process intrinsic emission potential.			



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Frequency and duration	Frequency and duration of use/exposure				
PROC	Duration of exposure	Duration of exposure			
PROC 22	≤ 240 minutes	≤ 240 minutes			
All other applicable PROCs	480 minutes (not restrict	ed)			
Human factors not infl	uenced by risk managen	nent			
The shift breathing volur	me during all process step	s reflected in th	ne PROCs	is assumed to be 10 m <sup>3</sup> /sl	nift (8 hours).
Other given operationa	al conditions affecting w	orkers exposu	ıre		
assessment of the cond exposure assessment in temperatures are expect	ike process temperature a ducted processes. In proc h MEASE is however base ted to vary within the indus sess temperatures are auto	ess steps with ed on the ratio stry the highest	consideral of process ratio was t	oly high temperatures (i.e temperature and melting aken as a worst case ass	<ul> <li>PROC 22, 23, 25), the point. As the associated umption for the exposure</li> </ul>
	ind measures at process				
Risk management meas required in the processe	sures at the process level s.	(e.g. containm	ient or seg	regation of the emission s	source) are generally not
Technical conditions a	ind measures to control	dispersion fro	om source	towards the worker	
PROC	Level of separation	Localised (LC)	controls	Efficiency of LC (according to MEASE)	Further information
PROC 6, 14, 21	Any potentially required separation of workers	not required		na	-
from the emission source is indicated above under "Frequency and duration of exposure". A reduction of exposure duration can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with relevant exposure.       Iocal exhaust ventilation       78 %         Organisational measures to prevent /limit releases, dispersion and exposure					
Organisational measur		ises, dispersio	on and exp	oosure	
Avoid inhalation or ingestion. General occupational hygiene measures are required to ensure a safe handling of the substance. These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), no eating and smoking at the workplace, the wearing of standard working clothes and shoes unless otherwise stated below. Shower					

eating and smoking at the workplace, the wearing of standard working clothes and shoes unless otherwise stated below. Shower and change clothes at end of work shift. Do not wear contaminated clothing at home. Do not blow dust off with compressed air.



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Conditions and measures related to personal protection, hygiene and health evaluation					
PROC	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further personal protective equipment (PPE)	
PROC 22	FFP1 mask	APF=4	Since calcium oxide is classified as irritating to	Eye protection equipment (e.g. goggles or visors) must be worn, unless potential contact with the eye can be	
All other applicable PROCs	not required	na	skin, the use of protective gloves is mandatory for all process steps.	and type of application (i.e. closed process). Additionally, face protection, protective clothing and safety shoes are required to be worn as appropriate.	
Any RPE as defined above shall only be worn if the following principles are implemented in parallel: The duration of work (compare with "duration of exposure" above) should reflect the additional physiological stress for the worker due to the breathing resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the wearing of RPE. For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the face properly and securely. The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and the management of their correct use in the workplace. Therefore, they should define and document a suitable policy for a respiratory protective device programme including training of the workers. An overview of the APFs of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE.					
2.2 Control of envi	ronmental exposur	e			
Amounts used					
The daily and annual an exposure.	mount per site (for point	sources) is not consider	ed to be the main detern	ninant for environmental	
Frequency and duratio	Frequency and duration of use				
Intermittent (< 12 time pe	er year) or continuous use	/release			
Environment factors no	ot influenced by risk ma	nagement			
Flow rate of receiving su	rface water: 18000 m3/day	y			
Other given operationa	I conditions affecting er	nvironmental exposure			
Effluent discharge rate: 2000 m³/day					
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil					
Risk management measures related to the environment aim to avoid discharging lime solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The justification for this risk management measure can be found in the introduction section.					
Conditions and measu	res related to waste				
Solid industrial waste of	lime should be reused or	discharged to the industria	al wastewater and further	neutralized if needed.	



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3. Exposure estimation	3. Exposure estimation and reference to its source				
Occupational exposure	•				
is the quotient of the ref demonstrate a safe use. dust) and the respective	The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium oxide of 1 mg/m <sup>3</sup> (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.				
PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)	
PROC 6, 14, 21, 22, 23, 24, 25	MEASE <pre>&lt; 1 mg/m³ (0.01 - 0.44)</pre> Since calcium oxide is classified as irritating skin, dermal exposure has to be minimised as f as technically feasible. A DNEL for dermal effect has not been derived. Thus, dermal exposure not assessed in this exposure scenario.				
Environmental emissio	ns				
as emissions of calcium effect and risk assessmedischarges, being the too being addressed, includ when applicable, both fo local scale. The high wa water. Significant emissi emissions or exposure assessment for the aqua related to the OH- discharge	The environmental exposure assessment is only relevant for the aquatic environment, when applicable including STPs/WWTPs, as emissions of calcium oxide in the different life-cycle stages (production and use) mainly apply to (waste) water. The aquatic effect and risk assessment only deal with the effect on organisms/ecosystems due to possible pH changes related to OH-discharges, being the toxicity of Ca2+ is expected to be negligible compared to the (potential) pH effect. Only the local scale is being addressed, including municipal sewage treatment plants (STPs) or industrial waste water treatment plants (WWTPs) when applicable, both for production and industrial use as any effects that might occur would be expected to take place on a local scale. The high water solubility and very low vapour pressure indicate that calcium oxide will be found predominantly in water. Significant emissions or exposure to air are not expected due to the low vapour pressure of calcium oxide. Significant emissions or exposure to the terrestrial environment are not expected either for this exposure scenario. The exposure related to the OH- discharges at the local scale. The exposure assessment is approached by assessing the resulting pH impact: the surface water pH should not increase above 9.				
Environmental emissions	The production of calcium oxide can potentially result in an aquatic emission and locally increase the calcium oxide concentration and affect the pH in the aquatic environment. When the pH is not neutralised, the discharge of effluent from calcium oxide production sites may impact the pH in the receiving water. The pH of effluents is normally measured very frequently and can be neutralised easily as often required by national laws.				
Exposure concentration in waste water treatment plant (WWTP)	Waste water from calcium oxide production is an inorganic wastewater stream and therefore there is no biological treatment. Therefore, wastewater streams from calcium oxide production sites will normally not be treated in biological waste water treatment plants (WWTPs), but can be used for pH control of acid wastewater streams that are treated in biological WWTPs.				
Exposure concentration aquatic compartment will be compartment will be when calcium oxide is emitted to surface water, sorption to particulate matter and sediment will be negligible. When lime is rejected to surface water, the pH may increase, depending on the buffer capacity of the water. The higher the buffer capacity of the water, the lower the effect on pH will be. In general the buffer capacity preventing shifts in acidity or alkalinity in natural waters is regulated by the equilibrium between carbon dioxide (CO2), the bicarbonate ion (HCO3-) and the carbonate ion (CO32-).					
sediments	The sediment compartment is not included in this ES, because it is not considered relevant for calcium oxide: when calcium oxide is emitted to the aquatic compartment, sorption of to sediment particles is negligible.				
Exposure concentrations in soil and groundwater	The terrestrial compartment is not included in this exposure scenario, because it is not considered to be relevant.				
Exposure concentration in atmospheric compartment	The air compartment is not included in this CSA because it is considered not relevant for calcium oxide: when emitted to air as an aerosol in water, calcium oxide is neutralised as a result of its reaction with CO2 (or other acids), into HCO3- and Ca2+. Subsequently, the salts (e.g. calcium(bi)carbonate) are washed out from the air and thus the atmospheric emissions of neutralised calcium oxide largely end up in soil and water.				
Exposure concentration relevant for the food chain (secondary poisoning)	Bioaccumulation in orga poisoning is therefore no	nisms is not relevant for t required.	calcium oxide: a risk as	sessment for secondary	



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### 4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

#### Occupational exposure

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. This has to be done by showing that they limit the inhalation and dermal exposure to a level below the respective DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (<u>www.ebrc.de/mease.html</u>) to estimate the associated exposure. The dustiness of the substance used can be determined according to the MEASE glossary. For example, substances with a dustiness less than 2.5 % according to the Rotating Drum Method (RDM) are defined as "medium dusty" and substances with a dustiness less than 10 % (RDM) are defined as "medium dusty".

#### DNEL<sub>inhalation</sub>: 1 mg/m<sup>3</sup> (as respirable dust)

Important note: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m<sup>3</sup>. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).

#### Environmental exposure

If a site does not comply with the conditions stipulated in the safe use ES, it is recommended to apply a tiered approach to perform a more site-specific assessment. For that assessment, the following stepwise approach is recommended.

**Tier 1**: retrieve information on effluent pH and the contribution of the calcium oxide on the resulting pH. Should the pH be above 9 and be predominantly attributable to lime, then further actions are required to demonstrate safe use.

**Tier 2a**: retrieve information on receiving water pH after the discharge point. The pH of the receiving water shall not exceed the value of 9. If the measures are not available, the pH in the river can be calculated as follows:

$$pHriver = Log \left[ \frac{Qeffluent * 10^{pHeffluent} + Qriverupstream * 10^{pHupstream}}{Qriverupstream + Qeffluent} \right]$$
(Eq 1)

Where:

Q effluent refers to the effluent flow (in m3/day)

Q river upstream refers to the upstream river flow (in m<sup>3</sup>/day)

pH effluent refers to the pH of the effluent

pH upstream river refers to the pH of the river upstream of the discharge point

Please note that initially, default values can be used:

- Q river upstream flows: use the 10th of existing measurements distribution or use default value of 18000 m<sup>3</sup>/day
- Q effluent: use default value of 2000 m<sup>3</sup>/day
- The upstream pH is preferably a measured value. If not available, one can assume a neutral pH of 7 if this can be justified.

Such equation has to be seen as a worst case scenario, where water conditions are standard and not case specific.

**Tier 2b**: Equation 1 can be used to identify which effluent pH causes an acceptable pH level in the receiving body. In order to do so, pH of the river is set at value 9 and pH of the effluent is calculated accordingly (using default values as reported previously, if necessary). As temperature influences lime solubility, pH effluent might require to be adjusted on a case-by-case basis. Once the maximum admissible pH value in the effluent is established, it is assumed that the OH- concentrations are all dependent on lime discharge and that there is no buffer capacity conditions to consider (this is a unrealistic worst case scenario, which can be modified where information is available). Maximum load of lime that can be annually rejected without negatively affecting the pH of the receiving water is calculated assuming chemical equilibrium. OH- expressed as moles/litre are multiplied by average flow of the effluent and then divided by the molar mass of the calcium oxide.

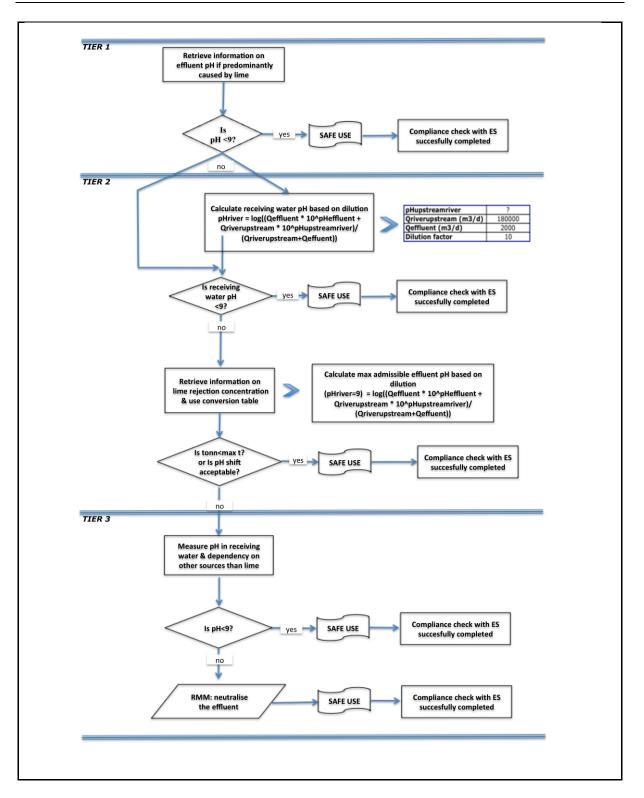
**Tier 3**: measure the pH in the receiving water after the discharge point. If pH is below 9, safe use is reasonably demonstrated and the ES ends here. If pH is found to be above 9, risk management measures have to be implemented: the effluent has to undergo neutralisation, thus ensuring safe use of lime during production or use phase.



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# ES number 9.6: Professional uses of aqueous solutions of lime substances

Exposure Scenario Format (1) addressing uses carried out by workers				
1. Title				
Free short title	Professional uses of aqueous solutions of lime substances			
Systematic title based on use descriptor	SU22, SU1, SU5, SU6a, SU6b, SU7, SU10, SU11, SU12, SU13, SU16, SU17, SU18, SU19, SU20, SU23,       SU24         PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18, PC19, PC20, PC21, PC23, PC24, PC25, PC26, PC27, PC28, PC29, PC30, PC31, PC32, PC33, PC34, PC35, PC36, PC37, PC39, PC40       AC1, AC2, AC3, AC4, AC5, AC6, AC7, AC8, AC10, AC11, AC13         (appropriate PROCs and ERCs are given in Section 2 below)       SU24			
Processes, tasks and/or activities covered	Processes, tasks and/or activities covered are des	cribed in Section 2 below.		
Assessment Method	The assessment of inhalation exposure is base environmental assessment is based on FOCUS-E	d on the exposure estimation tool MEASE. The xposit.		
2. Operational con	ditions and risk management measure	9S		
PROC/ERC	REACH definition	Involved tasks		
PROC 2	Use in closed, continuous process with occasional controlled exposure			
PROC 3	Use in closed batch process (synthesis or formulation)			
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises			
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)			
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities			
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities			
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	Further information is provided in the ECHA Guidance on information requirements and chemical safety assessment, Chapter R.12: Use		
PROC 10	Roller application or brushing	descriptor system (ECHA-2010-G-05-EN).		
PROC 11	Non industrial spraying			
PROC 12	Use of blowing agents in manufacture of foam			
PROC 13	Treatment of articles by dipping and pouring			
PROC 15	Use as laboratory reagent			
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected			
PROC 17	Lubrication at high energy conditions and in partly open process			
PROC 18	Greasing at high energy conditions			
PROC 19	Hand-mixing with intimate contact and only PPE available			
ERC2, ERC8a, ERC8b, ERC8c, ERC8d, ERC8e, ERC8f	Wide dispersive indoor and outdoor use of reactive substances or processing aids in open systems	Calcium oxide is applied in numerous cases of wide dispersive uses: agricultural, forestry, fish and shrimps farming, soil treatment and environmental protection.		



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Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

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Product characteristic				
is reflected by an assign at ambient temperature t temperature based, takir abrasive tasks are based	E approach, the substance ment of a so-called fugaci the fugacity is based on th ng into account the process d on the level of abrasion in 1) is assumed to be involv	ty class in the MEASE too ne dustiness of that substa s temperature and the me instead of the substance in	bl. For operations conduct ance. Whereas in hot met elting point of the substand trinsic emission potential.	ed with solid substance al operations, fugacity ce. As a third group, hig
PROC	Use in preparation	Content in preparation	Physical form	Emission potential
All applicable PROCs	not restricted		aqueous solution	very low
Amounts used				
combination of the scale	ndled per shift is not con of operation (industrial vs. of the process intrinsic em	professional) and level of		
Frequency and duratio	n of use/exposure			
PROC	Duration of exposure			
PROC 11	≤ 240 minutes			
All other applicable PROCs	480 minutes (not restricted	ed)		
Human factors not influ	uenced by risk managen	nent		
The shift breathing volun	ne during all process step	s reflected in the PROCs i	s assumed to be 10 m <sup>3</sup> /sł	nift (8 hours).
Other given operationa	I conditions affecting w	orkers exposure		
	s are not used in hot-met ot considered relevant for			
	nd measures at process	· ·		•
Risk management meas required in the processes	sures at the process level	(e.g. containment or segr	egation of the emission s	source) are generally n
	nd measures to control	dispersion from source	towards the worker	
PROC	Level of separation	Localised controls (LC)	Efficiency of LC (according to MEASE)	Further information
PROC 19	Separation of workers from the emission source is generally not	not applicable	na	-
All other applicable PROCs	required in the conducted processes.	not required	na	-
Organisational measur	es to prevent /limit relea	ses, dispersion and exp	osure	

eating and smoking at the workplace, the wearing of standard working clothes and shoes unless otherwise stated below. Shower and change clothes at end of work shift. Do not wear contaminated clothing at home. Do not blow dust off with compressed air.



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PROC	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further persona protective equipment (PPE)
PROC 11	FFP3 mask	APF=20		Eye protection equipment (e.g goggles or visors) mus be worn, unless
PROC 17	FFP1 mask	APF=4	Since calcium oxide is classified as irritating to skin, the use of protective gloves is mandatory for all	potential contact with the eye can be excluded by the nature and type of application (i.e. closed process)
All other applicable PROCs	not required	na	process steps.	Additionally, face protection, protective clothing and safety shoes are required to be worn as appropriate
hair). The recommended contours of the face prop The employer and self-e devices and the manage policy for a respiratory p An overview of the APFs	I devices above which rely berly and securely. employed persons have le ement of their correct use rotective device programn s of different RPE (accordi fronmental exposur	on a tight face seal will ne egal responsibilities for the in the workplace. There he including training of the ng to BS EN 529:2005) ca	between face and mask (ir of provide the required pro- e maintenance and issue fore, they should define a e workers. an be found in the glossar or agricultural soil p	tection unless they fit the of respiratory protective and document a suitable y of MEASE.
		from dust measurements	in air as a function of the c	listance from application
	Quar	tity of dust		
	per	m3 (in mg)		
	120 100 80 60 40 20		Wind speed - 3.5 m/s - 6 m/s - 3.5 m/s	
	1	3 7 1		
			Distance from	m the
			Distance from spreader(in m	



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Amounts used					
CaO	1,700 kg/ha				
Frequency and duration	on of use				
1 day/year (one application per year); Multiple applications during the year are allowed, provided the total yearly amount of 1,700 kg/ha CaO is not exceeded					
Environment factors not influenced by risk management					
	Volume of surface water: 300 L/m <sup>2</sup> Field surface area: 1 ha				
Other given operation	al conditions affecting environmental exposure				
Outdoor use of products Soil mixing depth: 20 cm					
Technical conditions a	and measures at process level (source) to prevent release				
There are no direct relea	ases to adjacent surface waters.				
Technical conditions a	and measures to reduce or limit discharges, air emissions and releases to soil				
Drift should be minimise	d.				
Organizational measu	res to prevent/limit release from site				
	nents for good agricultural practice, agricultural soil should be analysed prior to application of lime and uld be adjusted according to the results of the analysis.				
2.2 Control of env	ironmental exposure – only relevant for urban soil treatment				
Product characteristic	S				
	Quantity of dust per m3 (in mg) Wind speed: - 3.5 m/s - 6 m/s - 3.5 m/s - 3.5 m/s - 3.5 m/s - 3.5 m/s - 0 m/s - 3.5 m/s - 1 m/s - 1 m/s - 1 m/s - 20 Distance from the spreader(in m)				
American	(Figure taken from: Laudet, A. et al., 1999)				
Amounts used					
CaO	180,000 kg/ha				
Frequency and duration	on of use ce in a lifetime; Multiple applications during the year are allowed, provided the total yearly amount of				
180,000 kg/ha (CaO) is					
Environment factors n	ot influenced by risk management				
Field surface area: 1 ha					



poisoning)

## PRODUCT SAFETY DATA SHEET for CaO

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Other stress second to a	the second state of the state of the second st				
· ·	al conditions affecting er	nvironmental exposure			
Outdoor use of products Soil mixing depth: 20 cm					
Technical conditions a	nd measures at process	level (source) to prever	nt release		
Lime is only applied onto surface waters.	o the soil in the technosph	ere zone before road con	struction. There are no di	rect releases to adjacent	
Technical onsite condi	tions and measures to r	educe or limit discharge	s, air emissions and rel	eases to soil	
Drift should be minimise	d.				
3. Exposure estim	ation and reference	to its source			
Occupational exposure					
is the quotient of the ref demonstrate a safe use. dust) and the respective	tool MEASE was used for ined exposure estimate a . For inhalation exposure, inhalation exposure estir since the respirable fraction	nd the respective DNEL the RCR is based on the nate derived using MEAS	(derived no-effect level) a DNEL for calcium oxide o E (as inhalable dust). Th	and has to be below 1 to of 1 mg/m <sup>3</sup> (as respirable us, the RCR includes an	
PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)	
PROC 2, 3, 4, 5, 8a, 8b, 9, 10, 11, 12, 13, 15, 16, 17, 18, 19	MEASE	<ul> <li>&lt; 1 mg/m<sup>3</sup> (&lt;0.001 - Since calcium oxide is classified as irritating skin, dermal exposure has to be minimised as as technically feasible. A DNEL for dermal effe has not been derived. Thus, dermal exposure not assessed in this exposure scenario.</li> </ul>			
Environmental exposu	re for agricultural soil p	otection			
on the calculation of pre- surface water and sedim more appropriate for ag modelling. FOCUS is a German EXPOSIT 1.0 n the soil, calcium oxide ca Environmental emissions	soil and surface water was adicted environmental con- nent (Kloskowksi et al., 199 pricultural-like application model typically develope nodel, where parameters s an indeed migrate then tow See amounts used	centration values (PEC) of 99). The FOCUS/EXPOSI as in this case where part of for biocidal applications such as drifts can be impr	of plant protection produc T modelling tool is prefer arameter as the drift nee s and was further elabor oved according to collect	ts for soil, ground water, red to the EUSES as it is ds to be included in the ated on the basis of the	
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for agricultu	ral soil protection			
Exposure concentration in	Substance	PEC (ug/L)	PNEC (ug/L)	RCR	
aquatic pelagic compartment	CaO	5.66	370	0.015	
Exposure concentration in sediments	As described above, no exposure of surface water nor sediment to lime is expected. Further, in natural waters the hydroxide ions react with HCO3– to form water and CO32 CO32- forms CaCO3 by reacting with Ca2+. The calcium carbonate precipitates and deposits on the sediment. Calcium carbonate is of low solubility and a constituent of natural soils.				
Exposure concentrations in soil	Substance	PEC (mg/L)	PNEC (mg/L)	RCR	
and groundwater	CaO	500	816	0.61	
Exposure concentration in atmospheric compartment	This point is not relevant	. Calcium oxide is not vola	atile. The vapour pressure	s is below 10 <sup>-5</sup> Pa.	
Exposure concentration relevant for the food chain (secondary poisoning)		because calcium oxides o uses covered do not signif vironment.			



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#### Environmental exposure for urban soil treatment

The urban soil treatment scenario is based on a road border scenario. At the special road border technical meeting (Ispra, September 5, 2003), EU Member States and industry agreed on a definition for a "road technosphere". The road technosphere can be defined as "the engineered environment that carries the geotechnical functions of the road in connection with its structure, operation and maintenance including the installations to ensure road safety and manage run off. This technosphere, which includes the hard and soft shoulder at the edge of the carriageway, is vertically dictated by the groundwater watertable. The road authority has responsibility for this road technosphere including road safety, road support, prevention of pollution and water management". The road technosphere was therefore excluded as assessment endpoint for risk assessment for the purpose of the existing/new substances regulations. The target zone is the zone beyond the technosphere, to which the environmental risk assessment applies.

The PEC calculation for soil was based on the FOCUS soil group (FOCUS, 1996) and on the "draft guidance on the calculation of predicted environmental concentration values (PEC) of plant protection products for soil, ground water, surface water and sediment (Kloskowksi et al., 1999). The FOCUS/EXPOSIT modelling tool is preferred to the EUSES as it is more appropriate for agricultural-like application as in this case where parameter as the drift needs to be included in the modelling. FOCUS is a model typically developed for biocidal applications and was further elaborated on the basis of the German EXPOSIT 1.0 model, where parameters such as drifts can be improved according to collected data.

	ae anne ean se imprerea	accerang te concetea aat			
Environmental emissions	See amounts used				
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for road bor	Not relevant for road border scenario			
Exposure concentration in aquatic pelagic compartment	Not relevant for road border scenario				
Exposure concentration in sediments	Not relevant for road border scenario				
Exposure concentrations in soil	Substance	PEC (mg/L)	PNEC (mg/L)	RCR	
and groundwater	CaO	529	816	0.65	
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium oxide is not volatile. The vapour pressures is below 10 <sup>-5</sup> Pa.				
Exposure concentration relevant for the food chain (secondary poisoning)	Exposure concentration relevant for the food chain         This point is not relevant because calcium can be considered to be omnipresent and essential in the environment. The uses covered do not significantly influence the distribution of the constituents (Ca <sup>2+</sup> and OH <sup>2</sup> ) in the environment.				
Environmental exposure for other uses					
<ul> <li>For all other uses, no quantitative environmental exposure assessment is carried because</li> <li>The operational conditions and risk management measures are less stringent than those outlined for agricultural soil protection or urban soil treatment</li> <li>Lime is an ingredient and chemically bound into a matrix. Releases are negligible and insufficient to cause a pH-shift in soil, wastewater or surface water</li> <li>Lime is specifically used to release CO2-free breathable air, upon reaction with CO2. Such applications only relates to the air compartment, where the lime properties are exploited</li> </ul>					

Neutralisation/pH-shift is the intended use and there are no additional impacts beyond those desired.



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#### 4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. This has to be done by showing that they limit the inhalation and dermal exposure to a level below the respective DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (<u>www.ebrc.de/mease.html</u>) to estimate the associated exposure. The dustiness of the substance used can be determined according to the MEASE glossary. For example, substances with a dustiness less than 2.5 % according to the Rotating Drum Method (RDM) are defined as "low dusty", substances with a dustiness less than 10 % (RDM) are defined as "medium dusty" and substances with a dustiness ≥10 % are defined as "high dusty".

#### DNEL<sub>inhalation</sub>: 1 mg/m<sup>3</sup> (as respirable dust)

Important note: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m<sup>3</sup>. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).



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# ES number 9.7: Professional uses of low dusty solids/powders of lime substances

Exposure Scenario	o Format (1) addressing uses carried o	out by workers		
1. Title				
Free short title	Professional uses of low dusty solids/powders of li	me substances		
Systematic title based on use descriptor	SU22, SU1, SU5, SU6a, SU6b, SU7, SU10, SU11, SU12, SU13, SU16, SU17, SU18, SU19, SU20, SU23,         PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18, PC19, PC20, PC21, PC23, PC24, PC25, PC26, PC27, PC28, PC29, PC30, PC31, PC32, PC33, PC34,         PC34,       PC35,       PC36,       PC37,       PC39,       PC40         AC1, AC2, AC3, AC4, AC5, AC6, AC7, AC8, AC10, AC11, AC13       (appropriate PROCs and ERCs are given in Section 2 below)       PC30, PC31, PC32, PC33, PC30, PC31, PC39, PC40			
Processes, tasks and/or activities covered	Processes, tasks and/or activities covered are des	cribed in Section 2 below.		
Assessment Method	The assessment of inhalation exposure is base environmental assessment is based on FOCUS-E	d on the exposure estimation tool MEASE. The xposit.		
2. Operational con	ditions and risk management measure	es		
PROC/ERC	REACH definition	Involved tasks		
PROC 2	Use in closed, continuous process with occasional controlled exposure			
PROC 3	Use in closed batch process (synthesis or formulation)			
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises			
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)			
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities			
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities			
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)			
PROC 10	Roller application or brushing	Further information is provided in the ECHA		
PROC 11	Non industrial spraying	Guidance on information requirements and		
PROC 13	Treatment of articles by dipping and pouring	chemical safety assessment, Chapter R.12: Use descriptor system (ECHA-2010-G-05-EN).		
PROC 15	Use as laboratory reagent			
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected			
PROC 17	Lubrication at high energy conditions and in partly open process			
PROC 18	Greasing at high energy conditions			
PROC 19	Hand-mixing with intimate contact and only PPE available			
PROC 21	Low energy manipulation of substances bound in materials and/or articles			
PROC 25	Other hot work operations with metals			
PROC 26	Handling of solid inorganic substances at ambient temperature			
ERC2, ERC8a, ERC8b, ERC8c, ERC8d, ERC8e, ERC8f	Wide dispersive indoor and outdoor use of reactive substances or processing aids in open systems			



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2.1 Control of wor	kers exposure				
Product characteristic					
According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. Whereas in hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, high abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential.					
PROC	Use in preparation	Content in preparation	Physical form	Emission potential	
PROC 25	not restricted		solid/powder, molten	high	
All other applicable PROCs	not restricted		solid/powder	low	
Amounts used					
combination of the scale	ndled per shift is not con of operation (industrial vs. of the process intrinsic em	professional) and level of			
Frequency and duratio	n of use/exposure				
PROC	Duration of exposure				
PROC 17	≤ 240 minutes				
All other applicable PROCs	480 minutes (not restricted	ed)			
Human factors not influ	uenced by risk managen	nent			
The shift breathing volum	ne during all process step	s reflected in the PROCs i	s assumed to be 10 m <sup>3</sup> /sł	nift (8 hours).	
Other given operationa	I conditions affecting w	orkers exposure			
assessment of the cond exposure assessment in temperatures are expect	ke process temperature a lucted processes. In proce MEASE is however base red to vary within the indust ess temperatures are auto	ess steps with considerated on the ratio of process stry the highest ratio was t	bly high temperatures (i.e temperature and melting aken as a worst case ass	. PROC 22, 23, 25), the point. As the associated umption for the exposure	
	nd measures at process				
Risk management meas required in the processe	sures at the process level s.	(e.g. containment or segr	regation of the emission s	source) are generally not	
Technical conditions a	nd measures to control	dispersion from source	towards the worker		
PROC	Level of separation	Localised controls (LC)	Efficiency of LC (according to MEASE)	Further information	
PROC 19	Any potentially required separation of workers from the emission source is indicated above under "Frequency and duration of exposure".	not applicable	na	-	
All other applicable PROCs	A reduction of exposure duration can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with relevant exposure.	not required	na	-	



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#### Organisational measures to prevent /limit releases, dispersion and exposure

Avoid inhalation or ingestion. General occupational hygiene measures are required to ensure a safe handling of the substance. These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), no eating and smoking at the workplace, the wearing of standard working clothes and shoes unless otherwise stated below. Shower and change clothes at end of work shift. Do not wear contaminated clothing at home. Do not blow dust off with compressed air.

(	Conditions and measu	res related to per	rsonal p	protecti	on, hygiene and	healt	h eva	luatio	on	
		Specification	of	RPF	efficiency	_				Furthe

PROC	respiratory protective equipment (RPE)	(assigned protection factor, APF)	Specification of gloves	protective equipment (PPE)
PROC 4, 5, 11, 26	FFP1 mask	APF=4		Eye protection
PROC 16, 17, 18, 25	FFP2 mask	APF=10		equipment (e.g. goggles or visors) must
All other applicable PROCs	not required	na	Since calcium oxide is classified as irritating to skin, the use of protective gloves is mandatory for all process steps.	the eye can be

Any RPE as defined above shall only be worn if the following principles are implemented in parallel: The duration of work (compare with "duration of exposure" above) should reflect the additional physiological stress for the worker due to the breathing resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the wearing of RPE.

For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the face properly and securely.

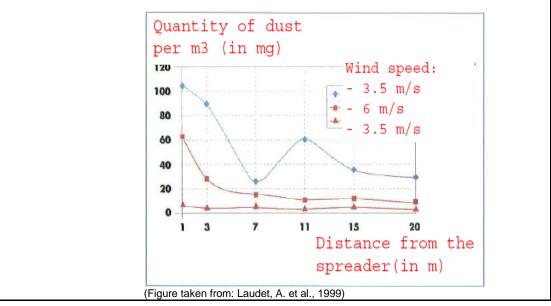
The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and the management of their correct use in the workplace. Therefore, they should define and document a suitable policy for a respiratory protective device programme including training of the workers.

An overview of the APFs of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE.

2.2 Control of environmental exposure – only relevant for agricultural soil protection

**Product characteristics** 

Drift: 1% (very worst-case estimate based on data from dust measurements in air as a function of the distance from application)





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Amounts used						
CaO	1,700 kg/ha					
Frequency and duration	on of use					
	1 day/year (one application per year) Multiple applications during the year are allowed, provided the total yearly amount of 1,700 kg/ha is not exceeded (CaO)					
Environment factors n	ot influenced by risk management					
Volume of surface wate Field surface area: 1 ha						
	al conditions affecting environmental exposure					
Outdoor use of products Soil mixing depth: 20 cm						
Technical conditions a	and measures at process level (source) to prevent release					
There are no direct relea	ases to adjacent surface waters.					
Technical conditions a	and measures to reduce or limit discharges, air emissions and releases to soil					
Drift should be minimise	d.					
Organizational measu	res to prevent/limit release from site					
	nents for good agricultural practice, agricultural soil should be analysed prior to application of lime and uld be adjusted according to the results of the analysis.					
2.2 Control of env	ironmental exposure – only relevant for urban soil treatment					
Product characteristic	S					
Drift: 1% (very worst-cas	se estimate based on data from dust measurements in air as a function of the distance from application)					
	Quantity of dust					
	per m3 (in mg)					
	Wind speed:					
	100 - 3.5 m/s					
	+ - 6 m/s					
	80 - 3.5 m/s					
	60 - 5.5 m/s					
	40					
	20					
	0					
	1 3 7 11 15 20 Distance from the					
	Distance from the					
	spreader(in m)					
	(Figure taken from: Laudet, A. et al., 1999)					
Amounts used						
CaO	180,000 kg/ha					
Frequency and duration	on of use					
1 day/year and only on 180,000 kg/ha is not exe	ce in a lifetime. Multiple applications during the year are allowed, provided the total yearly amount of ceeded (CaO)					
	ot influenced by risk management					
Field surface area: 1 ha						



poisoning)

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Other given operationa	al conditions affecting er	nvironmental exposure			
Outdoor use of products Soil mixing depth: 20 cm					
Technical conditions a	nd measures at process	level (source) to prever	nt release		
Lime is only applied onto surface waters.	o the soil in the technosph	ere zone before road con	struction. There are no d	irect releases to adjacent	
Technical onsite condi	tions and measures to r	educe or limit discharge	s, air emissions and rel	eases to soil	
Drift should be minimise	d.				
3. Exposure estim	ation and reference	to its source			
Occupational exposure	e				
is the quotient of the rel demonstrate a safe use dust) and the respective	tool MEASE was used for fined exposure estimate a For inhalation exposure, inhalation exposure estir since the respirable fraction	nd the respective DNEL the RCR is based on the nate derived using MEAS	(derived no-effect level) a DNEL for calcium oxide E (as inhalable dust). Th	and has to be below 1 to of 1 mg/m <sup>3</sup> (as respirable us, the RCR includes an	
PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)	
PROC 2, 3, 4, 5, 8a, 8b, 9, 10, 11, 13, 15, 16, 17, 18, 19, 21, 25, 26	5, 16, MEASE <pre>&lt; 1 mg/m³ (0.01 - 0.75)</pre> as technically feasible. A DNEL for dermal effects				
Environmental exposu	re for agricultural soil p	otection			
on the calculation of pre- surface water and sedim more appropriate for ag modelling. FOCUS is a German EXPOSIT 1.0 n the soil, calcium oxide ca	soil and surface water was adicted environmental con- nent (Kloskowksi et al., 19- pricultural-like application model typically develope model, where parameters an indeed migrate then to	centration values (PEC) of 99). The FOCUS/EXPOS as in this case where part of for biocidal applications such as drifts can be impr	of plant protection produc T modelling tool is prefer arameter as the drift nee s and was further elabor oved according to collect	ts for soil, ground water, red to the EUSES as it is ds to be included in the ated on the basis of the	
Environmental emissions	See amounts used				
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for agricultu	ral soil protection			
Exposure concentration in	Substance	PEC (ug/L)	PNEC (ug/L)	RCR	
aquatic pelagic compartment	CaO	5.66	370	0.015	
Exposure concentration in sediments	As described above, no exposure of surface water nor sediment to lime is expected. Further, in natural waters the hydroxide ions react with HCO3- to form water and CO32 CO32- forms CaCO3 by reacting with Ca2+. The calcium carbonate precipitates and deposits on the sediment. Calcium carbonate is of low solubility and a constituent of natural soils.				
Exposure concentrations in soil	Substance	PEC (mg/L)	PNEC (mg/L)	RCR	
and groundwater	CaO	500	816	0.61	
Exposure concentration in atmospheric compartment	This point is not relevant	. Calcium oxide is not vola	atile. The vapour pressure	es is below 10 <sup>-5</sup> Pa.	
Exposure concentration relevant for the food chain (secondary poisoning)		because calcium can be overed do not significantly nent.			



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#### Environmental exposure for urban soil treatment

The urban soil treatment scenario is based on a road border scenario. At the special road border technical meeting (Ispra, September 5, 2003), EU Member States and industry agreed on a definition for a "road technosphere". The road technosphere can be defined as "the engineered environment that carries the geotechnical functions of the road in connection with its structure, operation and maintenance including the installations to ensure road safety and manage run off. This technosphere, which includes the hard and soft shoulder at the edge of the carriageway, is vertically dictated by the groundwater watertable. The road authority has responsibility for this road technosphere including road safety, road support, prevention of pollution and water management". The road technosphere was therefore excluded as assessment endpoint for risk assessment for the purpose of the existing/new substances regulations. The target zone is the zone beyond the technosphere, to which the environmental risk assessment applies.

The PEC calculation for soil was based on the FOCUS soil group (FOCUS, 1996) and on the "draft guidance on the calculation of predicted environmental concentration values (PEC) of plant protection products for soil, ground water, surface water and sediment (Kloskowksi et al., 1999). The FOCUS/EXPOSIT modelling tool is preferred to the EUSES as it is more appropriate for agricultural-like application as in this case where parameter as the drift needs to be included in the modelling. FOCUS is a model typically developed for biocidal applications and was further elaborated on the basis of the German EXPOSIT 1.0 model, where parameters such as drifts can be improved according to collected data.

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Environmental emissions	See amounts used				
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for road bor	Not relevant for road border scenario			
Exposure concentration in aquatic pelagic compartment	Not relevant for road border scenario				
Exposure concentration in sediments	Not relevant for road border scenario				
Exposure concentrations in soil	Substance	PEC (mg/L)	PNEC (mg/L)	RCR	
and groundwater	CaO	529	816	0.65	
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium oxide is not volatile. The vapour pressures is below 10 <sup>-5</sup> Pa.				
Exposure concentration relevant for the food chain (secondary poisoning)	Exposure         This point is not relevant because calcium can be considered to be omnipresent and essential in the environment. The uses covered do not significantly influence the distribution of the constituents (Ca <sup>2+</sup> and OH <sup>2</sup> ) in the environment.				
Environmental exposure for other uses					
<ul> <li>For all other uses, no quantitative environmental exposure assessment is carried because</li> <li>The operational conditions and risk management measures are less stringent than those outlined for agricultural soil protection or urban soil treatment</li> <li>Lime is an ingredient and chemically bound into a matrix. Releases are negligible and insufficient to cause a pH-shift in soil, wastewater or surface water</li> <li>Lime is specifically used to release CO2-free breathable air, upon reaction with CO2. Such applications only relates to the air compartment, where the lime properties are exploited</li> </ul>					

• Neutralisation/pH-shift is the intended use and there are no additional impacts beyond those desired.



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#### 4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. This has to be done by showing that they limit the inhalation and dermal exposure to a level below the respective DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (<u>www.ebrc.de/mease.html</u>) to estimate the associated exposure. The dustiness of the substance used can be determined according to the MEASE glossary. For example, substances with a dustiness less than 2.5 % according to the Rotating Drum Method (RDM) are defined as "low dusty", substances with a dustiness less than 10 % (RDM) are defined as "medium dusty" and substances with a dustiness ≥10 % are defined as "high dusty".

#### DNEL<sub>inhalation</sub>: 1 mg/m<sup>3</sup> (as respirable dust)

Important note: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m<sup>3</sup>. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).



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# ES number 9.8: Professional uses of medium dusty solids/powders of lime substances

Exposure Scenario	o Format (1) addressing uses carried o	out by workers		
1. Title				
Free short title	Professional uses of medium dusty solids/powders of lime substances			
Systematic title based on use descriptor	SU22, SU1, SU5, SU6a, SU6b, SU7, SU10, SU11, SU12, SU13, SU16, SU17, SU18, SU19, SU20, SU23,       SU24         PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18, PC19, PC20, PC21, PC23, PC24, PC25, PC26, PC27, PC28, PC29, PC30, PC31, PC32, PC33, PC34,       PC35, PC36, PC37, PC39, PC30, PC39, PC40         AC1, AC2, AC3, AC4, AC5, AC6, AC7, AC8, AC10, AC11, AC13       (appropriate PROCs and ERCs are given in Section 2 below)       PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18, PC19, PC30, PC30, PC31, PC32, PC33, PC34, PC35, PC36, PC37, PC39, PC40			
Processes, tasks and/or activities covered	Processes, tasks and/or activities covered are described in Section 2 below.			
Assessment Method	The assessment of inhalation exposure is based on the exposure estimation tool MEASE. The environmental assessment is based on FOCUS-Exposit.			
2. Operational conditions and risk management measures				
PROC/ERC	REACH definition	Involved tasks		
PROC 2	Use in closed, continuous process with occasional controlled exposure			
PROC 3	Use in closed batch process (synthesis or formulation)			
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises			
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)			
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities			
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities			
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)			
PROC 10	Roller application or brushing	Further information is provided in the ECHA Guidance on information requirements and		
PROC 11	Non industrial spraying	chemical safety assessment, Chapter R.12: Use		
PROC 13	Treatment of articles by dipping and pouring	descriptor system (ECHA-2010-G-05-EN).		
PROC 15	Use as laboratory reagent			
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected			
PROC 17	Lubrication at high energy conditions and in partly open process			
PROC 18	Greasing at high energy conditions			
PROC 19	Hand-mixing with intimate contact and only PPE available			
PROC 25	Other hot work operations with metals			
PROC 26	Handling of solid inorganic substances at ambient temperature			
ERC2, ERC8a, ERC8b, ERC8c, ERC8d, ERC8e, ERC8f	Wide dispersive indoor and outdoor use of reactive substances or processing aids in open systems			



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2.1 Control of wor	kers exposure			
Product characteristic				
is reflected by an assign at ambient temperature temperature based, takir	approach, the substance ment of a so-called fugaci the fugacity is based on th ng into account the proces d on the level of abrasion i	ity class in the MEASE too ne dustiness of that subst is temperature and the me	ol. For operations conduct ance. Whereas in hot me elting point of the substan	ted with solid substances tal operations, fugacity is ce. As a third group, high
PROC	Use in preparation	Content in preparation	Physical form	Emission potential
PROC 25	not restricted		solid/powder, molten	high
All other applicable PROCs	not restricted		solid/powder	medium
Amounts used				
The actual tonnage handled per shift is not considered to influence the exposure as such for this scenario. Instead, the combination of the scale of operation (industrial vs. professional) and level of containment/automation (as reflected in the PROC) is the main determinant of the process intrinsic emission potential.				
Frequency and duration of use/exposure				
PROC	Duration of exposure			
PROC 11, 16, 17, 18, 19	≤ 240 minutes			
All other applicable PROCs	480 minutes (not restricted	ed)		
Human factors not infl	uenced by risk managen	nent		
The shift breathing volur	ne during all process step	s reflected in the PROCs i	is assumed to be 10 m <sup>3</sup> /sl	hift (8 hours).
Other given operationa	I conditions affecting w	orkers exposure		
assessment of the cond exposure assessment in temperatures are expect	Operational conditions like process temperature and process pressure are not considered relevant for occupational exposure assessment of the conducted processes. In process steps with considerably high temperatures (i.e. PROC 22, 23, 25), the exposure assessment in MEASE is however based on the ratio of process temperature and melting point. As the associated temperatures are expected to vary within the industry the highest ratio was taken as a worst case assumption for the exposure estimation. Thus all process temperatures are automatically covered in this exposure scenario for PROC 22, 23 and PROC 25.			
Technical conditions a	nd measures at process	level (source) to prever	nt release	
Risk management meas required in the processe	sures at the process level s.	(e.g. containment or seg	regation of the emission s	source) are generally not
Technical conditions a	nd measures to control	dispersion from source	towards the worker	
PROC	Level of separation	Localised controls (LC)	Efficiency of LC (according to MEASE)	Further information
PROC 11, 16	Any potentially required separation of workers from the emission	generic local exhaust ventilation	72 %	
PROC 17, 18	source is indicated above under	integrated local exhaust ventilation	87 %	-
PROC 19	"Frequency and duration of exposure". A reduction of exposure	not applicable	na	-
All other applicable PROCs	duration can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with relevant exposure.	not required	na	-



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#### Organisational measures to prevent /limit releases, dispersion and exposure

Avoid inhalation or ingestion. General occupational hygiene measures are required to ensure a safe handling of the substance. These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), no eating and smoking at the workplace, the wearing of standard working clothes and shoes unless otherwise stated below. Shower and change clothes at end of work shift. Do not wear contaminated clothing at home. Do not blow dust off with compressed air.

Conditions and measures related to personal protection, hygiene and health evaluation				
PROC	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further personal protective equipment (PPE)
PROC 2, 3, 16, 19	FFP1 mask	APF=4		Eye protection equipment (e.g.
PROC 4, 5, 8a, 8b, 9, 10, 13, 17, 18, 25, 26	FFP2 mask	APF=10		goggles or visors) must be worn. unless
PROC 11	FFP1 mask	APF=10	Since calcium oxide is	potential contact with
PROC 15	not required	na	classified as irritating to skin, the use of protective gloves is mandatory for all process steps.	excluded by the nature and type of application

Any RPE as defined above shall only be worn if the following principles are implemented in parallel: The duration of work (compare with "duration of exposure" above) should reflect the additional physiological stress for the worker due to the breathing resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the wearing of RPE.

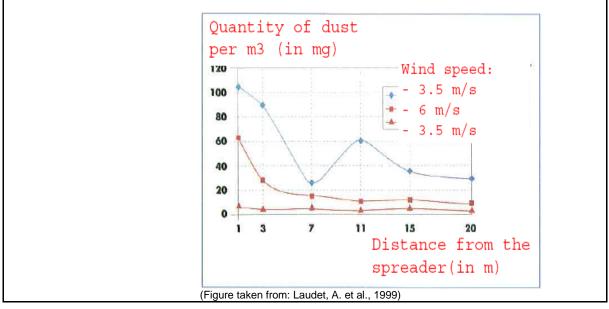
For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the

contours of the face properly and securely. The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and the management of their correct use in the workplace. Therefore, they should define and document a suitable policy for a respiratory protective device programme including training of the workers. An overview of the APFs of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE.

2.2 Control of environmental exposure – only relevant for agricultural soil protection

#### **Product characteristics**

Drift: 1% (very worst-case estimate based on data from dust measurements in air as a function of the distance from application)





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Amounts used				
CaO	1,700 kg/ha			
Frequency and duration of use				
1 day/year (one application per ye kg/ha is not exceeded (CaO)	ar) Multiple applications during the year are allowed, provided the total yearly amount of 1,700			
Environment factors not influer	nced by risk management			
Volume of surface water: 300 L/m Field surface area: 1 ha	2			
Other given operational conditi	ons affecting environmental exposure			
Outdoor use of products Soil mixing depth: 20 cm				
Technical conditions and meas	ures at process level (source) to prevent release			
There are no direct releases to adjacent surface waters.				
Technical conditions and measures to reduce or limit discharges, air emissions and releases to soil				
Drift should be minimised.				
Organizational measures to prevent/limit release from site				
In line with the requirements for good agricultural practice, agricultural soil should be analysed prior to application of lime and the application rate should be adjusted according to the results of the analysis.				
2.2 Control of environme	ntal exposure – only relevant for urban soil treatment			
Product characteristics				
Drift: 1% (very worst-case estimat	e based on data from dust measurements in air as a function of the distance from application)			
	Quantity of dust			
	per m3 (in mg)			
	Wind speed:			
	100 🔨 - 3.5 m/s			
	80 - 6 m/s			
	- 3.5 m/s			
	60			
	40			
	20			
	Distance from the			
	spreader(in m)			
American	(Figure taken from: Laudet, A. et al., 1999)			
Amounts used				
CaO 180,000	kg/ha			
Frequency and duration of use				
1 day/year and only once in a life 180,000 kg/ha is not exceeded (C	etime. Multiple applications during the year are allowed, provided the total yearly amount of aO)			
Environment factors not influer	nced by risk management			
Field surface area: 1 ha				



poisoning)

## PRODUCT SAFETY DATA SHEET for CaO

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Other given operationa	Other given operational conditions affecting environmental exposure				
	Outdoor use of products Soil mixing depth: 20 cm				
Technical conditions a	Technical conditions and measures at process level (source) to prevent release				
Lime is only applied onto the soil in the technosphere zone before road construction. There are no direct releases to adjacent surface waters.					
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil					
Drift should be minimise	d.				
3. Exposure estim	3. Exposure estimation and reference to its source				
	Occupational exposure				
The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium oxide of 1 mg/m <sup>3</sup> (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.					
PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)	
PROC 2, 3, 4, 5, 8a, 8b, 9, 10, 11, 13, 15, 16, 17, 18, 19, 25, 26	MEASE	< 1 mg/m³ (0.25 – 0.825)	skin, dermal exposure has technically feasible. A	classified as irritating to as to be minimised as far DNEL for dermal effects 'hus, dermal exposure is osure scenario.	
Environmental exposu	re for agricultural soil p	otection			
on the calculation of pre- surface water and sedim more appropriate for ag modelling. FOCUS is a German EXPOSIT 1.0 n	See amounte used				
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for agricultural soil protection				
Exposure	Substance	PEC (ug/L)	PNEC (ug/L)	RCR	
concentration in aquatic pelagic compartment	CaO	5.66	370	0.015	
Exposure concentration in sediments	As described above, no exposure of surface water nor sediment to lime is expected. Further, in natural waters the hydroxide ions react with HCO3- to form water and CO32 CO32- forms CaCO3 by reacting with Ca2+. The calcium carbonate precipitates and deposits on the sediment. Calcium carbonate is of low solubility and a constituent of natural soils.				
Exposure concentrations in soil	Substance	PEC (mg/L)	PNEC (mg/L)	RCR	
and groundwater	CaO	500	816	0.61	
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium oxide is not volatile. The vapour pressures is below 10 <sup>-5</sup> Pa.				
Exposure concentration relevant for the food chain (secondary		because calcium can be overed do not significantly tent.			



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#### Environmental exposure for urban soil treatment

The urban soil treatment scenario is based on a road border scenario. At the special road border technical meeting (Ispra, September 5, 2003), EU Member States and industry agreed on a definition for a "road technosphere". The road technosphere can be defined as "the engineered environment that carries the geotechnical functions of the road in connection with its structure, operation and maintenance including the installations to ensure road safety and manage run off. This technosphere, which includes the hard and soft shoulder at the edge of the carriageway, is vertically dictated by the groundwater watertable. The road authority has responsibility for this road technosphere including road safety, road support, prevention of pollution and water management". The road technosphere was therefore excluded as assessment endpoint for risk assessment for the purpose of the existing/new substances regulations. The target zone is the zone beyond the technosphere, to which the environmental risk assessment applies.

The PEC calculation for soil was based on the FOCUS soil group (FOCUS, 1996) and on the "draft guidance on the calculation of predicted environmental concentration values (PEC) of plant protection products for soil, ground water, surface water and sediment (Kloskowksi et al., 1999). The FOCUS/EXPOSIT modelling tool is preferred to the EUSES as it is more appropriate for agricultural-like application as in this case where parameter as the drift needs to be included in the modelling. FOCUS is a model typically developed for biocidal applications and was further elaborated on the basis of the German EXPOSIT 1.0 model, where parameters such as drifts can be improved according to collected data.

See amounts used			
Not relevant for road border scenario			
Not relevant for road border scenario			
Not relevant for road border scenario			
Substance	PEC (mg/L)	PNEC (mg/L)	RCR
CaO	529	816	0.65
This point is not relevant. Calcium oxide is not volatile. The vapour pressures is below 10 <sup>-5</sup> Pa.			
This point is not relevant because calcium can be considered to be omnipresent and essential in the environment. The uses covered do not significantly influence the distribution of the constituents (Ca <sup>2+</sup> and OH <sup>-</sup> ) in the environment.			
Environmental exposure for other uses			
re for other uses			
	Not relevant for road bor Not relevant for road bor Not relevant for road bor <b>Substance</b> CaO This point is not relevant This point is not relevant environment. The uses c	Not relevant for road border scenario         Not relevant for road border scenario         Not relevant for road border scenario         Substance       PEC (mg/L)         CaO       529         This point is not relevant. Calcium oxide is not vola         This point is not relevant because calcium can be environment. The uses covered do not significantly	Not relevant for road border scenario         Not relevant for road border scenario         Not relevant for road border scenario         Substance       PEC (mg/L)         CaO       529         816         This point is not relevant. Calcium oxide is not volatile. The vapour pressure environment. The uses covered do not significantly influence the distribution

to the air compartment, where the lime properties are exploited
Neutralisation/pH-shift is the intended use and there are no additional impacts beyond those desired.



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#### 4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. This has to be done by showing that they limit the inhalation and dermal exposure to a level below the respective DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (<u>www.ebrc.de/mease.html</u>) to estimate the associated exposure. The dustiness of the substance used can be determined according to the MEASE glossary. For example, substances with a dustiness less than 2.5 % according to the Rotating Drum Method (RDM) are defined as "low dusty", substances with a dustiness less than 10 % (RDM) are defined as "medium dusty" and substances with a dustiness ≥10 % are defined as "high dusty".

#### DNEL<sub>inhalation</sub>: 1 mg/m<sup>3</sup> (as respirable dust)

Important note: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m<sup>3</sup>. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).



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# ES number 9.9: Professional uses of high dusty solids/powders of lime substances

Exposure Scenario	o Format (1) addressing uses carried o	out by workers			
1. Title	1. Title				
Free short title	Professional uses of high dusty solids/powders of	lime substances			
Systematic title based on use descriptor	SU23, PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11,				
Processes, tasks and/or activities covered	Processes, tasks and/or activities covered are des	cribed in Section 2 below.			
Assessment Method	The assessment of inhalation exposure is base environmental assessment is based on FOCUS-E	d on the exposure estimation tool MEASE. The xposit.			
2. Operational con	ditions and risk management measure	S			
PROC/ERC	REACH definition	Involved tasks			
PROC 2	Use in closed, continuous process with occasional controlled exposure				
PROC 3	Use in closed batch process (synthesis or formulation)				
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises				
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)				
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities				
PROC 8b	ransfer of substance or preparation (charging/ ischarging) from/to vessels/large containers at edicated facilities				
PROC 9	ransfer of substance or preparation into small ontainers (dedicated filling line, including reighing)				
PROC 10	Roller application or brushing Guidance on information require				
PROC 11	Non industrial spraying	chemical safety assessment, Chapter R.12: Use descriptor system (ECHA-2010-G-05-EN).			
PROC 13	Treatment of articles by dipping and pouring	чезепріог зузіені (ЕСПА-2010-G-03-EN).			
PROC 15	Use as laboratory reagent				
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected				
PROC 17	Lubrication at high energy conditions and in partly open process				
PROC 18	Greasing at high energy conditions				
PROC 19	Hand-mixing with intimate contact and only PPE available				
PROC 25	Other hot work operations with metals				
PROC 26	Handling of solid inorganic substances at ambient temperature				
ERC2, ERC8a, ERC8b, ERC8c, ERC8d, ERC8e, ERC8f	Wide dispersive indoor and outdoor use of reactive substances or processing aids in open systems				



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2.1 Control of wor	kers exposure			
Product characteristic				
is reflected by an assign at ambient temperature temperature based, takir	E approach, the substance ment of a so-called fugaci the fugacity is based on th ng into account the proces d on the level of abrasion	ity class in the MEASE too ne dustiness of that subst is temperature and the me	ol. For operations conduct ance. Whereas in hot me elting point of the substan	ted with solid substances tal operations, fugacity is ce. As a third group, high
PROC	Use in preparation	Content in preparation	Physical form	Emission potential
All applicable PROCs	not restricted		solid/powder	high
Amounts used				
combination of the scale	ndled per shift is not con of operation (industrial vs. of the process intrinsic em	professional) and level of		
Frequency and duratio	n of use/exposure			
PROC	Duration of exposure			
PROC 4, 5, 8a, 8b, 9, 10, 16, 17, 18, 19, 26	≤ 240 minutes			
PROC 11	≤ 60 minutes			
All other applicable PROCs	480 minutes (not restrict	ed)		
Human factors not influ	uenced by risk manager	nent		
The shift breathing volum	ne during all process step	s reflected in the PROCs	is assumed to be 10 m³/sl	hift (8 hours).
Other given operationa	I conditions affecting w	orkers exposure		
assessment of the cond exposure assessment in temperatures are expect	ke process temperature a lucted processes. In proc MEASE is however base ed to vary within the indus ess temperatures are auto	ess steps with consideral ed on the ratio of process stry the highest ratio was t	bly high temperatures (i.e temperature and melting aken as a worst case ass	e. PROC 22, 23, 25), the point. As the associated umption for the exposure
	nd measures at process			
Risk management meas required in the processe		(e.g. containment or seg	regation of the emission s	source) are generally not
Technical conditions a	nd measures to control	dispersion from source	towards the worker	
PROC	Level of separation	Localised controls (LC)	Efficiency of LC (according to MEASE)	Further information
PROC 4, 5, 8a, 8b, 9, 11, 16, 26	Any potentially required separation of workers from the emission	generic local exhaust ventilation	72 %	-
PROC 17, 18	source is indicated above under	integrated local exhaust ventilation	87 %	-
PROC 19	"Frequency and duration of exposure". A reduction of exposure duration can be	not applicable	na	only in well ventilated rooms or outdoors (efficiency 50 %)-
All other applicable PROCs	achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with relevant exposure.	not required	na	-



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#### Organisational measures to prevent /limit releases, dispersion and exposure

Avoid inhalation or ingestion. General occupational hygiene measures are required to ensure a safe handling of the substance. These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), no eating and smoking at the workplace, the wearing of standard working clothes and shoes unless otherwise stated below. Shower and change clothes at end of work shift. Do not wear contaminated clothing at home. Do not blow dust off with compressed air.

#### Conditions and measures related to personal protection, hygiene and health evaluation

PROC	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further personal protective equipment (PPE)
PROC 9, 26	FFP1 mask	APF=4		Eye protection equipment (e.g.
PROC 11, 17, 18, 19	FFP3 mask	APF=20		goggles or visors) must be worn, unless
PROC 25	FFP2 mask	APF=10	classified as irritating to	potential contact with the eye can be
All other applicable PROCs	FFP2 mask	APF=10	protective gloves is	excluded by the nature and type of application (i.e. closed process). Additionally, face protection, protective clothing and safety shoes are required to be worn as appropriate.

Any RPE as defined above shall only be worn if the following principles are implemented in parallel: The duration of work (compare with "duration of exposure" above) should reflect the additional physiological stress for the worker due to the breathing resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the wearing of RPE.

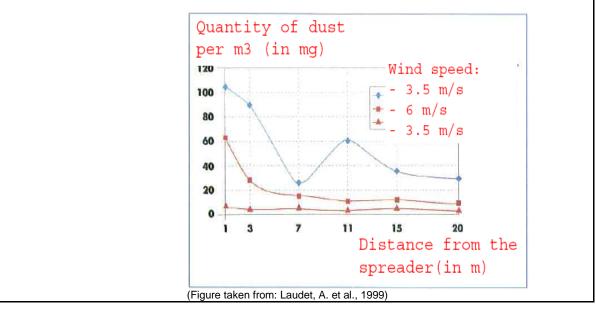
For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the

contours of the face properly and securely. The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and the management of their correct use in the workplace. Therefore, they should define and document a suitable policy for a respiratory protective device programme including training of the workers. An overview of the APFs of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE.

2.2 Control of environmental exposure – only relevant for agricultural soil protection

#### **Product characteristics**

Drift: 1% (very worst-case estimate based on data from dust measurements in air as a function of the distance from application)





prepared in accordance with Annex II of the REACH Regulation EC 1907/2006,

Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

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Amounts used	
CaO	1,700 kg/ha
Frequency and duration	on of use
1 day/year (one applica 1,700 kg/ha is not exce	ation per year). Multiple applications during the year are allowed, provided the total yearly amount of eded (CaO)
	ot influenced by risk management
Volume of surface wate Field surface area: 1 ha	
	al conditions affecting environmental exposure
Outdoor use of products Soil mixing depth: 20 cm	
Technical conditions a	and measures at process level (source) to prevent release
There are no direct relea	ases to adjacent surface waters.
Technical conditions a	and measures to reduce or limit discharges, air emissions and releases to soil
Drift should be minimise	ed.
Organizational measu	res to prevent/limit release from site
	nents for good agricultural practice, agricultural soil should be analysed prior to application of lime and uld be adjusted according to the results of the analysis.
2.2 Control of env	ironmental exposure – only relevant for urban soil treatment
Product characteristic	S
	Quantity of dust per m3 (in mg) Wind speed: - 3.5 m/s - 6 m/s - 3.5 m/s - 3.5 m/s - 3.5 m/s - 3.5 m/s - 0 Distance from the spreader(in m)
Amounto used	(Figure taken from: Laudet, A. et al., 1999)
Amounts used	180.000 ka/ka
CaO	180,000 kg/ha
Frequency and duration	on of use ce in a lifetime. Multiple applications during the year are allowed, provided the total yearly amount of
180,000 kg/ha is not exc	ceeded (CaO)
Environment factors n	ot influenced by risk management
Field surface area: 1 ha	



poisoning)

## PRODUCT SAFETY DATA SHEET for CaO

prepared in accordance with Annex II of the REACH Regulation EC 1907/2006,

Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

## Version: Draft Version September 2010 1.0/EN

Revision date: February 2013

Other given operationa	al conditions affecting er	vironmental exposure			
Outdoor use of products Soil mixing depth: 20 cm					
Technical conditions a	nd measures at process	level (source) to prever	nt release		
Lime is only applied onto surface waters.	o the soil in the technosph	ere zone before road con	struction. There are no di	irect releases to adjacent	
Technical onsite condi	itions and measures to r	educe or limit discharge	s, air emissions and rel	eases to soil	
Drift should be minimise	d.				
3. Exposure estim	ation and reference	to its source			
Occupational exposure	e				
is the quotient of the rel demonstrate a safe use dust) and the respective	tool MEASE was used for fined exposure estimate a . For inhalation exposure, a inhalation exposure estir since the respirable fraction	nd the respective DNEL the RCR is based on the nate derived using MEAS	(derived no-effect level) a DNEL for calcium oxide o E (as inhalable dust). Th	and has to be below 1 to of 1 mg/m³ (as respirable us, the RCR includes an	
PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)	
PROC 2, 3, 4, 5, 8a, 8b, 9, 10, 11, 13, 15, 16, 17, 18, 19, 25, 26	MEASE <1 mg/m³ (0.5 – 0.825) Since calcium oxide is classified as irritating skin, dermal exposure has to be minimised as fast to be minimis				
Environmental exposu	re for agricultural soil p	otection			
on the calculation of pre- surface water and sedim more appropriate for ag modelling. FOCUS is a German EXPOSIT 1.0 n	soil and surface water was adicted environmental con nent (Kloskowksi et al., 19 gricultural-like application model typically develope nodel, where parameters s an indeed migrate then tow See amounts used	centration values (PEC) of 99). The FOCUS/EXPOSI as in this case where part of for biocidal applications such as drifts can be impr	of plant protection produc T modelling tool is prefer arameter as the drift nee s and was further elabor oved according to collect	ts for soil, ground water, red to the EUSES as it is ds to be included in the ated on the basis of the	
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for agricultu	ral soil protection			
Exposure concentration in	Substance	PEC (ug/L)	PNEC (ug/L)	RCR	
aquatic pelagic compartment	CaO	5.66	370	0.015	
Exposure concentration in sediments	As described above, no exposure of surface water nor sediment to lime is expected. Further, in natural waters the hydroxide ions react with HCO3- to form water and CO32 CO32- forms CaCO3 by reacting with Ca2+. The calcium carbonate precipitates and deposits on the sediment. Calcium carbonate is of low solubility and a constituent of natural soils.				
Exposure concentrations in soil	Substance	PEC (mg/L)	PNEC (mg/L)	RCR	
and groundwater	CaO	500	816	0.61	
Exposure concentration in atmospheric compartment	in This point is not relevant. Calcium oxide is not volatile. The vapour pressures is below 10 <sup>-5</sup> Pa.				
Exposure concentration relevant for the food chain (secondary poisoning)		because calcium can be overed do not significantly nent.			



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#### Environmental exposure for urban soil treatment

The urban soil treatment scenario is based on a road border scenario. At the special road border technical meeting (Ispra, September 5, 2003), EU Member States and industry agreed on a definition for a "road technosphere". The road technosphere can be defined as "the engineered environment that carries the geotechnical functions of the road in connection with its structure, operation and maintenance including the installations to ensure road safety and manage run off. This technosphere, which includes the hard and soft shoulder at the edge of the carriageway, is vertically dictated by the groundwater watertable. The road authority has responsibility for this road technosphere including road safety, road support, prevention of pollution and water management". The road technosphere was therefore excluded as assessment endpoint for risk assessment for the purpose of the existing/new substances regulations. The target zone is the zone beyond the technosphere, to which the environmental risk assessment applies.

The PEC calculation for soil was based on the FOCUS soil group (FOCUS, 1996) and on the "draft guidance on the calculation of predicted environmental concentration values (PEC) of plant protection products for soil, ground water, surface water and sediment (Kloskowksi et al., 1999). The FOCUS/EXPOSIT modelling tool is preferred to the EUSES as it is more appropriate for agricultural-like application as in this case where parameter as the drift needs to be included in the modelling. FOCUS is a model typically developed for biocidal applications and was further elaborated on the basis of the German EXPOSIT 1.0 model, where parameters such as drifts can be improved according to collected data.

	ao anneo can bo improvoa	abeel anig to beneeted adt				
Environmental emissions	See amounts used	See amounts used				
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for road bor	Not relevant for road border scenario				
Exposure concentration in aquatic pelagic compartment	Not relevant for road bor	Not relevant for road border scenario				
Exposure concentration in sediments	Not relevant for road bor	der scenario				
Exposure concentrations in soil	Substance	PEC (mg/L)	PNEC (mg/L)	RCR		
and groundwater	CaO	529	816	0.65		
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium oxide is not volatile. The vapour pressures is below 10 <sup>-5</sup> Pa.					
Exposure concentration relevant for the food chain (secondary poisoning)	This point is not relevant because calcium can be considered to be omnipresent and essential in the environment. The uses covered do not significantly influence the distribution of the constituents (Ca <sup>2+</sup> and OH <sup>-</sup> ) in the environment.					
Environmental exposu	re for other uses					
<ul> <li>The operation protection or u</li> <li>Lime is an inguin soil, wastew</li> <li>Lime is specifi</li> </ul>	rban soil treatment redient and chemically bou ater or surface water	agement measures are le und into a matrix. Release 2-free breathable air, upon	ess stringent than those as are negligible and ins	e outlined for agricultural soil sufficient to cause a pH-shift uch applications only relates		

• Neutralisation/pH-shift is the intended use and there are no additional impacts beyond those desired.



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#### 4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. This has to be done by showing that they limit the inhalation and dermal exposure to a level below the respective DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (<u>www.ebrc.de/mease.html</u>) to estimate the associated exposure. The dustiness of the substance used can be determined according to the MEASE glossary. For example, substances with a dustiness less than 2.5 % according to the Rotating Drum Method (RDM) are defined as "low dusty", substances with a dustiness less than 10 % (RDM) are defined as "medium dusty" and substances with a dustiness ≥10 % are defined as "high dusty".

#### DNEL<sub>inhalation</sub>: 1 mg/m<sup>3</sup> (as respirable dust)

Important note: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m<sup>3</sup>. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).



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# ES number 9.10: Professional use of lime substances in soil treatment

Exposure Scenario Format (1) addressing uses carried out by workers						
1. Title						
Free short title	Professional use of lime s	substances in soil treatme	ent			
Systematic title based on use descriptor	SU22 (appropriate PROCs and	ERCs are given in Section	on 2 below)			
Processes, tasks and/or activities covered	Processes, tasks and/or a	activities covered are des	cribed in Section 2 below	Ι.		
Assessment Method	The assessment of inhala tool The environmental asses			the exposure estimation MEASE.		
2. Operational con	ditions and risk ma	nagement measure	es			
Task/ERC	REACH definition		Involved tasks			
Milling	PROC 5					
Loading of spreader	PROC 8b, PROC 26		Preparation and use of treatment.	f calcium oxides for soil		
Application to soil (spreading)	PROC 11					
ERC2, ERC8a, ERC8b, ERC8c, ERC8d, ERC8e,	Wide dispersive indoor and outdoor use of reactive substances or processing aids in open systems			agricultural, forestry, fish g, soil treatment and		
ERC8f	-	2.1 Control of workers exposure				
	kers exposure					
	kers exposure					
2.1 Control of wor Product characteristic According to the MEASE is reflected by an assign at ambient temperature temperature based, taking	approach, the substance ment of a so-called fugacit the fugacity is based on th ng into account the process	ty class in the MEASE too le dustiness of that substa s temperature and the me	bl. For operations conduc ance. Whereas in hot me elting point of the substan	ted with solid substances tal operations, fugacity is ce. As a third group, high		
2.1 Control of wor Product characteristic According to the MEASE is reflected by an assign at ambient temperature temperature based, taking	approach, the substance ment of a so-called fugacit the fugacity is based on th	ty class in the MEASE too le dustiness of that substa s temperature and the me	bl. For operations conduc ance. Whereas in hot me elting point of the substan	ted with solid substances tal operations, fugacity is ce. As a third group, high		
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2.1 Control of wor Product characteristic According to the MEASE is reflected by an assign at ambient temperature temperature based, takin abrasive tasks are base Task Milling Loading of spreader	approach, the substance ment of a so-called fugacit the fugacity is based on th ing into account the process d on the level of abrasion in Use in preparation	ty class in the MEASE too e dustiness of that substa s temperature and the me instead of the substance in Content in	ol. For operations conduc ance. Whereas in hot me elting point of the substan ntrinsic emission potentia Physical form	ted with solid substances tal operations, fugacity is ce. As a third group, high I. Emission potential		
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2.1 Control of wor Product characteristic According to the MEASE is reflected by an assign at ambient temperature temperature based, takin abrasive tasks are base Task Milling Loading of spreader Application to soil (spreading) Amounts used The actual tonnage har combination of the scale is the main determinant Frequency and duratio Task Milling	approach, the substance ment of a so-called fugacit the fugacity is based on the og into account the process d on the level of abrasion in Use in preparation not restricted not restricted not restricted not restricted adled per shift is not conso of operation (industrial vs. pof the process intrinsic emited not restricted adled per shift is not conso of operation (industrial vs. pof the process intrinsic emited additional solution of exposure 240 minutes	ty class in the MEASE too le dustiness of that substa is temperature and the me instead of the substance in Content in preparation	bl. For operations conduct ance. Whereas in hot me elting point of the substan intrinsic emission potentia Physical form solid/powder solid/powder solid/powder exposure as such for th	ted with solid substances tal operations, fugacity is ce. As a third group, high I. Emission potential high high high s scenario. Instead, the		
2.1 Control of wor Product characteristic According to the MEASE is reflected by an assign at ambient temperature temperature based, taking abrasive tasks are based Task Milling Loading of spreader Application to soil (spreading) Amounts used The actual tonnage han combination of the scale is the main determinant Frequency and duratio Task Milling Loading of spreader Application to soil (spreading)	approach, the substance ment of a so-called fugacit the fugacity is based on the g into account the process d on the level of abrasion in Use in preparation not restricted not restricted not restricted adled per shift is not conso of operation (industrial vs. pof the process intrinsic eminent of the process intrinsic eminent nof use/exposure Duration of exposure 240 minutes	ty class in the MEASE too the dustiness of that substa is temperature and the me instead of the substance in Content in preparation sidered to influence the professional) and level of ission potential.	bl. For operations conduct ance. Whereas in hot me elting point of the substan intrinsic emission potentia Physical form solid/powder solid/powder solid/powder exposure as such for th	ted with solid substances tal operations, fugacity is ce. As a third group, high I. Emission potential high high high s scenario. Instead, the		



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Other given operational conditions affecting workers exposure

Operational conditions (e.g. process temperature and process pressure) are not considered relevant for occupational exposure assessment of the conducted processes

Technical conditions and measures at process level (source) to prevent release

Risk management measures at the process level (e.g. containment or segregation of the emission source) are generally not required in the processes.

Technical conditions and measures to control dispersion from source towards the worker

Task	Level of separation	Localised controls (LC)	Efficiency of LC	Further information
Milling	Separation of workers is generally not	not required	na	-
Loading of spreader	required in the conducted processes.	not required	na	-
Application to soil (spreading)	During application the worker is sitting in the cabin of the spreader	Cabin with filtered air supply	99%	-

Organisational measures to prevent /limit releases, dispersion and exposure

Avoid inhalation or ingestion. General occupational hygiene measures are required to ensure a safe handling of the substance. These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), no eating and smoking at the workplace, the wearing of standard working clothes and shoes unless otherwise stated below. Shower and change clothes at end of work shift. Do not wear contaminated clothing at home. Do not blow dust off with compressed air.

#### ad measures related to personal protection, hygiene

conditions and measures related to personal protection, nygiene and nearth evaluation				
Task	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further personal protective equipment (PPE)
Milling	FFP3 mask	APF=20		Eye protection equipment (e.g. goggles or visors) must be worn, unless
Loading of spreader	FFP3 mask	APF=20	Since calcium oxide is classified as irritating to skin, the use of protective gloves is mandatory for all	excluded by the nature and type of application
Application to soil (spreading)	not required	na	process steps.	Additionally, face protection, protective clothing and safety shoes are required to be worn as appropriate.

Any RPE as defined above shall only be worn if the following principles are implemented in parallel: The duration of work (compare with "duration of exposure" above) should reflect the additional physiological stress for the worker due to the breathing resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the wearing of RPE.

For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the face properly and securely.

The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and the management of their correct use in the workplace. Therefore, they should define and document a suitable policy for a respiratory protective device programme including training of the workers. An overview of the APFs of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE.

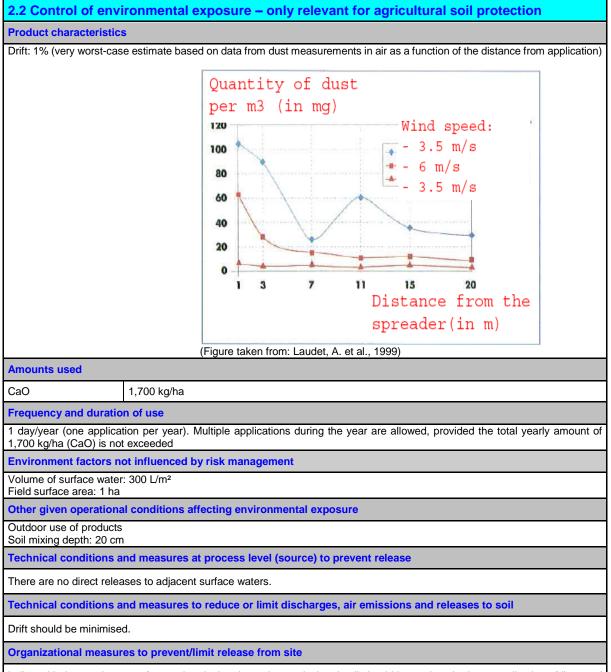


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In line with the requirements for good agricultural practice, agricultural soil should be analysed prior to application of lime and the application rate should be adjusted according to the results of the analysis.

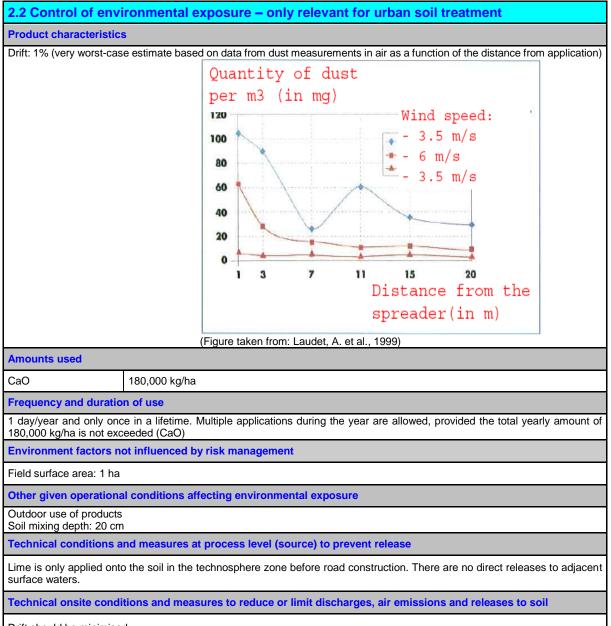


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Drift should be minimised.



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3. Exposure estimation and reference to its source					
Occupational exposure	Occupational exposure				
characterisation ratio (Re and has to be below 1 to	Measured data and modelled exposure estimates (MEASE) were used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium oxide of 1 mg/m <sup>3</sup> (as respirable dust).				
Task	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)	
Milling	MEASE	0.488 mg/m <sup>3</sup> (0.48)		classified as irritating to	
Loading of spreader	MEASE (PROC 8b)	0.488 mg/m <sup>3</sup> (0.48)	as technically feasible. A	as to be minimised as far DNEL for dermal effects	
Application to soil (spreading)	measured data	0.880 mg/m³ (0.88)	has not been derived. T not assessed in this expo	hus, dermal exposure is osure scenario.	
· · · · ·	re for agricultural soil p				
on the calculation of pre- surface water and sedim more appropriate for ag modelling. FOCUS is a German EXPOSIT 1.0 m	The PEC calculation for soil and surface water was based on the FOCUS soil group (FOCUS, 1996) and on the "draft guidance on the calculation of predicted environmental concentration values (PEC) of plant protection products for soil, ground water, surface water and sediment (Kloskowksi et al., 1999). The FOCUS/EXPOSIT modelling tool is preferred to the EUSES as it is more appropriate for agricultural-like application as in this case where parameter as the drift needs to be included in the modelling. FOCUS is a model typically developed for biocidal applications and was further elaborated on the basis of the German EXPOSIT 1.0 model, where parameters such as drifts can be improved according to collected data: once applied on the soil, calcium oxide can indeed migrate then towards surface waters, via drift.				
Environmental emissions	See amounts used				
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for agricultu	ral soil protection			
Exposure	Substance	PEC (ug/L)	PNEC (ug/L)	RCR	
concentration in aquatic pelagic compartment	CaO	5.66	370	0.015	
Exposure concentration in sediments	Exposure concentration in As described above, no exposure of surface water nor sediment to lime is expected. Further, in natural waters the hydroxide ions react with HCO3- to form water and CO32 CO32- forms CaCO3 by reacting with Ca2+. The calcium carbonate precipitates and deposite on the sediment. Calcium				
Exposure	Substance	PEC (mg/L)	PNEC (mg/L)	RCR	
concentrations in soil and groundwater	CaO	500	816	0.61	
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium oxide is not volatile. The vapour pressures is below 10 <sup>-5</sup> Pa.				
Exposure concentration relevant for the food chain (secondary poisoning)	This point is not relevant because calcium can be considered to be omnipresent and essential in the environment. The uses covered do not significantly influence the distribution of the constituents (Ca <sup>2+</sup> and OH <sup>-</sup> ) in the environment.				



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#### Environmental exposure for urban soil treatment

The urban soil treatment scenario is based on a road border scenario. At the special road border technical meeting (Ispra, September 5, 2003), EU Member States and industry agreed on a definition for a "road technosphere". The road technosphere can be defined as "the engineered environment that carries the geotechnical functions of the road in connection with its structure, operation and maintenance including the installations to ensure road safety and manage run off. This technosphere, which includes the hard and soft shoulder at the edge of the carriageway, is vertically dictated by the groundwater watertable. The road authority has responsibility for this road technosphere including road safety, road support, prevention of pollution and water management". The road technosphere was therefore excluded as assessment endpoint for risk assessment for the purpose of the existing/new substances regulations. The target zone is the zone beyond the technosphere, to which the environmental risk assessment applies.

The PEC calculation for soil was based on the FOCUS soil group (FOCUS, 1996) and on the "draft guidance on the calculation of predicted environmental concentration values (PEC) of plant protection products for soil, ground water, surface water and sediment (Kloskowksi et al., 1999). The FOCUS/EXPOSIT modelling tool is preferred to the EUSES as it is more appropriate for agricultural-like application as in this case where parameter as the drift needs to be included in the modelling. FOCUS is a model typically developed for biocidal applications and was further elaborated on the basis of the German EXPOSIT 1.0 model, where parameters such as drifts can be improved according to collected data.

more parametere eden	ao anne oan bo improvoa	according to concetted dat				
Environmental emissions	See amounts used	See amounts used				
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for road bor	Not relevant for road border scenario				
Exposure concentration in aquatic pelagic compartment	Not relevant for road bor	Not relevant for road border scenario				
Exposure concentration in sediments	Not relevant for road bor	Not relevant for road border scenario				
Exposure concentrations in soil	Substance	PEC (mg/L)	PNEC (mg/L)	RCR		
and groundwater	CaO	CaO 529 816 0.65				
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium oxide is not volatile. The vapour pressures is below 10 <sup>-5</sup> Pa.					
Exposure concentration relevant for the food chain (secondary poisoning)	This point is not relevant because calcium can be considered to be omnipresent and essential in the environment. The uses covered do not significantly influence the distribution of the constituents (Ca <sup>2+</sup> and OH <sup>-</sup> ) in the environment.					
Environmental exposu	re for other uses					
<ul> <li>The operation protection or u</li> <li>Lime is an inguin soil, wastew</li> <li>Lime is specifi</li> </ul>	rban soil treatment redient and chemically bou ater or surface water	agement measures are le und into a matrix. Release 2-free breathable air, upor	ess stringent than thos as are negligible and i	se outlined for agricultural soil nsufficient to cause a pH-shift Such applications only relates		

• Neutralisation/pH-shift is the intended use and there are no additional impacts beyond those desired.



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#### 4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. This has to be done by showing that they limit the inhalation and dermal exposure to a level below the respective DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (<u>www.ebrc.de/mease.html</u>) to estimate the associated exposure. The dustiness of the substance used can be determined according to the MEASE glossary. For example, substances with a dustiness less than 2.5 % according to the Rotating Drum Method (RDM) are defined as "low dusty", substances with a dustiness less than 10 % (RDM) are defined as "medium dusty" and substances with a dustiness ≥10 % are defined as "high dusty".

#### DNEL<sub>inhalation</sub>: 1 mg/m<sup>3</sup> (as respirable dust)

Important note: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m<sup>3</sup>. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).



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# ES number 9.11: Professional uses of articles/containers containing lime substances

1. Title		
Free short title	Professional uses of articles/containers containi	ng lime substances
Systematic title based on use descriptor	SU23, AC1, AC2, AC3, AC4, AC5, AC6, AC7, AC8, AC	
Processes, tasks and/or activities covered	(appropriate PROCs and ERCs are given in Sec Processes, tasks and/or activities covered are d	
Assessment Method	The assessment of inhalation exposure is based	d on the exposure estimation tool MEASE.
2. Operational con	ditions and risk management measu	res
PROC/ERC	REACH definition	Involved tasks
PROC 0	Other proces (PROC 21 (low emission potential) as proxy for exposure estimation)	or oxide/preparations as CO <sub>2</sub> absorbents (e. breathing apparatus)
PROC 21	Low energy manipulation of substances bound materials and/or articles	articles
PROC 24	High (mechanical) energy work-up of substance bound in materials and/or articles	Grinding, mechanical cutting
PROC 25	Other hot work operations with metals	Welding, soldering
ERC10, ERC11, ERC 12	Wide dispersive indoor and outdoor use of long life articles and materials with low release	g- Calcium oxide bound into or onto articles ar materials such as: wooden and plast construction and building materials (e.g. gutter drains), flooring, furniture, toys, leather product paper and cardboard products (magazine books, news paper and packaging paper electronic equipment (casing)
2.1 Control of wor	kers exposure	
Product characteristic		
is reflected by an assign at ambient temperature temperature based, takir	ment of a so-called fugacity class in the MEASE the fugacity is based on the dustiness of that sub ing into account the process temperature and the d on the level of abrasion instead of the substance	ential is one of the main exposure determinants. Th tool. For operations conducted with solid substance ostance. Whereas in hot metal operations, fugacity melting point of the substance. As a third group, hig e intrinsic emission potential.
PROC	Used in preparation? Content i preparation	in Physical form Emission potential
PROC 0	not restricted	massive objects low (pellets), low potential for dust formation due to abrasion during previous filling and handling activities of pellets, not during use of breathing apparatus abrasive potential)
PROC 21	not restricted	massive objects very low
PROC 24, 25	not restricted	massive objects high
Amounts used		
combination of the scale		ne exposure as such for this scenario. Instead, the of containment/automation (as reflected in the PRO



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Frequency and duration	on of use/exposure			
PROC	Duration of exposure			
PROC 0	480 (not restricted as far as occupation duration may be restricted due the			
PROC 21	480 minutes (not restricted)			
PROC 24, 25	≤ 240 minutes			
Human factors not inf	luenced by risk management			
The shift breathing volu	me during all process steps reflected	in the PROCs	is assumed to be 10 m <sup>3</sup> /sl	nift (8 hours).
Other given operation	al conditions affecting workers exp	osure		
exposure assessment in temperatures are expect	ducted processes. In process steps on n MEASE is however based on the ra- ted to vary within the industry the high cess temperatures are automatically of	atio of process hest ratio was t	temperature and melting aken as a worst case ass	point. As the associated umption for the exposure
<b>Technical conditions</b>	and measures at process level (sou	irce) to prever	nt release	
Risk management mea required in the processe	sures at the process level (e.g. conta	ainment or seg	regation of the emission s	source) are generally not
Technical conditions	and measures to control dispersior	n from source	towards the worker	
PROC	Level of separation	Localised controls (LC)	Efficiency of LC (according to MEASE)	Further information
PROC 0, 21, 24, 25	Any potentially required separation of workers from the emission source is indicated above under "Frequency and duration of exposure". A reduction of		na	-
Organisational measu	res to prevent /limit releases, dispe	ersion and exp	oosure	
These measures involve eating and smoking at the	stion. General occupational hygiene n e good personal and housekeeping p ne workplace, the wearing of standard and of work shift. Do not wear contami	oractices (i.e. re working clothes	egular cleaning with suital s and shoes unless otherw	ole cleaning devices), no



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PROC	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further persona protective equipment (PPE)
PROC 0, 21	not required	na		Eye protection equipment (e.g goggles or visors) mus
PROC 24, 25	FFP1 mask	be worn, unless potential contact with the eye can be excluded by the nature and type of application (i.e. closed process). Additionally, face protection, protective clothing and safety shoes are required to be worn as appropriate. el: The duration of work		
resistance and mass of considered that the wo For reasons as given a the use of RPE), (ii) ha hair). The recommende contours of the face pr The employer and self devices and the mana policy for a respiratory An overview of the APP	f-employed persons have le agement of their correct use protective device programm Fs of different RPE (accordi	he increased thermal stre bls and of communicating erefore be (i) healthy (esp istics reducing leakages b on a tight face seal will no egal responsibilities for the in the workplace. There he including training of the ing to BS EN 529:2005) ca	ss by enclosing the head are reduced during the we ecially in view of medical between face and mask (in of provide the required pro- e maintenance and issue fore, they should define a workers.	d. In addition, it shall be earing of RPE. problems that may affec n view of scars and facia tection unless they fit the of respiratory protective and document a suitable
2.2 Control of en	vironmental exposur	е		
Product characteristi	cs			
Lime is chemically bou	ind into/onto a matrix with ve	ery low release potential		
3. Exposure estir	mation and reference	to its source		
Occupational exposu	ire			
is the quotient of the r demonstrate a safe us	on tool MEASE was used for refined exposure estimate a e. For inhalation exposure, ve inhalation exposure estir	and the respective DNEL the RCR is based on the	(derived no-effect level) a DNEL for calcium oxide of	and has to be below 1 to of 1 mg/m³ (as respirable
	in since the respirable fraction	on being a sub-fraction of	the inhalable fraction acc	ording to EN 481.
additional safety margi				
additional safety margi	in since the respirable fraction Method used for inhalation exposure	on being a sub-fraction of Inhalation exposure	the inhalable fraction acc Method used for dermal exposure	ording to EN 481. Dermal exposure estimate (RCR)
additional safety margi PROC PROC 0	in since the respirable fraction Method used for inhalation exposure assessment	on being a sub-fraction of Inhalation exposure estimate (RCR)	the inhalable fraction acc Method used for dermal exposure assessment Since calcium oxide is skin, dermal exposure ha	Dermal exposure estimate (RCR) classified as irritating to as to be minimised as fa
additional safety margi PROC PROC 0 PROC 21	Method       used       for         inhalation       exposure         assessment       MEASE (PROC 21)	Inhalation exposure estimate (RCR) 0.5 mg/m <sup>3</sup> (0.5)	the inhalable fraction acc Method used for dermal exposure assessment Since calcium oxide is skin, dermal exposure has as technically feasible. A has not been derived. T	Dermal exposur estimate (RCR) classified as irritating t as to be minimised as fa . DNEL for dermal effect 'hus, dermal exposure i
	In since the respirable fraction         Method       used       for         inhalation       exposure         assessment         MEASE (PROC 21)         MEASE	on being a sub-fraction of Inhalation exposure estimate (RCR) 0.5 mg/m <sup>3</sup> (0.5) 0.05 mg/m <sup>3</sup> (0.05)	the inhalable fraction acc Method used for dermal exposure assessment Since calcium oxide is skin, dermal exposure ha as technically feasible. A	Dermal exposur estimate (RCR) classified as irritating t as to be minimised as fa . DNEL for dermal effect 'hus, dermal exposure i



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#### DNEL<sub>inhalation</sub>: 1 mg/m<sup>3</sup> (as respirable dust)

Important note: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m<sup>3</sup>. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).



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# ES number 9.12: Consumer use of building and construction material (DIY – do it yourself)

<b>F (</b> )	-	(0)					
Exposure Scenario	Format	(2) add	iressin	g uses carried out b	y consur	ners	
1. Title							
Free short title			Consu	mer use of building and	constructio	on material	
Systematic title ba	sed on	use		<b>4</b>			
descriptor			-	PC9a, PC9b, ERC8c, E			
Processes, tasks acti	vities co	vered	Applica	ng (mixing and filling) of ation of liquid, pasty lime			
				health:			
Assessment Method*		as exp Dutch		lation expo 992).	sure to dust has	dermal exposure as well s been assessed by the ided.	
2. Operational cor	dition	s and i					
RMM				ated risk management r		re in place	
		escrint	ion of a	ctivity referring to an	ticle cated	ories (AC) and	environmental release
PC/ERC			es (ERC		liolo oalog		
	N	/lixing ar	nd loadin	g of powder containing	lime substa	ances.	
PC 9a, 9b				e plaster, putty or slurry			
	F	ost-app	lication e	exposure.		-	
	V	Vide dist	persive in	ndoor use resulting in in	clusion into	o or onto a matrix	
	V	, Vide dis	persive c	outdoor use of processir	ng aids in o	pen systems	
ERC 8c, 8d, 8e, 8f	V	Vide dis	persive c	outdoor use of reactive s	substances	in open systems	
				outdoor use resulting in			
2.1 Control of con	sumer	s expo	sure				
Product characteristic							
Description of the	•	ntration	of the	Physical state of	Dustine	ss (if relevant)	Packaging design
preparation	substa	nce ir	n the	the preparation	Dustine		r donuging design
Lime substance	100 %	ation		Solid, powder	High m	edium and low,	Bulk in bags of up to
Plaster. Mortar	20-40%			Solid, powder			
Flaster, Mortal	20-40%	)		Solia, powdei	lime	depending on the kind of 35 kg. lime substance	
						ve value from	
						ct sheet see	
					section 9		
Plaster, Mortar	20-40%	5		Pasty	-		-
Putty, filler	30-55%			Pasty, highly	-		In tubes or buckets
r dity, mor	00 00 /	,		viscous, thick liquid	-		
Pre-mixed lime wash	~30%			Solid, powder	High - lo	w	Bulk in bags of up to
paint	20,0			,		ve value from	35 kg.
1 · ·						ct sheet see	3
					section 9		
Lime wash paint/milk	~ 30 %			Milk of lime	-	,	-
of lime preparation				preparation			
Amounts used							
Description of	the	Amour	nt used	per event			
preparation		050 -	4 1				
Filler, putty				wder (2:1 powder water		lle al ana an stars t	the denth and -'ful
					unt is heav	ily dependent on	the depth and size of the
Diastan/line coursels as 1.1			s to be filled.				
			g depending on the size of the room, wall to be treated.				
Floor/wall equalizer				ing on the size of the ro	om, wall to	be equalized.	
Frequency and duration	on of use	exposi			4		
Description of task				on of exposure per ev		frequency of e	vents
Mixing and loading of	lime con	tainina		min (DIY1-fact sheet		0/	- ( - k ()
powder.				er 2.4.2 Mixing and lo	bading of	2/year (DIY1 fac	ct sneet)
			powde	rs)			
Application of lime pl slurry to the walls or cei	aster, pu	utty or	Severa	al minutes - hours		2/year (DIY1 fac	ct sheet)
	1111111						



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Human factors not influenced by risk management								
Description of the task	Populat	ion exposed	Breathing ra	te	Exposed body part		Corresponding skin area [cm²]	
Handling of powder	Adult		1.25 m³/hr		Half of both hands		430 (DIY <sup>1</sup> fact sheet)	
Application of liquid, pasty lime preparations.	Adult		NR		Hands and forearms	;	1900 (DIY <sup>1</sup> fact sheet)	
Other given operationa	al condition	ons affecting	consumers exp	osure			•	
Description of the task		Indoor/outdo			volume	Air	exchange rate	
Handling of powder		indoor			personal space, small round the user)	0.6	hr <sup>-1</sup> (unspecified room)	
Application of liquid, pa preparations.	asty lime	indoor		NR		NR		
Conditions and measu	ires relate	ed to information	on and behavio	oural adv	vice to consumers			
						es wh	ich apply to professional	
<ul> <li>Change wet c</li> </ul>	lothing, sh	noes and gloves	immediately.					
be used in ac	cordance		ection plan (skin				on products which should eanse the skin thoroughly	
Conditions and measu								
In order to avoid health workplaces:	damage [	DIYers should c	omply with the	same str	ict protective measure	es wh	ich apply to professional	
	na or mixi	ina buildina mai	terials. during d	lemolitior	n or caulking and, abo	ve al	I, during overhead work,	
		as well as face					, ,	
Choose work	gloves c	arefully. Leathe	er gloves beco	me wet	and can facilitate but	rns. ۱	When working in a wet	
environment,	cotton glo	oves with plastic	c covering (nitr	ile) are b	better. Wear gauntlet gether which permeates the w	glove	s during overhead work	
	_			unnuity	which permeates the w	VOIKII	ig clothes.	
2.2 Control of env		ital exposu	e					
Product characteristic								
Not relevant for exposur	re assessr	nent						
Amounts used*								
Not relevant for exposur		nent						
Frequency and duration Not relevant for exposure		nont						
Environment factors n			nagomont					
Default river flow and di		iceu by fisk fild	anagement					
Other given operationa		ons affecting e	nvironmental	avnosur	9			
Indoor		ons ancomy c	invironmentar	chposur	<b>v</b>			
Direct discharge to the	vastewate	r is avoided						
Conditions and measu			sewage treat	nent pla	nt			
Default size of municipa								
Conditions and measu								
Not relevant for exposur								
Conditions and measu			recoverv of wa	ste				
Not relevant for exposur								
3. Exposure estim			e to its sour	ce				
					ure estimate and the r	respe	ctive DNEL (derived no-	
							he acute DNEL for lime	
							ble dust). Thus, the RCR	
0,00	• •	,					tion according to EN 481.	
Since limes are classifie	d as irritat	ing to skin and	eyes a qualitativ	ve asses	sment has been perfor	med	for dermal exposure and	

exposure to the eye.



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Human expose Handling of p			
Route exposure		Exposure estimate	Method used, comments
Oral		-	Qualitative assessment
			Oral exposure does not occur as part of the intended product use.
Dermal	:	small task: 0.1 µg/cm <sup>2</sup>	Qualitative assessment
		(-)	If risk reduction measures are taken into account no human exposure is
		large task: 1 µg/cm <sup>2</sup> (-)	expected. However, dermal contact to dust from loading of lime substances
			or direct contact to the lime cannot be excluded if no protective gloves are worn during application. This may occasionally result in mild irritation easily avoided by prompt rinsing with water.
			Quantitative assessment
			The constant rate model of ConsExpo has been used. The contact rate to
_			dust formed while pouring powder has been taken from the DIY <sup>1</sup> -fact shee (RIVM report 320104007).
Eye	1	Dust	Qualitative assessment
			If risk reduction measures are taken into account no human exposure is
			expected. Dust from loading of the lime substances cannot be excluded if no
			protective goggles are used. Prompt rinsing with water and seeking medica advice after accidental exposure is advisable.
Inhalation		Small task: 12 µg/m <sup>3</sup>	Quantitative assessment
minalation		(0.003)	Dust formation while pouring the powder is addressed by using the dutch
		Large task: 120 µg/m <sup>3</sup>	model (van Hemmen, 1992, as described in section 9.0.3.1 above).
		(0.03)	
Application o		pasty lime preparation	S.
Route	of	Exposure estimate	Method used, comments
exposure			
Oral	-	-	Qualitative assessment
			Oral exposure does not occur as part of the intended product use.
Dermal		Splashes	Qualitative assessment
			If risk reduction measures are taken into account no human exposure is
			expected. However, splashes on the skin cannot be excluded if no protective
			gloves are worn during the application. Splashes may occasionally result in mild irritation easily avoided by immediate rinsing of the hands with water.
Eye		Splashes	Qualitative assessment
Lye		Spiasiles	If appropriate goggles are worn no exposure to the eyes needs to be
			expected. However, splashes into the eyes cannot be excluded if no
			protective goggles are worn during the application of liquid or pasty lime
			preparations, especially during overhead work. Prompt rinsing with water and
			seeking medical advice after accidental exposure is advisable.
Inhalation		-	Qualitative assessment
			Not expected, as the vapour pressure of limes in water is low and generation
			of mists or aerosols does not take place.
Post-applicat			
			queous lime preparation will quickly convert to calcium carbonate with carbor
dioxide from th			
Environment			
			comment to avoid discharging lime solutions directly into municipal wastewater
		Ji a municidal Wastewate	er treatment plant is circum-neutral and therefore, there is no exposure to the
			instantation transmont plant is often neutralized anyway and lime may aver be
biological activ	vity. The	influent of a municipal v	vastewater treatment plant is often neutralized anyway and lime may even be
biological activ	vity. The ally for pH	influent of a municipal w I control of acid wastewa	vastewater treatment plant is often neutralized anyway and lime may even be ater streams that are treated in biological WWTPs. Since the pH of the influer ral, the pH impact is negligible on the receiving environmental compartments



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# ES number 9.13: Consumer use of CO<sub>2</sub> absorbent in breathing apparatuses

Exposure S	cenario .	Format (2) add	lressin	g uses carried out b	y consui	ners	
1. Title							
Free short tit	le			Consumer use of CO <sub>2</sub>	absorbent	in breathing app	aratuses
Systematic title based on use descriptor				SU21, PC2, ERC8b		in broating upp	
Processes, ta	asks activ	vities covered		Filling of the formulatio	n into the	cartridge	
,				Use of closed circuit br			
				Cleaning of equipment			
Assessment	Method*			Human health			
					nent has	been performed	d for oral and dermal
							ssed by the Dutch model
				(van Hemmen, 1992).			
				Environment			
				A qualitative justificatio			
				c management m			
RMM							14-18%) is added which
					e breathin	g cycle calcium di	hydroxide will be quickly
		with CO <sub>2</sub> to form			<u> </u>		(
PC/ERC				to article categories (A			
PC 2							lime as CO <sub>2</sub> absorbent.
							ed by water and sodium
		e) with the calciur of oxygen.	nunyaro	UNUE IO IUITI ITIE CARDONA	ale. The C	$O_2$ -mee an can be	re-breathed again, after
			: The ab	sorbent will be discarded	d after eac	h use and refilled	before each dive
ERC 8b				ng in inclusion into or on			
		onsumers ex		*			
Product char			poou				
Description		Concentration	of the	Physical state of	Dustine	ss (if relevant)	Packaging design
preparation	or the	substance in		the preparation	Dustness (in relevant		i ackaying design
propulation		preparation		the preparation			
CO <sub>2</sub> absorber	nt	78 - 84%		Solid, granular	Very I	ow dustiness	4.5, 18 kg canister
2	-	Depending or	n the	, <b>j</b>	(reductio		, - <b>3</b>
		application the				ed to powder)	
		component	has			rmation cannot	
		different additiv				out during the	
		A specific amo			filling of the scrubber		
		water is always	added		cartridge	).	
"I I I" OO I	h a a she a sa t	(14-18%).		O all'al anno a da n			4.0 by is breathing
"Used" CO <sub>2</sub> al	osorbent	~ 20%		Solid, granular	Very low dustiness		1-3 kg in breathing
				(reduction by compared to powd			apparatus
Amounts use	be	<u> </u>			compare		
		breathing appara	tus	1-3 kg depending on th	e kind of I	preathing apparat	us
		on of use/exposi		s ng ang on ang on a			· ·
Description of				on of exposure per eve	ent	frequency of e	vents
		ation into the		33  min per filling, in sum  < 15  min			e (up to 4 times)
cartridge							,
Use of clo	osed cire	cuit breathing	1-2 h			Up to 4 dives a	day
apparatus							
Cleaning and			< 15 m			After each dive	(up to 4 times)
		uenced by risk r					
Description	of the	Population exp	osed	Breathing rate	Expose	d body part	Corresponding skin
task	d	م وار را ا		4 OF ma2/len /lent t	hay de		area [cm <sup>2</sup> ]
Filling of		adult		1.25 m <sup>3</sup> /hr (light	hands		840
formulation i	πιο της			working activity)			(REACH guidance
cartridge Use of close	d circuit						R.15, men)
					-		-
breathing app Cleaning					hands		840
emptying	and of				hands		(REACH guidance
equipment	U						R.15, men)
	operation	al conditions aff	ecting o	consumers exposure			
Description of			or/outdo		volume	Air	exchange rate
Description			.,				eneriange rate



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Filling of the formula	tion into the	NR	NR	NR						
cartridge										
Use of closed circu	it breathing	-	-	-						
apparatus										
	nptying of	NR	NR	NR						
equipment										
			d behavioural advice to co	nsumers						
		clothing. Do not breat								
Keep container tight	y closed as to	avoid the soda lime	to dry out.							
Keep out of reach of										
Wash thoroughly after		income all at a loculitie on law		al a dhúa a						
Do not mix with acids		immediately with pier	nty of water and seek medic							
		ho broathing apparatu	is to assure a proper use of	the breathing apparatus						
		d to personal protect		the breathing apparatus.						
				ng half mask (mask type FFP2 acc. to EN						
149).	, yoyyies an	a protective clothes a	uning nanuling. Ose a mem	ig hall mask (mask type FFF2 acc. to EN						
		antal avecasion								
		nental exposure	8							
Product characteris										
Not relevant for expo	sure assessr	nent								
Amounts used*										
Not relevant for expo		nent								
Frequency and dura										
Not relevant for expo										
		ced by risk manage	ment							
Default river flow and										
	onal condition	ons affecting enviror	nmental exposure							
Indoor										
		d to municipal sewa								
Default size of munic	ipal sewage s	system/treatment plan	t and sludge treatment tech	nique						
			ent of waste for disposal							
Not relevant for expo										
Conditions and mea	asures relate	d to external recover	ery of waste							
Not relevant for expo	sure assessr	nent								
3. Exposure es	stimation	and reference	to its source							
				ate and the respective DNEL (derived no-						
				R is based on the acute DNEL for lime						
				stimate (as inhalable dust). Thus, the RCR						
				the inhalable fraction according to EN 481.						
Since lime substance	es are classif	ied as irritating to skir	n, and eyes a qualitative as	sessment has been performed for dermal						
exposure and exposi				·						
Due to the very spec	ialised kind c	of consumers (divers f	illing their own CO2 scrubbe	er) it can be assumed that instructions will						
be taken into accoun	t to reduce ex	posure								
Human exposure										
Filling of the formu										
Route of exposure	Exposure	estimate	Method used, comme							
Oral	-		Qualitative assessment							
				occur as part of the intended product use.						
Dermal	-		Qualitative assessment							
				ures are taken into account no human						
				However, dermal contact to dust from						
1				da lime or direct contact to the granules						
				f no protective gloves are worn during						
				occasionally result in mild irritation easily						
- Fue	Duct		avoided by prompt rins							
Eye	Dust		Qualitative assessment							
				ures are taken into account no human						
				Dust from loading of the granular soda lime						
				al, therefore eye exposure will be minimal						
1		even without protective goggles. Nevertheless, prompt rinsi								
				e goggles. Nevertneless, prompt rinsing medical advice after accidental exposure						



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Large task: 12 µg/m³ (0.003) breathing apparatus Exposure estimate	Dust formation while pouring the powder is addressed by using the dutch model (van Hemmen, 1992, as described in section 9.0.3.1 above) and applying a dust reduction factor of 10 for the granular form.  Method used, comments
breathing apparatus Exposure estimate -	<ul><li>9.0.3.1 above) and applying a dust reduction factor of 10 for the granular form.</li><li>Method used, comments</li></ul>
breathing apparatus Exposure estimate -	granular form. Method used, comments
breathing apparatus Exposure estimate -	Method used, comments
Exposure estimate	
-	
	Qualitative assessment
	Oral exposure does not occur as part of the intended product use
-	Qualitative assessment
	Due to the product characteristics, it can be concluded that derma
	exposure to the absorbent in breathing apparatuses is non
	existent.
-	Qualitative assessment
	Due to the product characteristics, it can be concluded that ever
	exposure to the absorbent in breathing apparatuses is non existent.
nealiaible	Qualitative assessment
	Instructional advice is provided to remove any dust before
	finishing the assembly of the scrubber. Divers filling their own CO
	scrubber represent a specific subpopulation within consumers
	Proper use of equipment and materials is in their own interest
	hence it can be assumed that instructions will be taken into
	account.
	Due to the product characteristics and the instructional advices given, it can be concluded that inhalation exposure to the
	absorbent during the use of the breathing apparatus is negligible
ng of equipment	
Exposure estimate	Method used, comments
-	Qualitative assessment
	Oral exposure does not occur as part of the intended product use
Dust and splashes	Qualitative assessment
	If risk reduction measures are taken into account no human
	exposure is expected. However, dermal contact to dust from emptying granular soda lime or direct contact to the granule:
	cannot be excluded if no protective gloves are worn during
	cleaning. Furthermore, during the cleaning of the cartridge with
	water contact to moistened soda lime may occur. This may
	occasionally result in mild irritation easily avoided by immediate
	rinsing of with water.
Dust and splashes	Qualitative assessment
	If risk reduction measures are taken into account no human
	exposure is expected. However, contact to dust from emptying
	granular soda limes or during the cleaning of the cartridge wit
	water contact to moisten soda limes may occur in very rare occasions. Prompt rinsing with water and seeking medical advice
	after accidental exposure is advisable.
Small task: 0.3 µg/m <sup>3</sup> (7.5 x 10 <sup>-5</sup> )	Quantitative assessment
Large task: $3 \mu g/m^3 (7.5 \times 10^{-4})$	Dust formation while pouring the powder is addressed by using
	the Dutch model (van Hemmen, 1992, as described in section
	9.0.3.1 above) and applying a dust reduction factor of 10 for the
	aronular form and a factor of 4 to account for the reduced area
	granular form and a factor of 4 to account for the reduced amoun
sure	of lime in the "used" absorbent.
	negligible ng of equipment Exposure estimate - Dust and splashes Dust and splashes Dust and splashes Small task: 0.3 µg/m³ (7.5 × 10 <sup>-5</sup> )

treatment plant is often neutralized anyway and lime may even be used beneficially for pH control of acid wastewater streams that are treated in biological WWTPs. Since the pH of the influent of the municipal treatment plant is circum neutral, the pH impact is negligible on the receiving environmental compartments, such as surface water, sediment and terrestrial compartment.



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# ES number 9.14: Consumer use of garden lime/fertilizer

Exposure Scenario	Forma	at (2) add	dressin	ig uses carrie	ed out k	oy consu	mers		
1. Title									
Free short title				Consumer use	e of gard	en lime/fer	tilizer		
Systematic title based	on us	e descrip	tor	SU21, PC20,			-		
Processes, tasks acti				Manual applic			e. fertilizer		
,,				Post-applicati			-,		
Assessment Method*				Human health					
						ent has bee	en performe	d for	oral and dermal exposure
									dust exposure has been
				assessed by t					
				Environment					
				A qualitative j	ustificatio	on assessn	nent is provi	ded.	
2. Operational cor	nditio	ns and	risk m	anagement	measu	ires			
RMM No product integr						are in place.			
PC/ERC									environmental release
		categori			0		,		
PC 20					lime by :	shovel/han	d (worst ca	se) ar	nd soil incorporation.
				exposure to play			,	,	·
PC 12		Surface s	spreadin	g of the garden	lime by s	shovel/ hai	nd (worst ca	se) a	nd soil incorporation.
		Post-app	lication e	exposure to play	ying child	dren.	•		•
ERC 8e		Wide dis	persive o	outdoor use of r	eactive s	ubstances	in open sys	stems	3
2.1 Control of con	sume	ers expo	osure						
Product characteristic									
Description of the	Conc	entration	of the	Physical st	ate of	Dustine	ss (if releva	int)	Packaging design
preparation	substance in the preparation		n the	the preparation			•	,	
Garden lime	100 %	6		Solid, powder		High dusty			Bulk in bags or
						0 ,			containers of 5, 10 and
									25 kg
Fertilizer	Up to	20 %		Solid, granular		Low dust	ty		Bulk in bags or
									containers of 5, 10 and
				25 kg					25 kg
Amounts used									
Description of the pre	paratio	on		Amount used per event Source of inform					
Garden lime				100g /m <sup>2</sup> (up to 200g/m <sup>2</sup> )					and direction of use
Fertilizer				100g /m <sup>2</sup> (up to 1kg/m <sup>2</sup> (compost)) Information and direction of			and direction of use		
Frequency and duration		se/exposi					-		
Description of the task	<b>(</b>			ion of exposure per event			frequency of events		
Manual application				es-hours			1 tasks per year		
				nding on the size of the treated					
6			area						
Post-application				toddlers playing on grass (El					
there are fairly and the fi		d have also been		ure factors hand	IDOOK)		application	1	
Human factors not inf	luence	lation exp	manage		4.0	<b>-</b>			
Description of the task	Popu	liation exp	osea	Breathing ra	te	Exposed	d body part		Corresponding skin area [cm²]
	Adult			1.25 m <sup>3</sup> /br		Hondo o	Hands and forearms		1900 (DIY fact sheet)
Manual application Post-application		/Toddlers		1.25 m³/hr NR		NR	nu iureatitis		NR
Other given operation			ecting		nosure				
Description of the tasl			or/outdo			volume		۸ir	exchange rate
Manual application	•	outdo						NR	excitatige face
					ersonal space, small NR round the user)		INIX		
Post-application		outdo	or		NR			NR	
Conditions and measu	ires re			on and behavi		vice to co	nsumers	1411	
Do not get in eyes, on s								type	FEP2 acc. to EN 149)
Keep container closed a					030 a m	ching nair i		type	111 2 dec. to EN 140).
In case of contact with e					ter and s	eek medic	al advice.		
Wash thoroughly after h	<b>,</b>			picity of Wu					
Do not mix with acids a			nes to wa	ater and not wa	ter to lim	es.			
Incorporation of the gar							vill facilitate	the e	ffect.
Conditions and measu						<u> </u>			
Wear suitable gloves, g									

Wear suitable gloves, goggles and protection clothes.



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2.2 Control of e	nvironmental exposu	re	
<b>Product characteris</b>	tics		
Drift: 1 % (very worst-	-case estimate based on data	a from dust measurer	ments in air as a function of the distance from application)
Amounts used			
Amount used	Ca(OH)2	2,244 kg/ha	In professional agricultural soil protection, it is
	CaO	1,700 kg/ha	recommended not to exceed 1700 kg CaO/ha or
	CaO.MgO	1,478 kg/ha	the corresponding amount of 2244 kg
	Ca(OH)2.Mg(OH)2	2,030 kg/ha	Ca(OH) <sub>2</sub> /ha. This rate is three times the amount
	CaCO3.MgO	2,149 kg/ha	needed to compensate the annual losses of lime
	Ca(OH)2.MgO	1,774 kg/ha	by leaching. For this reason, the value of 1700
	Natural hydraulic lime	2,420 kg/ha	kg CaO/ha or the corresponding amount of 2244
		2,420 kg/11a	kg Ca(OH) <sub>2</sub> /ha is used in this dossier as the basis
			for the risk assessment. The amount used for the
			other lime variants can be calculated based on
			their composition and the molecular weight.
Frequency and dura	ation of use		
1 day/year (one appl	ication per year); Multiple a	pplications during th	e year are allowed, provided the total yearly amount of
1,700 kg/ha is not ex			
	s not influenced by risk ma	anagement	
Not relevant for expo			
	onal conditions affecting e	nvironmental expo	SUITA
Outdoor use of produ		internal expo	
Soil mixing depth: 20			
			provent release
	s and measures at proces		Drevent release
	eleases to adjacent surface v		
		or limit discharges	s, air emissions and releases to soil
Drift should be minim			
Conditions and me	asures related to municipa	I sewage treatment	t plant
Not relevant for expo	sure assessment		
Conditions and me	asures related to external	treatment of waste	for disposal
Not relevant for expo	sure assessment		
Conditions and me	asures related to external	recovery of waste	
Not relevant for expo			
	imation and reference	e to its source	
			posure estimate and the respective DNEL (derived no-
effect level) and is g substances of 1 mg/r includes an additiona Since lime substanc	iven in parentheses below. n <sup>3</sup> (as respirable dust) and th al safety margin since the res es are classified as irritating	For inhalation exposi- e respective inhalation pirable fraction is a s	sure, the RCR is based on the long-term DNEL for lime on exposure estimate (as inhalable dust). Thus, the RCR sub-fraction of the inhalable fraction according to EN 481. qualitative assessment has been performed for dermal
exposure and expos	ure to the eye.		
Human exposure			
Manual application			• •
Route of exposure	Exposure estimate	Method u	ised, comments
Oral	-		e assessment
			sure does not occur as part of the intended product use.
Dermal	Dust, powder		e assessment
			duction measures are taken into account no human
			is expected. However, dermal contact to dust from
			n of lime substances or by direct contact to the limes
			e excluded if no protective gloves are worn during
			n. Due to the relatively long application time, skin
			would be expected. This can easily be avoided by
			e rinsing with water. It would be assumed that consumers
			experience of skin irritation will protect themselves.
			, any occurring skin irritation, which will be reversible,
			sumed to be non-recurring.
Eye	Dust		e assessment
			duction measures are taken into account no human
			is expected. Dust from surfacing with lime cannot be
			if no protective goggles are used. Prompt rinsing with
			d seeking medical advice after accidental exposure is
	1	advisable	



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Inhalation (garden lime)	Small task: 12 μg/m³ (0.0012) Large task: 120 μg/m³ (0.012)	Quantitative assessment No model describing the application of powders by shovel/hand is available, therefore, read-across from the dust formation model while pouring powders has been used as a worst case. Dust formation while pouring the powder is addressed by using the dutch model (van Hemmen, 1992, as described in section 9.0.3.1 above).
Inhalation (fertilizer)	Small task: 0.24 μg/m³ (2.4 * 10 <sup>-4</sup> ) Large task: 2.4 μg/m³ (0.0024)	Quantitative assessment No model describing the application of powders by shovel/hand is available, therefore, read across from the dust formation model while pouring powders has been used as a worst case. Dust formation while pouring the powder is addressed by using the dutch model (van Hemmen, 1992, as described in section 9.0.3.1 above) and applying a dust reduction factor of 10 for the granular form and a factor of 5 to account for the reduced amount of limes in fertilizer.

#### ost-application

According to the PSD (UK Pesticide Safety Directorate, now called CRD) post-application exposure need to be addressed for products which are applied in parks or amateur products used to treat lawns and plants grown in private gardens. In this case exposure of children, who may have access to these areas soon after treatment, needs to be assessed. The US EPA model predicts the post-application exposure to products used in private gardens (e.g. lawns) by toddlers crawling on the treated area and also via the oral route through hand-to-mouth activities.

Garden lime or fertilizer including lime is used to treat acidic soil. Therefore, after application to the soil and subsequent watering the hazard driving effect of lime (alkalinity) will be quickly neutralized. Exposure to lime substances will be negligible within a short time after application.

#### Environmental exposure

No quantitative environmental exposure assessment is carried out because the operational conditions and risk management measures for consumer use are less stringent than those outlined for professional agricultural soil protection. Moreover, the neutralisation/pH-effect is the intended and desired effect in the soil compartment. Releases to wastewater are not expected.



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# ES number 9.15: Consumer use of lime substances as water treatment chemicals

Exposure Scenario For	rmat (2) a	ddressin	g uses carrie	d out by	/ consur	ners		
1. Title			<u> </u>	<u> </u>				
Free short title			Consumerus	o of limo r	substance	s as water treatr	mont chomicals	
		ntor	SU21, PC20,			s as water treat	Herit Chemicais	
Systematic title based on Processes, tasks activitie		ptor		g or re-fill	ing of soli	d formulations i	nto container/preparation	
Assessment Method*	A qualitative a as well as for the Dutch mod Environment:	Human health: A qualitative assessment has been performed for oral and dermal exposure as well as for exposure of the eye. Dust exposure has been assessed by the Dutch model (van Hemmen, 1992).						
2. Operational cond	ditions	and risl						
RMM						sures are in plac	ce.	
PC/ERC	Descr	ption of a	activity referrin				environmental release	
Transfer of lime s Dropwise applicat			ng (transfer of lir substances (soli ation of lime milk	d) into co to water.	ntainer for	further application	or for water treatment. ion.	
ERC 8b			indoor use of rea	active sub	ustances II	n open systems		
2.1 Control of cons	umers	exposu	ire					
Product characteristic								
preparation su pr	Concentration of the substance in the preparation		Physical st the preparati	ion	Dustiness (if relevant)		Packaging design	
Water treatment Up chemical	Up to 100 %		Solid, fine pov	wder	high dustiness (indicative value from DIY fact sheet see section 9.0.3)		Bulk in bags or buckets/containers.	
Water treatment Up chemical	Up to 99 %		Solid, granu different size (D50 value 0. D50 value 1.7 D50 value 3.0	7 75	low dustiness (reduction by 10% compared to powder)		Bulk-tank lorry or in "Big Bags" or in sacks	
Amounts used								
Description of the prepara	tion		Amount used	per eve	nt			
Water treatment chemical aquaria		actor for	depending on the size of the water reactor to be filled (~ 100g /L)					
Water treatment chemical drinking water		actor for	depending on the size of the water reactor to be filled (~up to 1.2 kg/L)					
Lime milk for further applica	tion		~ 20 g / 5L					
Frequency and duration o	f use/expo							
Description of task		Durati	ion of exposure	e per eve	nt	frequency of	events	
Preparation of lime milk (loa and refilling)	ading, fillin	DIY-fa	act sheet, RIVI			1 task/month 1task/week	ask/month	
Dropwise application of lin water	me milk t		al minutes - hou			1 tasks/ month	1	
Human factors not influen	ced by ris	k manage	ment					
	opulation e		Breathing ra	te	Expos	ed body part	Corresponding skin area [cm <sup>2</sup> ]	
	lult		1.25 m³/hr		Half of	both hands	430 (RIVM report 320104007)	
<u> </u>	lult		NR		Hands		860 (RIVM report 320104007)	
Other given operational co	onditions a	ffecting	consumers exp	oosure			. ,	
Description of the task		loor/outdo			volume	Ai	r exchange rate	
Preparation of lime milk (loa	or 1 m <sup>3</sup> (personal space, small area around the user) indoor)							



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Dropwise application	of lime milk	indoor		NR		NR			
to water	0								
	asures relate	d to information a	nd behavio	oural advice to cor	sumers				
Conditions and mea Do not get in eyes, o Keep container close Use only with adequa In case of contact with Wash thoroughly afte Do not mix with acide Conditions and mea Wear suitable gloves 2.2 Control of Product characteris Not relevant for expoo Amounts used* Not relevant for expoo Frequency and dura Not relevant for expoo Environment factor Default river flow and Other given operati Indoor	n skin, or on ed and out of ate ventilation th eyes, rinse er handling. s and always asures relate s, goggles and environm stics sure assessm ation of use sure assessm s not influen d dilution	clothing. Do not bre reach of children. immediately with p add limes to water d to personal prod protective clothes. nental exposu ment nent ced by risk manage	eathe dust lenty of wat and not wat tection and Use a filter IFE gement	er and seek medica er to limes. I hygiene ring half mask (mas	l advice.	2 acc. to EN 149).			
Conditions and mea	asures relate	d to municipal set	wage treat	nent plant					
Default size of munic					iaue				
Conditions and me									
Not relevant for expo				and the second					
Conditions and me			overv of wa	ste					
Not relevant for expo									
3. Exposure es			e to ite	Source					
includes an additiona	al safety marg es are classif	in since the respiration in since the respiration in the second	ole fraction i	s a sub-fraction of the	ne inhalable	nhalable dust). Thus, the RCR e fraction according to EN 481. as been performed for dermal			
Preparation of lime	milk (loading	g)							
Route of exposure	Exposure	estimate	Metl	hod used, commer	nts				
Oral	-		Oral		occur as pa	art of the intended product use.			
Dermal (powder)       small task: 0.1 µg/cm² (-)       Qualitative assessment         Iarge task: 1 µg/cm² (-)       If risk reduction measures are taken into account no hur exposure is expected. However, dermal contact to dust f loading of limes or direct contact to the lime cannot be excluif no protective gloves are worn during application. This is occasionally result in mild irritation easily avoided by pro rinsing with water.         Quantitative assessment       The constant rate model of ConsExpo has been used. contact rate to dust formed while pouring powder has been ta from the DIY-fact sheet (RIVM report 320104007). For grant the exposure estimate will be even lower.									
					(RIVM rep	ort 320104007). For granules			
Еуе	Dust		the e Qua If ris expo exclu	exposure estimate v litative assessment sk reduction measu psure is expected. I uded if no protectiv	(RIVM rep vill be even ures are ta Dust from le e goggles	ort 320104007). For granules			



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Inhalation		Small task: 1.2 µg/m <sup>3</sup> (0.0003)	Quantitative assessment
(granules)		Large task: 12 µg/m³ (0.003)	Dust formation while pouring the powder is addressed by using the Dutch model (van Hemmen, 1992 as described in section 9.0.3.1 above) and applying a dust reduction factor of 10 for the granular form.
Dropwise app	olicatio	on of lime milk to water	
Route	of	Exposure estimate	Method used, comments
exposure			
Oral		-	Qualitative assessment
			Oral exposure does not occur as part of the intended product use.
Dermal		Droplets or splashes	Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, splashes on the skin cannot be excluded if no protective gloves are worn during application. Splashes may occasionally result in mild irritation easily avoided by immediate rinsing of the hands in water.
Eye		Droplets or splashes	Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, splashes into the eyes cannot be excluded if no protective goggles are worn during the application. However, it is rare for eye irritation to occur as a result of exposure to a clear solution of calcium hydroxide (lime water) and mild irritation can easily be avoided by immediate rinsing of the eyes with water.
Inhalation		-	Qualitative assessment Not expected, as the vapour pressure of limes in water is low and generation of mists or aerosols does not take place.
Environmenta	al expo	osure	
plant is often r treated in biolo	neutrali ogical \	ized anyway and lime may even be WWTPs. Since the pH of the influen	ed to be negligible. The influent of a municipal wastewater treatment used beneficially for pH control of acid wastewater streams that are t of the municipal treatment plant is circum neutral, the pH impact is such as surface water, sediment and terrestrial compartment.



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# ES number 9.15: Consumer use of cosmetics containing lime substances

Exposure Scenario Form	at (2) addressin	g uses carried out by consumers							
1. Title									
Free short title		Consumer use of cosmetics containing limes							
Systematic title based on us	e descriptor	SU21, PC39 , ERC8a							
Processes, tasks activities	covered	•							
Assessment Method*		Human health: According to Article 14(5) (b) of regulation (EC) 1907/2006 risks to human health need not be considered for substances included in cosmetic products within the scope of Directive 76/768/EC. Environment A qualitative justification assessment is provided.							
2. Operational conditio	ns and risk m								
ERC 8a	Wide dispersive i	indoor use of processing aids in open systems							
2.1 Control of consume	ers exposure								
Product characteristic									
	nan nealth from this	s use does not need to be considered.							
Amounts used	1 14 4 17								
,		s use does not need to be considered.							
Frequency and duration of u									
		s use does not need to be considered.							
Human factors not influence									
		s use does not need to be considered.							
Other given operational con									
		s use does not need to be considered.							
		on and behavioural advice to consumers							
Not relevant, as the risk to hun	nan health from this	s use does not need to be considered.							
Conditions and measures re	lated to personal	protection and hygiene							
Not relevant, as the risk to hun	nan health from thi	s use does not need to be considered.							
2.2 Control of environm	nental exposu	re							
Product characteristics									
Not relevant for exposure asse	ssment								
Amounts used*									
Not relevant for exposure asse	essment								
Frequency and duration of u									
Not relevant for exposure asse									
Environment factors not infl		anagement							
Default river flow and dilution	uchiced by fisk fill	anagement							
Other given operational cond	ditions affecting a	provincemental expersure							
Indoor	and the anecting e	anvironmental exposure							
Conditions and measures re	lated to municipe	I sowage treatment plant							
Default size of municipal sewage system/treatment plant and sludge treatment technique Conditions and measures related to external treatment of waste for disposal									
		treatment of waste for disposal							
Not relevant for exposure assessment									
Conditions and measures related to external recovery of waste									
Not relevant for exposure asse									
3. Exposure estimation	and reference	e to its source							
Human exposure									
		by other legislation and therefore need not be addressed under regulation							
(EC) 1907/2006 according to A	Article 14(5) (b) of t	his regulation.							
Environmental exposure									
plant is often neutralized anyw treated in biological WWTPs.	ay and lime may e Since the pH of the	expected to be negligible. The influent of a municipal wastewater treatment even be used beneficially for pH control of acid wastewater streams that are a influent of the municipal treatment plant is circum neutral, the pH impact is tments, such as surface water, sediment and terrestrial compartment.							

End of the safety data sheet



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## **APPENDIX: EXPOSURE SCENARIOS**

The current document includes all relevant occupational and environmental exposure scenarios (ES) for the production and use of calcium magnesium oxide as required under the REACH Regulation (Regulation (EC) No 1907/2006). For the development of the ES the Regulation and the relevant REACH Guidance have been considered. For the description of the covered uses and processes, the "R.12 – Use descriptor system" guidance (Version: 2, March 2010, ECHA-2010-G-05-EN), for the description and implementation of risk management measures (RMM) the "R.13 – Risk management measures" guidance (Version: 1.1, May 2008), for the occupational exposure estimation the "R.14 – Occupational exposure estimation" guidance (Version: 2, May 2010, ECHA-2010-G-09-EN) and for the actual environmental exposure assessment the "R.16 – Environmental Exposure Assessment" (Version: 2, May 2010, ECHA-10-G-06-EN) was used.

### Methodology used for environmental exposure assessment

The environmental exposure scenarios only address the assessment at the local scale, including municipal sewage treatment plants (STPs) or industrial waste water treatment plants (WWTPs) when applicable, for industrial and professional uses as any effects that might occur is expected to take place on a local scale.

### 1) Industrial uses (local scale)

The exposure and risk assessment is only relevant for the aquatic environment, when applicable including STPs/WWTPs, as emissions in the industrial stages mainly apply to (waste) water. The aquatic effect and risk assessment only deal with the effect on organisms/ecosystems due to possible pH changes related to OH<sup>-</sup> discharges. The exposure assessment for the aquatic environment only deals with the possible pH changes in STP effluent and surface water related to the OH<sup>-</sup> discharges at the local scale and is performed by assessing the resulting pH impact: the surface water pH should not increase above 9 (In general, most aquatic organisms can tolerate pH values in the range of 6-9).

Risk management measures related to the environment aim to avoid discharging calcium magnesium oxide solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. Discharges should be carried out such that pH changes in receiving surface waters are minimised. The effluent pH is normally measured and can be neutralised easily, as often required by national laws.

## 2) Professional uses (local scale)

The exposure and risk assessment is only relevant for the aquatic and terrestrial environment. The aquatic effect and risk assessment is determined by the pH effect. Nevertheless, the classical risk characterisation ratio (RCR), based on PEC (predicted environmental concentration) and PNEC (predicted no effect concentration) is calculated. The professional uses on a local scale refer to applications on agricultural or urban soil. The environmental exposure is assessed based on data and a modelling tool. The modelling FOCUS/ Exposit tool is used to assess terrestrial and aquatic exposure (typically conceived for biocidal applications).

Details and scaling approach indications are reported in the specific scenarios.



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#### Methodology used for occupational exposure assessment

By definition an exposure scenario (ES) has to describe under which operational conditions (OC) and risk management measure (RMMs) the substance can be handled safely. This is demonstrated if the estimated exposure level is below the respective derived no-effect level (DNEL), which is expressed in the risk characterisation ratio (RCR).

For workers, the repeated dose DNEL for inhalation as well as the acute DNEL for inhalation are based on the respective recommendations of the scientific committee on occupational exposure limits (SCOEL) being 1 mg/m<sup>3</sup> and 4 mg/m<sup>3</sup>, respectively.

In cases where neither measured data nor analogous data are available, human exposure is assessed with the aid of a modelling tool. At the first tier screening level, the MEASE tool (<u>http://www.ebrc.de/mease.html</u>) is used to assess inhalation exposure according to the ECHA guidance (R.14).

Since the SCOEL recommendation refers to <u>respirable dust</u> while the exposure estimates in MEASE reflect the <u>inhalable</u> fraction, an additional safety margin is inherently included in the exposure scenarios below when MEASE has been used to derive exposure estimates.

### Methodology used for consumer exposure assessment

By definition an ES has to describe under which conditions the substances, preparation or articles can be handled safely. In cases where neither measured data nor analogous data are available, exposure is assessed with the aid of a modelling tool.

For consumers, the repeated dose DNEL for inhalation as well as the acute DNEL for inhalation are based on the respective recommendations of the Scientific Committee on Occupational Exposure Limits (SCOEL), being 1 mg/m<sup>3</sup> and 4 mg/m<sup>3</sup>, respectively.

For inhalation exposure to powders the data, derived from van Hemmen (van Hemmen, 1992: Agricultural pesticide exposure data bases for risk assessment. Rev Environ Contam Toxicol. 126: 1-85.), has been used to calculate the inhalation exposure. The inhalation exposure for consumers is estimated at 15  $\mu$ g/hr or 0.25  $\mu$ g/min. For larger tasks the inhalation exposure is expected to be higher. A factor of 10 is suggested when the product amount exceeds 2.5 kg, resulting in the inhalation exposure of 150  $\mu$ g/hr. To convert these values in mg/m<sup>3</sup> a default value of 1.25 m<sup>3</sup>/hr for the breathing volume under light working conditions will be assumed (van Hemmen, 1992) giving 12  $\mu$ g/m<sup>3</sup> for small tasks and 120  $\mu$ g/m<sup>3</sup> for larger tasks.

When the preparation or substance is applied in granular form or as tablets, reduced exposure to dust was assumed. To take this into account if data about particle size distribution and attrition of the granule are lacking, the model for powder formulations is used, assuming a reduction in dust formation by 10 % according to Becks and Falks (Manual for the authorisation of pesticides. Plant protection products. Chapter 4 Human toxicology; risk operator, worker and bystander, version 1.0., 2006).

For dermal exposure and exposure to the eye a qualitative approach has been followed, as no DNEL could be derived for this route due to the irritating properties of calcium oxide. Oral exposure was not assessed as this is not a foreseeable route of exposure regarding the uses addressed.

Since the SCOEL recommendation refers to respirable dust while the exposure estimates by the model from van Hemmen reflect the inhalable fraction, an additional safety margin is inherently included in the exposure scenarios below, i.e. the exposure estimates are very conservative.

The exposure assessment of calcium magnesium oxide professional and industrial and consumer uses is performed and organized based on several scenarios. An overview of the scenarios and the coverage of substance life cycle is presented in Table 1.



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### Table 1: Overview on exposure scenarios and coverage of substance life cycle

ES number	Exposure scenario title	Manufacture		Identified uses		Resultin g life cycle stage	Identified Use					Process	Article	Environmental
			Formulation	End use	Consumer	Service life (for articles)	Linked to Ideni	category (SU)	Chemical Category (PC)	Product	category (PROC)	categor y (AC)	release category (ERC)	
9.1	Manufacture and industrial uses of aqueous solutions of lime substances	x	x	x		x	1	3; 1, 2a, 2b, 4, 5, 6a 9, 10, 11, 12, 13, 14 17, 18, 19, 20, 23, 2	4, 15, 16,	1, 2, 3, 7, 8, 9a, 9b, 14, 15, 16, 17, 18, 19 24, 25, 26, 27, 28, 29 33, 34, 35, 36, 37, 38	), 20, 21, 23, ), 30, 31, 32,	1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 13	1, 2, 3, 4, 5, 6a, 6b, 6c, 6d, 7, 12a, 12b, 10a, 10b, 11a, 11b
9.2	Manufacture and industrial uses of low dusty solids/powders of lime substances	x	x	x		x	2	3; 1, 2a, 2b, 4, 5, 6a 9, 10, 11, 12, 13, 14 17, 18, 19, 20, 23, 2	4, 15, 16,	1, 2, 3, 7, 8, 9a, 9b, 14, 15, 16, 17, 18, 19 24, 25, 26, 27, 28, 29 33, 34, 35, 36, 37, 38	9, 20, 21, 23, 9, 30, 31, 32,	1, 2, 3, 4, 5, 6, 7, 8a, 8b, 9, 10, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 25, 26, 27a, 27b	5, 6, 7, 8,	6c, 6d, 7, 12a, 12b,
9.3	Manufacture and industrial uses of medium dusty solids/powders of lime substances	x	x	x		x	3	3; 1, 2a, 2b, 4, 5, 6a 9, 10, 11, 12, 13, 14 17, 18, 19, 20, 23, 2	4, 15, 16,	1, 2, 3, 7, 8, 9a, 9b, 14, 15, 16, 17, 18, 19 24, 25, 26, 27, 28, 29 33, 34, 35, 36, 37, 38	), 20, 21, 23, ), 30, 31, 32,	1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 13, 14, 15, 16, 17, 18, 19, 22, 23, 24, 25, 26, 27a, 27b	5, 6, 7, 8,	6c, 6d, 7, 12a, 12b,



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	Exposure scenario title	Manufacture		Identified uses		Resultin g life cycle stage	Identified Use	tified Use					Process	Article categor y (AC)	Environmental release category (ERC)
ES number			Formulation	End use	Consumer	Service life (for articles)	Linked to Ident			Chemical F Category (PC)	Product	category (PROC)			
9.4	Manufacture and industrial uses of high dusty solids/powders of lime substances	x	x	x		x	4	9	3; 1, 2a, 2b, 4, 5, 6a, 6 9, 10, 11, 12, 13, 14, 17, 18, 19, 20, 23, 24	öb, 7, 8, 15, 16,	1, 2, 3, 7, 8, 9a, 9b, 1 14, 15, 16, 17, 18, 19, 2 24, 25, 26, 27, 28, 29, 3 33, 34, 35, 36, 37, 38, 3	20, 21, 23, 30, 31, 32,	1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 13, 14, 15, 16, 17, 18, 19, 22, 23, 24, 25, 26, 27a, 27b	5, 6, 7, 8,	6c, 6d, 7, 12a, 12b,
9.5	Manufacture and industrial uses of massive objects containing lime substances	х	x	x		х	5	9	3; 1, 2a, 2b, 4, 5, 6a, 6 9, 10, 11, 12, 13, 14, 17, 18, 19, 20, 23, 24		1, 2, 3, 7, 8, 9a, 9b, 1 14, 15, 16, 17, 18, 19, 2 24, 25, 26, 27, 28, 29, 3 33, 34, 35, 36, 37, 38, 3	20, 21, 23, 30, 31, 32,		5, 6, 7, 8,	1, 2, 3, 4, 5, 6a, 6b, 6c, 6d, 7, 12a, 12b, 10a, 10b, 11a, 11b
9.6	Professional uses of aqueous solutions of lime substances		x	x		х	6		22; 1, 5, 6a, 6b, 7, 10, 13, 16, 17, 18, 19, 20,		1, 2, 3, 7, 8, 9a, 9b, 1 14, 15, 16, 17, 18, 19, 2 24, 25, 26, 27, 28, 29, 3 33, 34, 35, 36, 37, 38, 3	20, 21, 23, 30, 31, 32,	2, 3, 4, 5, 8a, 8b, 9, 10, 12, 13, 15, 16, 17, 18, 19	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 13	2, 8a, 8b, 8c, 8d, 8e, 8f
9.7	Professional uses of low dusty solids/powders of lime substances		x	x		x	7				1, 2, 3, 7, 8, 9a, 9b, 1 14, 15, 16, 17, 18, 19, 2 24, 25, 26, 27, 28, 29, 3 33, 34, 35, 36, 37, 38, 3	20, 21, 23, 30, 31, 32,	2, 3, 4, 5, 8a, 8b, 9, 10, 13, 15, 16, 17, 18, 19, 21, 25, 26	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 13	2, 8a, 8b, 8c, 8d, 8e, 8f



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			lde use	entific es	ed	Resultin g life cycle stage	tified Use				Process	Article	Environmental
ES number	Exposure scenario title	Manufacture	Formulation	End use	Consumer	Service life (for articles)	Linked to Identified	Sector of use category (SU)	e Chemical Category (PC)	Product	category (PROC)	categor y (AC)	release category (ERC)
9.8	Professional uses of medium dusty solids/powders of lime substances		x	x		x	8	22; 1, 5, 6a, 6b, 7, 10, 11, 12 13, 16, 17, 18, 19, 20, 23, 24	1, 2, 3, 7, 8, 9a, 9b, , 14, 15, 16, 17, 18, 19 24, 25, 26, 27, 28, 29 33, 34, 35, 36, 37, 38	, 30, 31, 32,	2, 3, 4, 5, 8a, 8b, 9, 10, 13, 15, 16, 17, 18, 19, 25, 26	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 13	2, 8a, 8b, 8c, 8d, 8e, 8f, 9a, 9b
9.9	Professional uses of high dusty solids/powders of lime substances		x	x		x	9	22; 1, 5, 6a, 6b, 7, 10, 11, 12 13, 16, 17, 18, 19, 20, 23, 24		, 20, 21, 23, , 30, 31, 32,	2, 3, 4, 5, 8a, 8b, 9, 10, 13, 15, 16, 17, 18, 19, 25, 26	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 13	2, 8a, 8b, 8c, 8d, 8e, 8f
9.10	Professional use of lime substances in soil treatment		x	x			10	22	9b		5, 8b, 11, 26		2, 8a, 8b, 8c, 8d, 8e, 8f



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			lde use	entifi es	ed	Resultin g life cycle stage	tified Use			Process	Article	Environmental
ES number	Exposure scenario title	Manufacture	Formulation	End use	Consumer	Service life (for articles)	Linked to Identified	Sector of use category (SU)	Chemical Product Category (PC)	category (PROC)	categor y (AC)	release category (ERC)
9.11	Professional uses of articles/containe rs containing lime substances			x		x	11	22; 1, 5, 6a, 6b, 7, 10, 11, 12, 13, 16, 17, 18, 19, 20, 23, 24		0, 21, 24, 25	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 13	10a, 11a, 11b, 12a, 12b
9.12	Consumer use of building and construction material (DIY)				x		х	21	9b, 9a			8
9.13	Consumer use of CO <sub>2</sub> absorbent in breathing apparatuses				x		х	21	2			8
9.14	Consumer use of garden lime/fertilizer				x		Х	21	20, 12			8e



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			lde use	ntifi es	ed	Resultin g life cycle stage	_			, Process	Article	Environmental
ES number	Exposure scenario title	Manufacture	Formulation	End use	Consumer	Service life (for articles)	Linked to Identified	Sector of use category (SU)	Chemical Produ Category (PC)	(PROC)	categor y (AC)	release category (ERC)
9.15	Consumer use of lime substances as water treatment chemicals in aquaria				x		х	21	20, 37			8
9.16	Consumer use of cosmetics containing lime substances				x		х	21	39			8



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# ES number 9.1: Manufacture and industrial uses of aqueous solutions of lime substances

Exposure Scenario	o Format (1) addressing uses carried o	out by workers		
1. Title				
Free short title	Manufacture and industrial uses of aqueous solution	ons of lime substances		
Systematic title based on use descriptor	SU15, SU16, SU17, SU18, PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11, PC19, PC20, PC21, PC23, PC24, PC25, PC26,			
Processes, tasks and/or activities covered	Processes, tasks and/or activities covered are des	scribed in Section 2 below.		
Assessment Method	The assessment of inhalation exposure is based o	on the exposure estimation tool MEASE.		
2. Operational con	ditions and risk management measure	es a la companya de l		
PROC/ERC	REACH definition	Involved tasks		
PROC 1	Use in closed process, no likelihood of exposure			
PROC 2	Use in closed, continuous process with occasional controlled exposure			
PROC 3	Use in closed batch process (synthesis or formulation)			
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises			
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)			
PROC 7	Industrial spraying			
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities			
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities	Further is found in the FOUN		
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	Further information is provided in the ECHA Guidance on information requirements and chemical safety assessment, Chapter R.12: Use		
PROC 10	Roller application or brushing	descriptor system (ECHA-2010-G-05-EN).		
PROC 12	Use of blowing agents in manufacture of foam			
PROC 13	Treatment of articles by dipping and pouring			
PROC 14	Production of preparations or articles by tabletting, compression, extrusion, pelletisation			
PROC 15	Use as laboratory reagent			
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected			
PROC 17	Lubrication at high energy conditions and in partly open process			
PROC 18	Greasing at high energy conditions	]		
PROC 19	Hand-mixing with intimate contact and only PPE available			
ERC 1-7, 12	Manufacture, formulation and all types of industrial uses			



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ERC 10, 11	Wide-dispersive outdoor life articles and materials		e of long-		
2.1 Control of wor	kers exposure				
Product characteristic					
is reflected by an assign at ambient temperature temperature based, takin abrasive tasks are based	According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This s reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. Whereas in hot metal operations, fugacity is emperature based, taking into account the process temperature and the melting point of the substance. As a third group, high abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. The spraying of aqueous solutions (PROC7 and 11) is assumed to be involved with a medium emission.				
PROC	Used in preparation?	Content preparation	in	Physical form	Emission potential
PROC 7	not restricted			aqueous solution	medium
All other applicable PROCs	not restricted			aqueous solution	very low
Amounts used					
combination of the scale	The actual tonnage handled per shift is not considered to influence the exposure as such for this scenario. Instead, the combination of the scale of operation (industrial vs. Professional) and level of containment/automation (as reflected in the PROC) is the main determinant of the process intrinsic emission potential.				
Frequency and duratio	n of use/exposure				
PROC	Duration of exposure				
PROC 7	≤ 240 minutes				
All other applicable PROCs	480 minutes (not restrict	ed)			
Human factors not influ	uenced by risk managen	nent			
The shift breathing volum	ne during all process step	s reflected in the	e PROCs i	is assumed to be 10 m <sup>3</sup> /sl	nift (8 hours).
Other given operationa	I conditions affecting w	orkers exposu	re		
	s are not used in hot-met ot considered relevant for				
Technical conditions a	nd measures at process	level (source)	to prever	nt release	
Risk management meas required in the processe	sures at the process level s.	(e.g. containme	ent or segi	regation of the emission s	source) are generally not
Technical conditions a	nd measures to control	dispersion fror	n source	towards the worker	
PROC	Level of separation	Localised (LC)	controls	Efficiency of LC (according to MEASE)	Further information
PROC 7	Any potentially required separation of workers from the emission source is indicated above under	local ventilation	exhaust	78 %	-
PROC 19	"Frequency and duration of exposure". A reduction of exposure duration can be	not applicable		na	-
All other applicable PROCs	achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with relevant exposure.	not required		na	-



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#### Organisational measures to prevent /limit releases, dispersion and exposure

Avoid inhalation or ingestion. General occupational hygiene measures are required to ensure a safe handling of the substance. These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), no eating and smoking at the workplace, the wearing of standard working clothes and shoes unless otherwise stated below. Shower and change clothes at end of work shift. Do not wear contaminated clothing at home. Do not blow dust off with compressed air.

#### Conditions and measures related to personal protection, hygiene and health evaluation

PROC	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further personal protective equipment (PPE)
PROC 7	FFP1 mask	APF=4	Since calcium magnesium oxide is classified as irritating to	Eye protection equipment (e.g. goggles or visors) must be worn, unless potential contact with the eye can be
All other applicable PROCs	not required	na	skin, the use of protective gloves is mandatory for all process steps.	excluded by the nature and type of application (i.e. closed process). Additionally, face protection, protective clothing and safety shoes are required to be worn as appropriate.

Any RPE as defined above shall only be worn if the following principles are implemented in parallel: The duration of work (compare with "duration of exposure" above) should reflect the additional physiological stress for the worker due to the breathing resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the wearing of RPE.

For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the face properly and securely.

The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and the management of their correct use in the workplace. Therefore, they should define and document a suitable policy for a respiratory protective device programme including training of the workers.

An overview of the APFs of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE.

2.2 Control of environmental exposure

Amounts used

The daily and annual amount per site (for point sources) is not considered to be the main determinant for environmental exposure.

Frequency and duration of use

Intermittent (< 12 time per year) or continuous use/release

Environment factors not influenced by risk management

Flow rate of receiving surface water: 18000 m<sup>3</sup>/day

Other given operational conditions affecting environmental exposure

Effluent discharge rate: 2000 m<sup>3</sup>/day

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Risk management measures related to the environment aim to avoid discharging lime solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The justification for this risk management measure can be found in the introduction section.

Conditions and measures related to waste

Solid industrial waste of lime should be reused or discharged to the industrial wastewater and further neutralized if needed.



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## 3. Exposure estimation and reference to its source

#### Occupational exposure

The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium magnesium oxide of 1 mg/m<sup>3</sup> (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.

PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)
PROC 1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19			Since calcium magnesiu irritating to skin, derma minimised as far as tech for dermal effects has r dermal exposure is not as scenario.	al exposure has to be nically feasible. A DNEL not been derived. Thus,

#### Environmental exposure

The environmental exposure assessment is only relevant for the aquatic environment, when applicable including STPs/WWTPs, as emissions of calcium magnesium oxide in the different life-cycle stages (production and use) mainly apply to (waste) water. The aquatic effect and risk assessment only deal with the effect on organisms/ecosystems due to possible pH changes related to OH- discharges, being the toxicity of Ca2+ and Mg2+ is expected to be negligible compared to the (potential) pH effect. Only the local scale is being addressed, including municipal sewage treatment plants (STPs) or industrial waste water treatment plants (WWTPs) when applicable, both for production and industrial use as any effects that might occur would be expected to take place on a local scale. The high water solubility and very low vapour pressure indicate that calcium magnesium oxide will be found predominantly in water. Significant emissions or exposure to air are not expected due to the low vapour pressure scenario. The exposure assessment for the aquatic environment will therefore only deal with the possible pH changes in STP effluent and surface water related to the OH- discharges at the local scale. The exposure assessment is approached by assessing the resulting pH impact: the surface water pH should not increase above 9.

Environmental emissions	The production of calcium magnesium oxide can potentially result in an aquatic emission and locally increase the calcium magnesium oxide concentration and affect the pH in the aquatic environment. When the pH is not neutralised, the discharge of effluent from calcium magnesium oxide production sites may impact the pH in the receiving water. The pH of effluents is normally measured very frequently and can be neutralised easily as often required by national laws.
Exposure concentration in waste water treatment plant (WWTP)	Waste water from calcium magnesium oxide production is an inorganic wastewater stream and therefore there is no biological treatment. Therefore, wastewater streams from calcium magnesium oxide production sites will normally not be treated in biological waste water treatment plants (WWTPs), but can be used for pH control of acid wastewater streams that are treated in biological WWTPs.
Exposure concentration in aquatic pelagic compartment	When calcium magnesium oxide is emitted to surface water, sorption to particulate matter and sediment will be negligible. When lime is rejected to surface water, the pH may increase, depending on the buffer capacity of the water. The higher the buffer capacity of the water, the lower the effect on pH will be. In general the buffer capacity preventing shifts in acidity or alkalinity in natural waters is regulated by the equilibrium between carbon dioxide (CO2), the bicarbonate ion (HCO3-) and the carbonate ion (CO32-).
Exposure concentration in sediments	The sediment compartment is not included in this ES, because it is not considered relevant for lime substance: when calcium magnesium oxide is emitted to the aquatic compartment, sorption of to sediment particles is negligible.
Exposure concentrations in soil and groundwater	The terrestrial compartment is not included in this exposure scenario, because it is not considered to be relevant.
Exposure concentration in atmospheric compartment	The air compartment is not included in this CSA because it is considered not relevant for lime substance: when emitted to air as an aerosol in water, calcium magnesium oxide is neutralised as a result of its reaction with CO2 (or other acids), into HCO3- and Ca2+. Subsequently, the salts (e.g. calcium(bi)carbonate) are washed out from the air and thus the atmospheric emissions of neutralised calcium magnesium oxide largely end up in soil and water.
Exposure concentration relevant for the food chain (secondary poisoning)	Bioaccumulation in organisms is not relevant for lime substance: a risk assessment for secondary poisoning is therefore not required.



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### 4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

#### Occupational exposure

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. This has to be done by showing that they limit the inhalation and demal exposure to a level below the respective DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (<u>www.ebrc.de/mease.html</u>) to estimate the associated exposure. The dustiness of the substance used can be determined according to the MEASE glossary. For example, substances with a dustiness less than 2.5 % according to the Rotating Drum Method (RDM) are defined as "low dusty", substances with a dustiness less than 10 % (RDM) are defined as "medium dusty" and substances with a dustiness ≥10 % are defined as "high dusty".

### DNEL<sub>inhalation</sub>: 1 mg/m<sup>3</sup> (as respirable dust)

Important note: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m<sup>3</sup>. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).

Environmental exposure

If a site does not comply with the conditions stipulated in the safe use ES, it is recommended to apply a tiered approach to perform a more site-specific assessment. For that assessment, the following stepwise approach is recommended.

**Tier 1**: retrieve information on effluent pH and the contribution of the calcium magnesium oxide on the resulting pH. Should the pH be above 9 and be predominantly attributable to lime, then further actions are required to demonstrate safe use.

**Tier 2a**: retrieve information on receiving water pH after the discharge point. The pH of the receiving water shall not exceed the value of 9. If the measures are not available, the pH in the river can be calculated as follows:

$$pHriver = Log \left[ \frac{Qeffluent * 10^{pHeffluent} + Qriverupstream * 10^{pHupstream}}{Qriverupstream + Qeffluent} \right]$$
(Eq 1)

Where:

Q effluent refers to the effluent flow (in m³/day)

Q river upstream refers to the upstream river flow (in m³/day)

pH effluent refers to the pH of the effluent

pH upstream river refers to the pH of the river upstream of the discharge point

Please note that initially, default values can be used:

- Q river upstream flows: use the 10th of existing measurements distribution or use default value of 18000 m³/day
- Q effluent: use default value of 2000 m³/day
- The upstream pH is preferably a measured value. If not available, one can assume a neutral pH of 7 if this can be justified.

Such equation has to be seen as a worst case scenario, where water conditions are standard and not case specific.

**Tier 2b**: Equation 1 can be used to identify which effluent pH causes an acceptable pH level in the receiving body. In order to do so, pH of the river is set at value 9 and pH of the effluent is calculated accordingly (using default values as reported previously, if necessary). As temperature influences lime solubility, pH effluent might require to be adjusted on a case-by-case basis. Once the maximum admissible pH value in the effluent is established, it is assumed that the OH- concentrations are all dependent on lime discharge and that there is no buffer capacity conditions to consider (this is a unrealistic worst case scenario, which can be modified where information is available). Maximum load of lime that can be annually rejected without negatively affecting the pH of the receiving water is calculated assuming chemical equilibrium. OH- expressed as moles/litre are multiplied by average flow of the effluent and then divided by the molar mass of the lime substance.

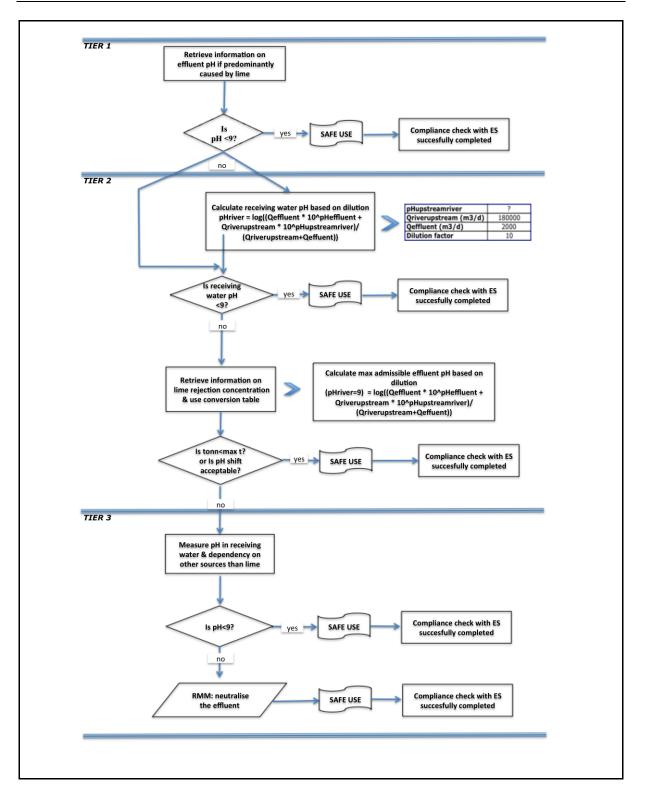
**Tier 3**: measure the pH in the receiving water after the discharge point. If pH is below 9, safe use is reasonably demonstrated and the ES ends here. If pH is found to be above 9, risk management measures have to be implemented: the effluent has to undergo neutralisation, thus ensuring safe use of lime during production or use phase.



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# ES number 9.2: Manufacture and industrial uses of low dusty solids/powders of lime substances

Exposure Scenario	o Format (1) addressing uses carried o	out by workers
1. Title		
Free short title	Manufacture and industrial uses of low dusty solid	s/powders of lime substances
Systematic title based on use descriptor	SU15, SU16, SU17, SU18, PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11, PC19, PC20, PC21, PC23, PC24, PC25, PC26,	
Processes, tasks and/or activities covered	Processes, tasks and/or activities covered are des	scribed in Section 2 below.
Assessment Method	The assessment of inhalation exposure is based o	on the exposure estimation tool MEASE.
2. Operational con	ditions and risk management measure	es
PROC/ERC	REACH definition	Involved tasks
PROC 1	Use in closed process, no likelihood of exposure	
PROC 2	Use in closed, continuous process with occasional controlled exposure	
PROC 3	Use in closed batch process (synthesis or formulation)	
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises	
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)	
PROC 6	Calendering operations	
PROC 7	Industrial spraying	
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities	
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities	Guidance on information requirements and
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	chemical safety assessment, Chapter R.12: Use descriptor system (ECHA-2010-G-05-EN).
PROC 10	Roller application or brushing	
PROC 13	Treatment of articles by dipping and pouring	
PROC 14	Production of preparations or articles by tabletting, compression, extrusion, pelletisation	
PROC 15	Use as laboratory reagent	
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected	
PROC 17	Lubrication at high energy conditions and in partly open process	
PROC 18	Greasing at high energy conditions	
PROC 19	Hand-mixing with intimate contact and only PPE available	
PROC 21	Low energy manipulation of substances bound in materials and/or articles	



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DBOC 22	Potentially closed processing operations with
PROC 22	minerals/metals at elevated temperature Industrial setting
	5
PROC 23	Open processing and transfer operations with
	minerals/metals at elevated temperature
PROC 24	High (mechanical) energy work-up of substances
FRUG 24	bound in materials and/or articles
PROC 25	Other hot work operations with metals
PROC 26	Handling of solid inorganic substances at ambient
	temperature
PROC 27a	Production of metal powders (hot processes)
PROC 27b	Production of metal powders (wet processes)
	, ,
ERC 1-7, 12	Manufacture, formulation and all types of
	industrial uses
ERC 10, 11	Wide-dispersive outdoor and indoor use of long-
	life articles and materials

## 2.1 Control of workers exposure

#### **Product characteristic**

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. Whereas in hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, high abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential.

PROC	Used in preparation?	Content in preparation	Physical form	Emission potential
PROC 22, 23, 25, 27a	not restricted		solid/powder, molten	high
PROC 24	not restricted		solid/powder	high
All other applicable PROCs	not restricted		solid/powder	low
Ann ann ta sea a d				

## Amounts used

The actual tonnage handled per shift is not considered to influence the exposure as such for this scenario. Instead, the combination of the scale of operation (industrial vs. Professional) and level of containment/automation (as reflected in the PROC) is the main determinant of the process intrinsic emission potential.

#### Frequency and duration of use/exposure

PROC	Duration of exposure
PROC 22	≤ 240 minutes
All other applicable PROCs	480 minutes (not restricted)
Liver on factors and influ	removal burnlah menenanan

Human factors not influenced by risk management

The shift breathing volume during all process steps reflected in the PROCs is assumed to be 10 m³/shift (8 hours).

Other given operational conditions affecting workers exposure

Operational conditions like process temperature and process pressure are not considered relevant for occupational exposure assessment of the conducted processes. In process steps with considerably high temperatures (i.e. PROC 22, 23, 25), the exposure assessment in MEASE is however based on the ratio of process temperature and melting point. As the associated temperatures are expected to vary within the industry the highest ratio was taken as a worst case assumption for the exposure estimation. Thus all process temperatures are automatically covered in this exposure scenario for PROC 22, 23 and PROC 25.

Technical conditions and measures at process level (source) to prevent release

Risk management measures at the process level (e.g. containment or segregation of the emission source) are generally not required in the processes.



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Technical conditions a	Technical conditions and measures to control dispersion from source towards the worker				
PROC	Level of separation	Localised controls (LC)	Efficiency of LC (according to MEASE)	Further information	
PROC 7, 17, 18	Any potentially required separation of workers	general ventilation	17 %	-	
PROC 19	from the emission source is indicated above under	not applicable	na	-	
PROC 22, 23, 24, 25, 26, 27a	"Frequency and duration of exposure".	local exhaust ventilation	78 %	-	
All other applicable PROCs	A reduction of exposure duration can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with relevant	A reduction of exposure duration can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the vorker from workplaces	-		
Organisational measur	es to prevent /limit relea	ises, dispersion and exp	oosure		
These measures involve eating and smoking at the and change clothes at er	Avoid inhalation or ingestion. General occupational hygiene measures are required to ensure a safe handling of the substance. These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), no eating and smoking at the workplace, the wearing of standard working clothes and shoes unless otherwise stated below. Shower and change clothes at end of work shift. Do not wear contaminated clothing at home. Do not blow dust off with compressed air.				
Conditions and measu	res related to personal p Specification of			Further personal	
PROC	respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further personal protective equipment (PPE)	
PROC 22, 24, 27a	FFP1 mask	APF=4		Eye protection equipment (e.g. goggles or visors) must	
All other applicable PROCs	not required	na	Since calcium magnesium oxide is classified as irritating to skin, the use of protective gloves is mandatory for all process steps.	be worn, unless potential contact with the eye can be excluded by the nature and type of application (i.e. closed process). Additionally, face protection, protective clothing and safety shoes are required to	
Any RPE as defined above shall only be worn if the following principles are implemented in parallel: The duration of work (compare with "duration of exposure" above) should reflect the additional physiological stress for the worker due to the breathing resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the wearing of RPE. For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the face properly and securely. The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and the management of their correct use in the workplace. Therefore, they should define and document a suitable policy for a respiratory protective device programme including training of the workers. An overview of the APFs of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE.					
2.2 Control of environmental exposure					
Amounts used The daily and annual amount per site (for point sources) is not considered to be the main determinant for environmental					
exposure.					
Frequency and duratio	n of use				

Intermittent (< 12 time per year) or continuous use/release



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#### Environment factors not influenced by risk management

Flow rate of receiving surface water: 18000 m³/day

Other given operational conditions affecting environmental exposure

Effluent discharge rate: 2000 m<sup>3</sup>/day

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Risk management measures related to the environment aim to avoid discharging lime solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The justification for this risk management measure can be found in the introduction section.

Conditions and measures related to waste

Solid industrial waste of lime should be reused or discharged to the industrial wastewater and further neutralized if needed.

#### 3. Exposure estimation and reference to its source

#### **Occupational exposure**

The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium magnesium oxide of 1 mg/m<sup>3</sup> (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.

PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)
PROC 1, 2, 3, 4, 5, 6, 7, 8a, 8b, 9, 10, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 25, 26, 27a, 27b	MEASE		Since calcium magnesiu irritating to skin, derma minimised as far as tech for dermal effects has r dermal exposure is not as scenario.	al exposure has to be nically feasible. A DNEL not been derived. Thus,

#### Environmental emissions

The environmental exposure assessment is only relevant for the aquatic environment, when applicable including STPs/WWTPs, as emissions of calcium magnesium oxide in the different life-cycle stages (production and use) mainly apply to (waste) water. The aquatic effect and risk assessment only deal with the effect on organisms/ecosystems due to possible pH changes related to OH- discharges, being the toxicity of Ca2+ and Mg2+ is expected to be negligible compared to the (potential) pH effect. Only the local scale is being addressed, including municipal sewage treatment plants (STPs) or industrial waste water treatment plants (WWTPs) when applicable, both for production and industrial use as any effects that might occur would be expected to take place on a local scale. The high water solubility and very low vapour pressure indicate that calcium magnesium oxide will be found predominantly in water. Significant emissions or exposure to air are not expected due to the low vapour pressure of calcium magnesium oxide. Significant emissions or exposure to the terrestrial environment are not expected either for this exposure scenario. The exposure assessment for the aquatic environment will therefore only deal with the possible pH changes in STP effluent and surface water related to the OH- discharges at the local scale. The exposure assessment is approached by assessing the resulting pH impact: the surface water pH should not increase above 9.

accounty and recalling p	
Environmental emissions	The production of calcium magnesium oxide can potentially result in an aquatic emission and locally increase the calcium and magnesium concentrations and affect the pH in the aquatic environment. When the pH is not neutralised, the discharge of effluent from calcium magnesium oxide production sites may impact the pH in the receiving water. The pH of effluents is normally measured very frequently and can be neutralised easily as often required by national laws.
Exposure	Waste water from calcium magnesium oxide production is an inorganic wastewater stream and
concentration in	therefore there is no biological treatment. Therefore, wastewater streams from calcium magnesium
waste water treatment	oxide production sites will normally not be treated in biological waste water treatment plants (WWTPs),
plant (WWTP)	but can be used for pH control of acid wastewater streams that are treated in biological WWTPs.
Exposure concentration in aquatic pelagic compartment	regulated by the equilibrium between carbon dioxide (CO2), the bicarbonate ion (HCO3-) and the
	carbonate ion (CO32-).



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Exposure concentration in sediments	The sediment compartment is not included in this ES, because it is not considered relevant for calcium magnesium oxide: when calcium magnesium oxide is emitted to the aquatic compartment, sorption to sediment particles is negligible.			
Exposure concentrations in soil and groundwater	The terrestrial compartment is not included in this exposure scenario, because it is not considered to be relevant.			
Exposure concentration in atmospheric compartment	The air compartment is not included in this CSA because it is considered not relevant for calcium magnesium oxide: when emitted to air as an aerosol in water, calcium magnesium oxide is neutralised as a result of its reaction with CO2 (or other acids), into HCO3- and Ca2+. Subsequently, the salts (e.g. calcium(bi)carbonate) are washed out from the air and thus the atmospheric emissions of neutralised calcium magnesium oxide largely end up in soil and water.			
Exposure concentration relevant for the food chain (secondary poisoning)	Bioaccumulation in organisms is not relevant for calcium magnesium oxide: a risk assessment for secondary poisoning is therefore not required.			
4. Guidance to DU	to evaluate whether he works inside the boundaries set by the ES			
Occupational exposure				
met or the downstream measures are adequate. respective DNEL (given If measured data are (www.ebrc.de/mease.htm according to the MEASE Method (RDM) are define	boundaries set by the ES if either the proposed risk management measures as described above are user can demonstrate on his own that his operational conditions and implemented risk management This has to be done by showing that they limit the inhalation and dermal exposure to a level below the that the processes and activities in question are covered by the PROCs listed above) as given below. not available, the DU may make use of an appropriate scaling tool such as MEASE all) to estimate the associated exposure. The dustiness of the substance used can be determined glossary. For example, substances with a dustiness less than 2.5 % according to the Rotating Drum ed as "low dusty", substances with a dustiness less than 10 % (RDM) are defined as "medium dusty" ustiness ≥10 % are defined as "high dusty".			
DNEL <sub>inhalation</sub> : 1 m	g/m <sup>3</sup> (as respirable dust)			
exists at a level of 4 mg/ acute DNEL is therefore term exposure estimates	Important note: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m <sup>3</sup> . By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40%).			
Environmental exposure				
If a site does not comply with the conditions stipulated in the safe use ES, it is recommended to apply a tiered approach to perform a more site-specific assessment. For that assessment, the following stepwise approach is recommended.				
	on on effluent pH and the contribution of the calcium magnesium oxide on the resulting pH. Should the redominantly attributable to lime, then further actions are required to demonstrate safe use.			
Tier 2a: retrieve informat value of 9. If the measure	ion on receiving water pH after the discharge point. The pH of the receiving water shall not exceed the es are not available, the pH in the river can be calculated as follows:			
$pHriver = Log \left[ \frac{Qeffluent * 10^{pHeffluent} + Qriverupstream * 10^{pHupstream}}{Qriverupstream + Qeffluent} \right]$				
$ \qquad \qquad$				
Where:				
Q effluent refe	rs to the effluent flow (in m³/day)			
	Q river upstream refers to the upstream river flow (in m³/day)			
·	ers to the pH of the effluent			
	iver refers to the pH of the river upstream of the discharge point			
<ul> <li>Please note that initially, default values can be used:</li> <li>Q river upstream flows: use the 10th of existing measurements distribution or use default value of 18000</li> </ul>				
	<ul> <li>May</li> <li>Q effluent: use default value of 2000 m³/day</li> </ul>			
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• The upstream pH is preferably a measured value. If not available, one can assume a neutral pH of 7 if this can be justified.

Such equation has to be seen as a worst case scenario, where water conditions are standard and not case specific.

**Tier 2b**: Equation 1 can be used to identify which effluent pH causes an acceptable pH level in the receiving body. In order to do so, pH of the river is set at value 9 and pH of the effluent is calculated accordingly (using default values as reported previously, if necessary). As temperature influences lime solubility, pH effluent might require to be adjusted on a case-by-case basis. Once the maximum admissible pH value in the effluent is established, it is assumed that the OH- concentrations are all dependent on lime discharge and that there is no buffer capacity conditions to consider (this is a unrealistic worst case scenario, which can be modified where information is available). Maximum load of lime that can be annually rejected without negatively affecting the pH of the receiving water is calculated assuming chemical equilibrium. OH- expressed as moles/litre are multiplied by average flow of the effluent and then divided by the molar mass of the calcium magnesium oxide.

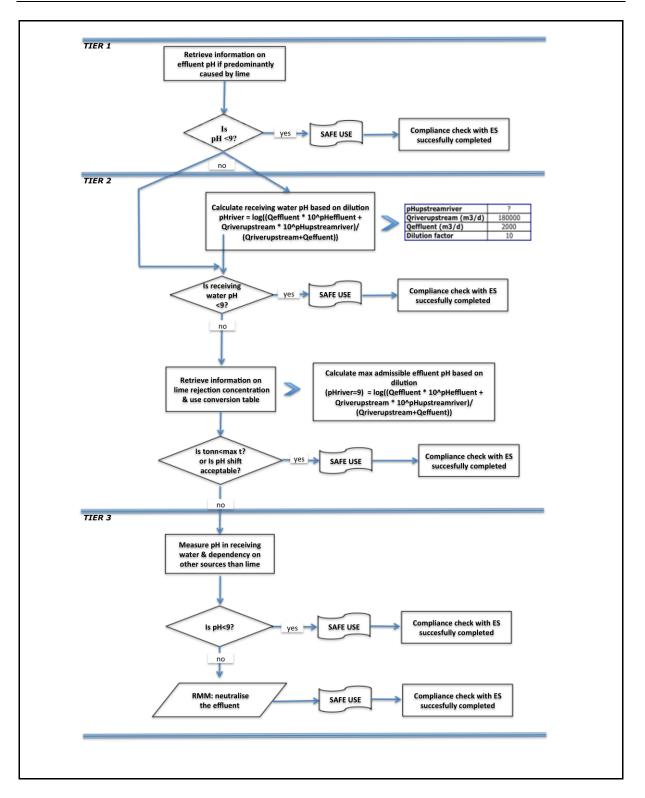
**Tier 3**: measure the pH in the receiving water after the discharge point. If pH is below 9, safe use is reasonably demonstrated and the ES ends here. If pH is found to be above 9, risk management measures have to be implemented: the effluent has to undergo neutralisation, thus ensuring safe use of lime during production or use phase.



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# ES number 9.3: Manufacture and industrial uses of medium dusty solids/powders of lime substances

Exposure Scenario	o Format (1) addressing uses carried o	out by workers	
1. Title			
Free short title	Manufacture and industrial uses of medium dusty solids/powders of lime substances		
Systematic title based on use descriptor	SU3, SU1, SU2a, SU2b, SU4, SU5, SU6a, SU6b, SU7, SU8, SU9, SU10, SU11, SU12, SU13, SU14,         SU15,       SU16,       SU17,       SU18,       SU19,       SU20,       SU23,       SU24         PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18,       PC19, PC20, PC21, PC23, PC24, PC25, PC26, PC27, PC28, PC29, PC30, PC31, PC32, PC33,         PC34,       PC35,       PC36,       PC37,       PC38,       PC39,       PC40         AC1, AC2, AC3, AC4, AC5, AC6, AC7, AC8, AC10, AC11, AC13       (appropriate PROCs and ERCs are given in Section 2 below)       PC30, PC31, PC32, PC33, PC30, PC31, PC32, PC33, PC30, PC31, PC32, PC33, PC30, PC31, PC32, PC30, PC30, PC31, PC32, PC30, PC30, PC31, PC32, PC30, PC31, PC30, PC31, PC32, PC		
Processes, tasks and/or activities covered	Processes, tasks and/or activities covered are des	scribed in Section 2 below.	
Assessment Method	The assessment of inhalation exposure is based of	on the exposure estimation tool MEASE.	
2. Operational con	ditions and risk management measure	es	
PROC/ERC	REACH definition	Involved tasks	
PROC 1	Use in closed process, no likelihood of exposure		
PROC 2	Use in closed, continuous process with occasional controlled exposure		
PROC 3	Use in closed batch process (synthesis or formulation)		
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises		
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)		
PROC 7	Industrial spraying		
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities		
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities		
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)		
PROC 10	Roller application or brushing	descriptor system (ECHA-2010-G-05-EN).	
PROC 13	Treatment of articles by dipping and pouring		
PROC 14	Production of preparations or articles by tabletting, compression, extrusion, pelletisation		
PROC 15	Use as laboratory reagent		
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected		
PROC 17	Lubrication at high energy conditions and in partly open process		
PROC 18	Greasing at high energy conditions		
PROC 19	Hand-mixing with intimate contact and only PPE available		
PROC 22	Potentially closed processing operations with minerals/metals at elevated temperature Industrial setting		
PROC 23	Open processing and transfer operations with minerals/metals at elevated temperature		



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PROC 24	High (mechanical) energy work-up of substances bound in materials and/or articles	
PROC 25	Other hot work operations with metals	
PROC 26	Handling of solid inorganic substances at ambient temperature	
PROC 27a	Production of metal powders (hot processes)	
PROC 27b	Production of metal powders (wet processes)	
ERC 1-7, 12	Manufacture, formulation and all types of industrial uses	
ERC 10, 11	Wide-dispersive outdoor and indoor use of long- life articles and materials	

## 2.1 Control of workers exposure

## Product characteristic

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. Whereas in hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, high abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential.

PROC	Used in preparation?	Content in preparation	Physical form	Emission potential
PROC 22, 23, 25, 27a	not restricted		solid/powder, molten	high
PROC 24	not restricted		solid/powder	high
All other applicable PROCs	not restricted		solid/powder	medium

#### Amounts used

The actual tonnage handled per shift is not considered to influence the exposure as such for this scenario. Instead, the combination of the scale of operation (industrial vs. Professional) and level of containment/automation (as reflected in the PROC) is the main determinant of the process intrinsic emission potential.

Frequency and duration of use/exposure

Trequency and duratio	ii oi use/exposure			
PROC	Duration of exposure			
PROC 7, 17, 18, 19, 22	≤ 240 minutes			
All other applicable PROCs	480 minutes (not restricted	ed)		
Human factors not influ	uenced by risk managen	nent		
The shift breathing volum	ne during all process step	s reflected in the PROCs	is assumed to be 10 m <sup>3</sup> /sh	nift (8 hours).
Other given operationa	Other given operational conditions affecting workers exposure			
Operational conditions like process temperature and process pressure are not considered relevant for occupational exposure assessment of the conducted processes. In process steps with considerably high temperatures (i.e. PROC 22, 23, 25), the exposure assessment in MEASE is however based on the ratio of process temperature and melting point. As the associated temperatures are expected to vary within the industry the highest ratio was taken as a worst case assumption for the exposure estimation. Thus all process temperatures are automatically covered in this exposure scenario for PROC 22, 23 and PROC 25.				
Technical conditions and measures at process level (source) to prevent release				
Risk management measures at the process level (e.g. containment or segregation of the emission source) are generally not required in the processes.				
Technical conditions a	Technical conditions and measures to control dispersion from source towards the worker			
PROC	Level of separation	Localised controls (LC)	Efficiency of LC (according to MEASE)	Further information



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Avoid inhalation or ingest		I hygiene measures are r	posure equired to ensure a safe h egular cleaning with suital	
eating and smoking at the and change clothes at en	e workplace, the wearing o ad of work shift. Do not we	f standard working clothe ar contaminated clothing	s and shoes unless otherw at home. Do not blow dus	ise stated below. Shower
Conditions and measur	res related to personal p			
PROC	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further personal protective equipment (PPE)
PROC 4, 5, 7, 8a, 8b, 9, 10, 16, 17, 18, 19, 22, 24, 27a	FFP1 mask	APF=4		Eye protection equipment (e.g. goggles or visors) must
All other applicable PROCs	not required	na	Since calcium magnesium oxide is classified as irritating to skin, the use of protective gloves is mandatory for all process steps.	be worn, unless potential contact with the eye can be excluded by the nature and type of application (i.e. closed process). Additionally, face protection, protective clothing and safety shoes are required to be worn as appropriate.
Any RPE as defined above shall only be worn if the following principles are implemented in parallel: The duration of work (compare with "duration of exposure" above) should reflect the additional physiological stress for the worker due to the breathing resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the wearing of RPE. For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the face properly and securely. The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and their correct use in the workplace. Therefore, they should define and document a suitable policy for a respiratory protective device programme including training of the workers. An overview of the APFs of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE.				
2.2 Control of envi	ronmental exposur	e		
Amounts used				
The daily and annual amount per site (for point sources) is not considered to be the main determinant for environmental exposure.				
Frequency and duration of use				
Intermittent (< 12 time pe	er year) or continuous use	/release		
Environment factors no	ot influenced by risk ma	nagement		
Flow rate of receiving surface water: 18000 m <sup>3</sup> /day				
Other given operational conditions affecting environmental exposure				



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#### Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Risk management measures related to the environment aim to avoid discharging lime solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The justification for this risk management measure can be found in the introduction section.

Conditions and measures related to waste

Solid industrial waste of lime should be reused or discharged to the industrial wastewater and further neutralized if needed.

#### 3. Exposure estimation and reference to its source

be relevant.

and groundwater

#### **Occupational exposure**

The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium magnesium oxide of 1 mg/m<sup>3</sup> (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.

<del>-</del> 01.				
PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)
PROC 1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 13, 14, 15, 16, 17, 18, 19, 22, 23, 24, 25, 26, 27a, 27b	MEASE	< 1 mg/m³ (0.01 – 0.88)	irritating to skin, derm minimised as far as tech for dermal effects has	im oxide is classified as al exposure has to be inically feasible. A DNEL not been derived. Thus, issessed in this exposure
Environmental emissio	ons			
The environmental exposure assessment is only relevant for the aquatic environment, when applicable including STPs/WWTPs as emissions of calcium magnesium oxide in the different life-cycle stages (production and use) mainly apply to (waste) water The aquatic effect and risk assessment only deal with the effect on organisms/ecosystems due to possible pH changes related to OH- discharges, being the toxicity of Ca2+ and Mg2+ is expected to be negligible compared to the (potential) pH effect. Only the local scale is being addressed, including municipal sewage treatment plants (STPs) or industrial waste water treatment plants (WWTPs) when applicable, both for production and industrial use as any effects that might occur would be expected to take place on a local scale. The high water solubility and very low vapour pressure indicate that calcium magnesium oxide will be found predominantly in water. Significant emissions or exposure to air are not expected due to the low vapour pressure or calcium magnesium oxide. Significant emissions or exposure to the terrestrial environment are not expected either for this exposure scenario. The exposure assessment for the aquatic environment will therefore only deal with the possible pH changes in STP effluent and surface water related to the OH- discharges at the local scale. The exposure assessment is approached by assessing the resulting pH impact: the surface water pH should not increase above 9.				
Environmental emissions	increase the calcium an When the pH is not neut	d magnesium concentrati tralised, the discharge of e	ons and affect the pH in t effluent from calcium mag	the aquatic environment. nesium oxide production

emissions	sites may impact the pH in the receiving water. The pH of effluents is normally measured very frequently and can be neutralised easily as often required by national laws.
Exposure concentration in waste water treatment plant (WWTP)	Waste water from calcium magnesium oxide production is an inorganic wastewater stream and therefore there is no biological treatment. Therefore, wastewater streams from calcium magnesium oxide production sites will normally not be treated in biological waste water treatment plants (WWTPs), but can be used for pH control of acid wastewater streams that are treated in biological WWTPs.
Exposure concentration in aquatic pelagic compartment	When calcium magnesium oxide is emitted to surface water, sorption to particulate matter and sediment will be negligible. When lime is rejected to surface water, the pH may increase, depending on the buffer capacity of the water. The higher the buffer capacity of the water, the lower the effect on pH will be. In general the buffer capacity preventing shifts in acidity or alkalinity in natural waters is regulated by the equilibrium between carbon dioxide (CO2), the bicarbonate ion (HCO3-) and the carbonate ion (CO32–).
Exposure concentration in sediments	The sediment compartment is not included in this ES, because it is not considered relevant for calcium magnesium oxide: when calcium magnesium oxide is emitted to the aquatic compartment, sorption of to sediment particles is negligible.
Exposure concentrations in soil	The terrestrial compartment is not included in this exposure scenario, because it is not considered to be relevant



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40 %)

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Exposure concentration in atmospheric compartment	The air compartment is not included in this CSA because it is considered not relevant for calcium magnesium oxide: when emitted to air as an aerosol in water, calcium magnesium oxide is neutralised as a result of its reaction with CO2 (or other acids), into HCO3- and Ca2+. Subsequently, the salts (e.g. calcium(bi)carbonate) are washed out from the air and thus the atmospheric emissions of neutralised calcium magnesium oxide largely end up in soil and water.		
Exposure concentration relevant for the food chain (secondary poisoning)	Bioaccumulation in organisms is not relevant for calcium magnesium oxide: a risk assessment for secondary poisoning is therefore not required.		
4. Guidance to DU	to evaluate whether he works inside the boundaries set by the ES		
Occupational exposure			
met or the downstream measures are adequate. respective DNEL (given If measured data are (www.ebrc.de/mease.htm according to the MEASE Method (RDM) are define	boundaries set by the ES if either the proposed risk management measures as described above are user can demonstrate on his own that his operational conditions and implemented risk management This has to be done by showing that they limit the inhalation and dermal exposure to a level below the that the processes and activities in question are covered by the PROCs listed above) as given below. not available, the DU may make use of an appropriate scaling tool such as MEASE nl) to estimate the associated exposure. The dustiness of the substance used can be determined glossary. For example, substances with a dustiness less than 2.5 % according to the Rotating Drum ed as "low dusty", substances with a dustiness less than 10 % (RDM) are defined as "medium dusty" ustiness ≥10 % are defined as "high dusty".		
DNEL <sub>inhalation</sub> : 1 m			
Important note: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m <sup>3</sup> . By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of			



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#### **Environmental exposure**

If a site does not comply with the conditions stipulated in the safe use ES, it is recommended to apply a tiered approach to perform a more site-specific assessment. For that assessment, the following stepwise approach is recommended.

**Tier 1**: retrieve information on effluent pH and the contribution of the calcium magnesium oxide on the resulting pH. Should the pH be above 9 and be predominantly attributable to lime, then further actions are required to demonstrate safe use.

**Tier 2a**: retrieve information on receiving water pH after the discharge point. The pH of the receiving water shall not exceed the value of 9. If the measures are not available, the pH in the river can be calculated as follows:

$$pHriver = Log \left[ \frac{Qeffluent * 10^{pHeffluent} + Qriverupstream * 10^{pHupstream}}{Qriverupstream + Qeffluent} \right]$$

$$Eq 1)$$

Where:

Q effluent refers to the effluent flow (in m<sup>3</sup>/day)

Q river upstream refers to the upstream river flow (in m<sup>3</sup>/day)

pH effluent refers to the pH of the effluent

pH upstream river refers to the pH of the river upstream of the discharge point

Please note that initially, default values can be used:

- Q river upstream flows: use the 10th of existing measurements distribution or use default value of 18000 m<sup>3</sup>/day
- Q effluent: use default value of 2000 m³/day
- The upstream pH is preferably a measured value. If not available, one can assume a neutral pH of 7 if this can be justified.

Such equation has to be seen as a worst case scenario, where water conditions are standard and not case specific.

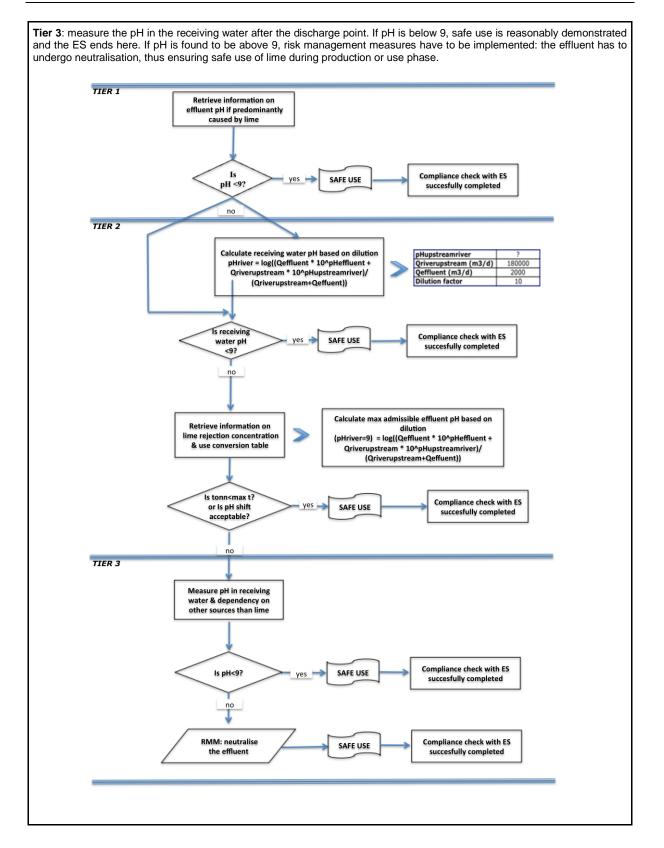
**Tier 2b**: Equation 1 can be used to identify which effluent pH causes an acceptable pH level in the receiving body. In order to do so, pH of the river is set at value 9 and pH of the effluent is calculated accordingly (using default values as reported previously, if necessary). As temperature influences lime solubility, pH effluent might require to be adjusted on a case-by-case basis. Once the maximum admissible pH value in the effluent is established, it is assumed that the OH- concentrations are all dependent on lime discharge and that there is no buffer capacity conditions to consider (this is a unrealistic worst case scenario, which can be modified where information is available). Maximum load of lime that can be annually rejected without negatively affecting the pH of the receiving water is calculated assuming chemical equilibrium. OH- expressed as moles/litre are multiplied by average flow of the effluent and then divided by the molar mass of the calcium magnesium oxide.



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# ES number 9.4: Manufacture and industrial uses of high dusty solids/powders of lime substances

Exposure Scenario	o Format (1) addressing uses carried o	out by workers			
1. Title	1. Title				
Free short title	Manufacture and industrial uses of high dusty solids/powders of lime substances				
Systematic title based on use descriptor	SU3, SU1, SU2a, SU2b, SU4, SU5, SU6a, SU6b, SU7, SU8, SU9, SU10, SU11, SU12, SU13, SU14, SU15, SU16, SU17, SU18, SU19, SU20, SU23, SU24         PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18, PC19, PC20, PC21, PC23, PC24, PC25, PC26, PC27, PC28, PC29, PC30, PC31, PC32, PC33, PC34, PC35, PC36, PC37, PC38, PC39, PC40         AC1, AC2, AC3, AC4, AC5, AC6, AC7, AC8, AC10, AC11, AC13         (appropriate PROCs and ERCs are given in Section 2 below)				
Processes, tasks and/or activities covered	Processes, tasks and/or activities covered are des	scribed in Section 2 below.			
Assessment Method	The assessment of inhalation exposure is based of	on the exposure estimation tool MEASE.			
2. Operational con	ditions and risk management measure	es			
PROC/ERC	REACH definition	Involved tasks			
PROC 1	Use in closed process, no likelihood of exposure				
PROC 2	Use in closed, continuous process with occasional controlled exposure				
PROC 3	Use in closed batch process (synthesis or formulation)				
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises				
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)				
PROC 7	Industrial spraying				
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities				
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities				
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	Further information is provided in the ECHA Guidance on information requirements and chemical safety assessment, Chapter R.12: Use			
PROC 10	Roller application or brushing	descriptor system (ECHA-2010-G-05-EN).			
PROC 13	Treatment of articles by dipping and pouring				
PROC 14	Production of preparations or articles by tabletting, compression, extrusion, pelletisation				
PROC 15	Use as laboratory reagent				
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected				
PROC 17	Lubrication at high energy conditions and in partly open process				
PROC 18	Greasing at high energy conditions				
PROC 19	Hand-mixing with intimate contact and only PPE available				
PROC 22	Potentially closed processing operations with minerals/metals at elevated temperature Industrial setting				
PROC 23	Open processing and transfer operations with minerals/metals at elevated temperature				



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PROC 24	High (mechanical) energy work-up of substances bound in materials and/or articles		
PROC 25	Other hot work operations with metals		
PROC 26	Handling of solid inorganic substances at ambient temperature		
PROC 27a	Production of metal powders (hot processes)		
PROC 27b	Production of metal powders (wet processes)		
ERC 1-7, 12	Manufacture, formulation and all types of industrial uses		
ERC 10, 11	Wide-dispersive outdoor and indoor use of long- life articles and materials		

## 2.1 Control of workers exposure

#### Product characteristic

According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. Whereas in hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, high abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential.

PROC	Used in preparation?	Content in preparation	Physical form	Emission potential
PROC 22, 23, 25, 27a	not restricted		solid/powder, molten	high
All other applicable PROCs	not restricted		solid/powder	high

### Amounts used

The actual tonnage handled per shift is not considered to influence the exposure as such for this scenario. Instead, the combination of the scale of operation (industrial vs. Professional) and level of containment/automation (as reflected in the PROC) is the main determinant of the process intrinsic emission potential.

#### Frequency and duration of use/exposure

PROC	Duration of exposure
PROC 7, 8a, 17, 18, 19,	

22	
All other applicable	480 minutes (not restricted)

#### Human factors not influenced by risk management

The shift breathing volume during all process steps reflected in the PROCs is assumed to be 10 m³/shift (8 hours).

#### Other given operational conditions affecting workers exposure

Operational conditions like process temperature and process pressure are not considered relevant for occupational exposure assessment of the conducted processes. In process steps with considerably high temperatures (i.e. PROC 22, 23, 25), the exposure assessment in MEASE is however based on the ratio of process temperature and melting point. As the associated temperatures are expected to vary within the industry the highest ratio was taken as a worst case assumption for the exposure estimation. Thus all process temperatures are automatically covered in this exposure scenario for PROC 22, 23 and PROC 25.

Technical conditions and measures at process level (source) to prevent release

Risk management measures at the process level (e.g. containment or segregation of the emission source) are generally not required in the processes.



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PROC 1       Any potentially required separation of workers from the emission source is indicated above under PROC 7       na       -         PROC 1       Frequency and duration of exposure duration can be achieved, for example, proCs       na       -         All other applicable PROCs       A reduction of exposure duration can be achieved, for example, pressure; contor foroms or by the installation of ventilated (positive pressure; contor foroms or by removing the worker from workplaces involved with relevant exposure.       na       -         Organisational measures to prevent /limit releases, dispersion and exposure       78 %       -         Avoid inhalation or ingestion. General occupational hygiene measures are required to ensure a safe handling of the substance involved with relevant exposure.       78 %       -         Organisational measures to prevent /limit releases, dispersion and exposure       78 %       -         Avoid inhalation or ingestion. General occupational hygiene measures are required to ensure a safe handling of the substance these measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning divices), no and change clothes at end of work shift. Do not wear contaminated clothing at home. Do not blow dust off with compressed air contained and moving at the workplace, the wearing of standard working clothes and shoes unless otherwise stated below. Showe and change clothes at end of work shift. Do not wear contaminated clothing at health evaluation         PROC       Specification of respiratory protective equipment (RPE)       Specification factor, APF)       Since protective eql	PROC	Level of separation	Localised control		Further information
PROC 1         separation of workers source is indicated above under Frequency and duration of exposure duration an be achieved, for example, by the installation (can be exposure) control forms or by removing the works from workplace the works from workplace the wearing of standard working clothes and shoes involved with relevant exposure.         Ta %         -           Organisational measures to prevent /limit releases, dispersion and exposure and change clothes at end of work shift. Do not wear contaminated clothing at home. Do not blow dust of with compressed air conditions and measures related to personal and housekeeping protection, hygiene measures are required to ensure a safe handling of the substance exposure.           PROC 1, 2, 3, 23, 25, The PROC 1, 2, 3, 23, 25, The second state of down within the one wear contaminated clothing at home. Do not blow dust of with compressed air conditions and measures related to personal and housekeeping protection requipment (RPE)         Specification factor, APF)         Further personal protective gloves is mandatory for all protective gloves		-	(LC)	(according to MEASE)	
PROC 2, 3       source is indicated during a local work under the protection of exposure ventilation       17 %       -         PROC 7       duration of exposure during a local work under the protection of exposure ventilation       at 4 %       -         PROC 19       duration of exposure or by removing the work latting of the installation or by removing the work latting of the substance or by removing the work from work places by removing the work of the mork places and the process of the substance or by removing the work of the substance or by removing of standard working of the substance or by removing of standard working of the substance or by removing of standard working of the substance or breaking at the work place, the wearing of standard working of the substance or respiratory protective equipment (RPE)       Reference or by removing the work place by the substance or boy or by removing of the substance or breaking at the work place, the wearing of standard working of the substance or respiratory protective equipment (RPE)       Specification or ingestion. General occupational hygiene measures are required to ensure a safe handling of the substance or respiratory protective equipment (RPE)       Specification or ingestion. General occupational hygiene measures are required to ensure a safe handling of the substance equipment (RPE)         PROC 10, 13, 14, 15       FFP2 mask       APF=10       Since calcium mork places is protective gloves is protecti	PROC 1	separation of workers	not required	na	-
PROC 1       duration of exposure <sup>T</sup> duration can be achieved, for example, by the installation or by removing the worker from workpate exposure.       entiliation to applicable       na       -         All other applicable PROCs       All other applicable or by removing the worker from workpate exposure.       ind applicable to cal worker from workpate exposure.       na       -         Organisational measures to prevent /limit releases, dispersion and exposure       78 %       -         Avoid inhalation or ingestion. General occupational hygiene measures are required to ensure a safe handling of the substance finate measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), in eating and smoking at the workplace, the wearing of standard working clothes and shoes unless otherwise stated below. Showe and change clothes at end of work shift. Do not wear contaminated clothing at home. Do not blow dust off with compressed air Conditions and measures related to personal protection, hygiene and health evaluation         PROC 10, 13, 14, 15, 16, 22, 24, 26, 27a       FFP2 mask       APF=10       Since cuclution fractor, APF)       Since cuclution magnesium oxide is classified as irritiang to protective gloves is involved with relevant exposure with 'duration of exposure' above) should reflect the additional physiological stress for the worker due to the health exposure with 'duration of exposure' above) should reflect the additional physiological stress for the worker due to the health exposure with 'duration of exposure' above) should reflect the additional physiological stress for the worker due to the health exposure with 'duration of exposure' above) should therefore be (i) healthy (especial) in view of	PROC 2, 3	source is indicated	general ventilation	17 %	-
PROC 19       duration can be how for the point applicable       na       -         All other applicable process       by the installation of verification or ingestion. General occupational hygiene measures are required to ensure a safe handling of the substance. These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), no eating and smoking at the workplace, the wearing of standard working clothes and shoes unless otherwise stated below. Showe and change clothes at end of work shift. Do not wear contaminated clothing at home. Do not blow dust off with compressed air Conditions and measures related to personal and protection, hygiene and health evaluation         PROC       Specification of respiratory protective (assigned protection, APP)       Specification of classified assisting to garges or visors) mus be very or classified assisting to garges or visors) mus be reciproted with factor, APP       Since calcium magnesium oxide is protection equipment (RPE) or protective equipment (RPE) or protective is classified as the down, unless the protection is classified as the substance. The second	PROC 7	duration of exposure".	0	<sup>st</sup> 84 %	-
All other applicable PROCs       by the installation of or by removing the worklation or by removing the worklation       local       exhaust ventilation         Organisational measures to prevent /limit releases, dispersion and exposure         Avoid inhalation or ingestion. General occupational hygiene measures are required to ensure a safe handling of the substance involved with release involved with release exposure         Conditions and measures to prevent /limit releases, dispersion and exposure         Conditions and measures related to personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), no eating and smoking at the workplace, the wearing of standard working clothes and shoes unless otherwise stated below. Showe and change clothes at end of work shift. Do not wear contaminated clothing at home. Do not blow dust off with compressed air factor, APP)         PROC       Specification of equipment (RPE)       Reperiment factor, APP)       Specification of gloves       Further persona protective equipment (e.g. gloges or visors) mus be worm, unless in andatory for application protective gloves isi factor, APP, factor, Sa, 8a, 8b, 9, fFP2 mask       APF=10       Since calcium magnesity of skin, the use of protective gloves isi mandatory for application or the volted by the natur and type of application protective gloves isi mandatory for application or diverse application of the closed process Additionally, factor shoes are required th the work as appropriate shoes are required the shoes are required the the work as appropriate shoes are required the the work as appropriate shoes are required the the work as appropriate shoes are frequired protection unless they fitth contrase of the RPE itself, due to the increased thermal stress by	PROC 19	duration can be	not applicable	na	-
Avoid inhalation or ingestion. General occupational hygiene measures are required to ensure a safe handling of the substance. These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), not eating and smoking at the workplace, the wearing of standard working clothes and shoes unless otherwise stated below. Showe and change clothes at end of work shift. Do not wear contaminated clothing at home. Do not blow dust off with compressed air Conditions and measures related to personal protection, hygiene and health evaluation PROC respiratory protective (assigned protection) PROC 1, 2, 3, 23, 25, not required na 17, 18, PROC 10, 13, 14, 15, FFP1 mask APF=10 Since calcium PROC 10, 13, 14, 15, FFP1 mask APF=4 A		by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with relevant		<sup>st</sup> 78 %	-
These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), nor eating and smoking at the workplace, the wearing of standard working clothes and shoes unless otherwise stated below. Showe and change clothes at end of work shift. Do not wear contaminated clothing at home. Do not blow dust off with compressed air Conditions and measures related to personal protection, hygiene and health evaluation PROC 1, 2, 3, 23, 25, not required na PROC 1, 2, 3, 23, 25, not required na PROC 1, 2, 3, 23, 25, not required na PROC 1, 13, 14, 15, 16, 22, 24, 26, 27a FFP1 mask APF=10 FFP2 devices and protection gives of protection gives of protective goods of the eye can be excluded by the nature protective goods of the eye can be protective gloves in andatory for all protection, protective clothing and safet show of the eye can be excluded by the nature on the eye can be excluded by the nature optication of exposure" above) should reflect the additional physiological stress for the worker due to the breathing resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the waring of RPE. For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and faci- the onloyer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and the management of their correct use in the workplace. Therefore, they should def	Organisational measur	es to prevent /limit relea	ises, dispersion and e	xposure	
PROC         Specification equipment (RPE)         RPE (assigned protection factor, APF)         Specification gloves         of         Further personal protective equipment (PE)           PROC 1, 2, 3, 23, 25, 27b         not required         na         Specification of factor, APF)         Specification gloves         of         Further personal protective equipment (PE)           PROC 1, 2, 3, 23, 25, 27b         not required         na         Since         Calcium         Since viscon (equipment (e.g. gogles or visors) mus be worn, unless potential contact with the eye can be worn, unless protective gloves is (lise, closed process);         Since transition of the equired the nature and type of application protective gloves is (lise, closed process);         Madatory for all protective gloves is (lise, closed process);         APF=4         Since transition of worn as appropriate show of the hearting and specification of worn as appropriate show of the protective is show of the RPE isself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the wearing of RPE.         For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect he use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mass of inview of scars and facial ain. The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the FAPE it claic characteristics reducing leakages between face and mass of inview of scars and facia hain'. The recommended devices programme including training of the	These measures involve eating and smoking at the and change clothes at er	good personal and hous workplace, the wearing o nd of work shift. Do not we	ekeeping practices (i.e. of standard working cloth ear contaminated clothin	regular cleaning with suital nes and shoes unless otherw g at home. Do not blow dus	ble cleaning devices), no ise stated below. Shower
PROC       respiratory protective equipment (RPE)       (assigned protection factor, APF)       Spectrication gloves       of gloves       protective equipmen (PPE)         PROC 1, 2, 3, 23, 25, 27b       not required       na				W.	Further personal
PROC 1, 2, 3, 23, 25, 27b       not required       na         PROC 1, 2, 3, 23, 25, 27b       not required       na         PROC 4, 5, 7, 8a, 8b, 9, 17, 18, 17, 18, 17, 18, 16, 22, 24, 26, 27a       FFP2 mask       APF=10         Since       calcium magnesium oxide is skin, the use of protective gloves is madatory for all process steps.       Since the eye can be excluded by the nature and type of application protective gloves is madatory for all process steps.         APF=4       FFP1 mask       APF=4       Since the eye can be excluded by the nature and type of application protective gloves is madatory for all process steps.         APRE as defined above shall only be worn if the following principles are implemented in parallel: The duration of exposure" above) should reflect the additional physiological stress for the worker due to the breathing resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the wearing of RPE.         For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE). (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facia hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the face property and securely.         The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective device programme including training of the workers.	PROC	respiratory protective	(assigned protectio	specification of	protective equipment
17, 18,       PP2 Inlask       PPF10       Since       calcium magnesium oxide is classified as irritating to skin, the use of protective gloves is mandatory for all process steps.       be wron, unless excluded by the nature and type of application (i.e. closed process) and dotting and safet shoes are required the verse required the beach of wron as appropriate to be wron as appropriate for the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of medical problems that may affect the use of RPE), (iii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and face have should derive to use of the safe the use of RPE).         For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect he use of RPE).       Iii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and face have should devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the face properly and securely.         The employeer and self-employed persons have legal responsibilities for the workers.       An overview of the APFs of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE.         2.2 Control of environmental exposure       Amounts used         The daily and annual amount per site (for point sources) is not considered to be the main determinant for environmenta	27b		na		equipment (e.g.
PROC 10, 13, 14, 15, 16, 22, 24, 26, 27a       FFP1 mask       APF=4       Since calcium magnesium oxide is classified as irritating to skin, the use of protective gloves is mandatory for all protective gloves is mandatory for all protective gloves is the event of the event event event event event event of the event ev		FFP2 mask	APF=10		0 00 /
(compare with "duration of exposure" above) should reflect the additional physiological stress for the worker due to the breathing resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the wearing of RPE. For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the face properly and securely. The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and the management of their correct use in the workplace. Therefore, they should define and document a suitable policy for a respiratory protective device programme including training of the workers. An overview of the APFs of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE. <b>2.2 Control of environmental exposure Amounts used</b> The daily and annual amount per site (for point sources) is not considered to be the main determinant for environmental enviro	PROC 10, 13, 14, 15,	FFP1 mask	APF=4	magnesium oxide is classified as irritating to skin, the use of protective gloves is mandatory for all	potential contact with the eye can be excluded by the nature and type of application (i.e. closed process). Additionally, face protection, protective
2.2 Control of environmental exposure Amounts used The daily and annual amount per site (for point sources) is not considered to be the main determinant for environmental					shoes are required to
The daily and annual amount per site (for point sources) is not considered to be the main determinant for environmenta	(compare with "duration of resistance and mass of considered that the work For reasons as given ab- the use of RPE), (ii) have hair). The recommended contours of the face prop The employer and self- devices and the manage policy for a respiratory pr	of exposure" above) should the RPE itself, due to the er's capability of using too ove, the worker should the e suitable facial characteri devices above which rely perly and securely. employed persons have le ement of their correct use rotective device programm	d reflect the additional p he increased thermal si ols and of communicatin erefore be (i) healthy (e istics reducing leakages on a tight face seal will egal responsibilities for e in the workplace. The he including training of t	hysiological stress for the wo tress by enclosing the head or are reduced during the wo specially in view of medical s between face and mask (in not provide the required pro- the maintenance and issue refore, they should define a he workers.	shoes are required to be worn as appropriate el: The duration of work orker due to the breathing d. In addition, it shall be earing of RPE. problems that may affec o view of scars and facia tection unless they fit the of respiratory protective and document a suitable
	(compare with "duration of resistance and mass of considered that the work For reasons as given abo the use of RPE), (ii) have hair). The recommended contours of the face prop The employer and self-ed devices and the manage policy for a respiratory pr An overview of the APFs	of exposure" above) should the RPE itself, due to the er's capability of using too ove, the worker should the e suitable facial characteric devices above which rely perly and securely. employed persons have le ement of their correct use rotective device programm of different RPE (accordi	d reflect the additional p ne increased thermal si ols and of communicatin erefore be (i) healthy (e istics reducing leakages on a tight face seal will egal responsibilities for a in the workplace. The ne including training of t ng to BS EN 529:2005)	hysiological stress for the wo tress by enclosing the head or are reduced during the wo specially in view of medical s between face and mask (in not provide the required pro- the maintenance and issue refore, they should define a he workers.	shoes are required to be worn as appropriate el: The duration of work orker due to the breathing d. In addition, it shall be earing of RPE. problems that may affec o view of scars and facia tection unless they fit the of respiratory protective and document a suitable
	(compare with "duration of resistance and mass of considered that the work For reasons as given ab- the use of RPE), (ii) have hair). The recommended contours of the face prop The employer and self- devices and the manage policy for a respiratory pr An overview of the APFs <b>2.2 Control of envi</b>	of exposure" above) should the RPE itself, due to the er's capability of using too ove, the worker should the e suitable facial characteric devices above which rely perly and securely. employed persons have le ement of their correct use rotective device programm of different RPE (accordi	d reflect the additional p ne increased thermal si ols and of communicatin erefore be (i) healthy (e istics reducing leakages on a tight face seal will egal responsibilities for a in the workplace. The ne including training of t ng to BS EN 529:2005)	hysiological stress for the wo tress by enclosing the head or are reduced during the wo specially in view of medical s between face and mask (in not provide the required pro- the maintenance and issue refore, they should define a he workers.	shoes are required to be worn as appropriate el: The duration of work orker due to the breathing d. In addition, it shall be earing of RPE. problems that may affect tection unless they fit the of respiratory protective and document a suitable

Intermittent (< 12 time per year) or continuous use/release



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#### Environment factors not influenced by risk management

Flow rate of receiving surface water: 18000 m³/day

Other given operational conditions affecting environmental exposure

Effluent discharge rate: 2000 m<sup>3</sup>/day

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Risk management measures related to the environment aim to avoid discharging lime solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The justification for this risk management measure can be found in the introduction section.

Conditions and measures related to waste

Solid industrial waste of lime should be reused or discharged to the industrial wastewater and further neutralized if needed.

### 3. Exposure estimation and reference to its source

#### **Occupational exposure**

The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium magnesium oxide of 1 mg/m<sup>3</sup> (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.

PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)
PROC 1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 13, 14, 15, 16, 17, 18, 19, 22, 23, 24, 25, 26, 27a, 27b	MEASE	<1 mg/m³ (0.01 – 0.96)	Since calcium magnesiu irritating to skin, derma minimised as far as tech for dermal effects has r dermal exposure is not as scenario.	al exposure has to be nically feasible. A DNEL not been derived. Thus,

#### Environmental emissions

The environmental exposure assessment is only relevant for the aquatic environment, when applicable including STPs/WWTPs, as emissions of calcium magnesium oxide in the different life-cycle stages (production and use) mainly apply to (waste) water. The aquatic effect and risk assessment only deal with the effect on organisms/ecosystems due to possible pH changes related to OH- discharges, being the toxicity of Ca2+ and Mg2+ is expected to be negligible compared to the (potential) pH effect. Only the local scale is being addressed, including municipal sewage treatment plants (STPs) or industrial waste water treatment plants (WWTPs) when applicable, both for production and industrial use as any effects that might occur would be expected to take place on a local scale. The high water solubility and very low vapour pressure indicate that calcium magnesium oxide will be found predominantly in water. Significant emissions or exposure to air are not expected due to the low vapour pressure of calcium magnesium oxide. Significant emissions or exposure to the terrestrial environment are not expected either for this exposure assessment for the aquatic environment will therefore only deal with the possible pH changes in STP effluent and surface water related to the OH- discharges at the local scale. The exposure assessment is approached by assessing the resulting pH impact: the surface water pH should not increase above 9.

Environmental emissions	The production of calcium magnesium oxide can potentially result in an aquatic emission and locally increase the calcium and magnesium concentrations and affect the pH in the aquatic environment. When the pH is not neutralised, the discharge of effluent from calcium magnesium oxide production sites may impact the pH in the receiving water. The pH of effluents is normally measured very frequently and can be neutralised easily as often required by national laws.
Exposure	Waste water from calcium magnesium oxide production is an inorganic wastewater stream and
concentration in	therefore there is no biological treatment. Therefore, wastewater streams from calcium magnesium
waste water treatment	oxide production sites will normally not be treated in biological waste water treatment plants (WWTPs),
plant (WWTP)	but can be used for pH control of acid wastewater streams that are treated in biological WWTPs.
	When calcium magnesium oxide is emitted to surface water, sorption to particulate matter and
Exposure	sediment will be negligible. When lime is rejected to surface water, the pH may increase, depending
concentration in	on the buffer capacity of the water. The higher the buffer capacity of the water, the lower the effect on
aquatic pelagic	pH will be. In general the buffer capacity preventing shifts in acidity or alkalinity in natural waters is
compartment	regulated by the equilibrium between carbon dioxide (CO2), the bicarbonate ion (HCO3-) and the
	carbonate ion (CO32-).



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Exposure concentration in sediments	The sediment compartment is not included in this ES, because it is not considered relevant for calcium magnesium oxide: when calcium magnesium oxide is emitted to the aquatic compartment, sorption of to sediment particles is negligible.			
Exposure concentrations in soil and groundwater	The terrestrial compartment is not included in this exposure scenario, because it is not considered to be relevant.			
Exposure concentration in atmospheric compartment	The air compartment is not included in this CSA because it is considered not relevant for calcium magnesium oxide: when emitted to air as an aerosol in water, calcium magnesium oxide is neutralised as a result of its reaction with CO2 (or other acids), into HCO3- and Ca2+. Subsequently, the salts (e.g. calcium(bi)carbonate) are washed out from the air and thus the atmospheric emissions of neutralised calcium magnesium oxide largely end up in soil and water.			
Exposure concentration relevant for the food chain (secondary poisoning)	Bioaccumulation in organisms is not relevant for calcium magnesium oxide: a risk assessment for secondary poisoning is therefore not required.			
4. Guidance to DU	to evaluate whether he works inside the boundaries set by the ES			
Occupational exposure				
met or the downstream measures are adequate. respective DNEL (given If measured data are (www.ebrc.de/mease.htr according to the MEASE Method (RDM) are defin	e boundaries set by the ES if either the proposed risk management measures as described above are user can demonstrate on his own that his operational conditions and implemented risk management. This has to be done by showing that they limit the inhalation and dermal exposure to a level below the that the processes and activities in question are covered by the PROCs listed above) as given below. not available, the DU may make use of an appropriate scaling tool such as MEASE nl) to estimate the associated exposure. The dustiness of the substance used can be determined glossary. For example, substances with a dustiness less than 2.5 % according to the Rotating Drum ed as "low dusty", substances with a dustiness less than 10 % (RDM) are defined as "medium dusty" ustiness ≥10 % are defined as "high dusty".			
DNELinhalation: 1 m	g/m <sup>3</sup> (as respirable dust)			
exists at a level of 4 mg, acute DNEL is therefore term exposure estimates	has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects /m <sup>3</sup> . By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long- s by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the d only be reduced to half-shift as a risk management measure (leading to an exposure reduction of			
Environmental exposure				
perform a more site-spec <b>Tier 1</b> : retrieve information pH be above 9 and be p	y with the conditions stipulated in the safe use ES, it is recommended to apply a tiered approach to cific assessment. For that assessment, the following stepwise approach is recommended. on on effluent pH and the contribution of the calcium magnesium oxide on the resulting pH. Should the redominantly attributable to lime, then further actions are required to demonstrate safe use.			
value of 9. If the measur	es are not available, the pH in the river can be calculated as follows:			
pHriver = $Log \frac{Qe}{d}$	$\frac{effluent * 10^{pHeffluent} + Qriverupstream * 10^{pHupstream}}{Qriverupstream + Qeffluent}$			
	$(Eq \ 1)$			
Where:	re to the offluent flow (in m <sup>3</sup> /day)			
	rs to the effluent flow (in m³/day) am refers to the upstream river flow (in m³/day)			
Q river upstream refers to the upstream river flow (in m³/day) pH effluent refers to the pH of the effluent				
pH upstream river refers to the pH of the river upstream of the discharge point				
Please note that initially, default values can be used:				
• Q riv				
Q ef	fluent: use default value of 2000 m³/day			
	upstream pH is preferably a measured value. If not available, one can assume a neutral pH of 7 if this be justified.			
Tier 2b: Equation 1 can	seen as a worst case scenario, where water conditions are standard and not case specific. be used to identify which effluent pH causes an acceptable pH level in the receiving body. In order to at at value 9 and pH of the effluent is calculated accordingly (using default values as reported previously,			



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if necessary). As temperature influences lime solubility, pH effluent might require to be adjusted on a case-by-case basis. Once the maximum admissible pH value in the effluent is established, it is assumed that the OH- concentrations are all dependent on lime discharge and that there is no buffer capacity conditions to consider (this is a unrealistic worst case scenario, which can be modified where information is available). Maximum load of lime that can be annually rejected without negatively affecting the pH of the receiving water is calculated assuming chemical equilibrium. OH- expressed as moles/litre are multiplied by average flow of the effluent and then divided by the molar mass of the calcium magnesium oxide.

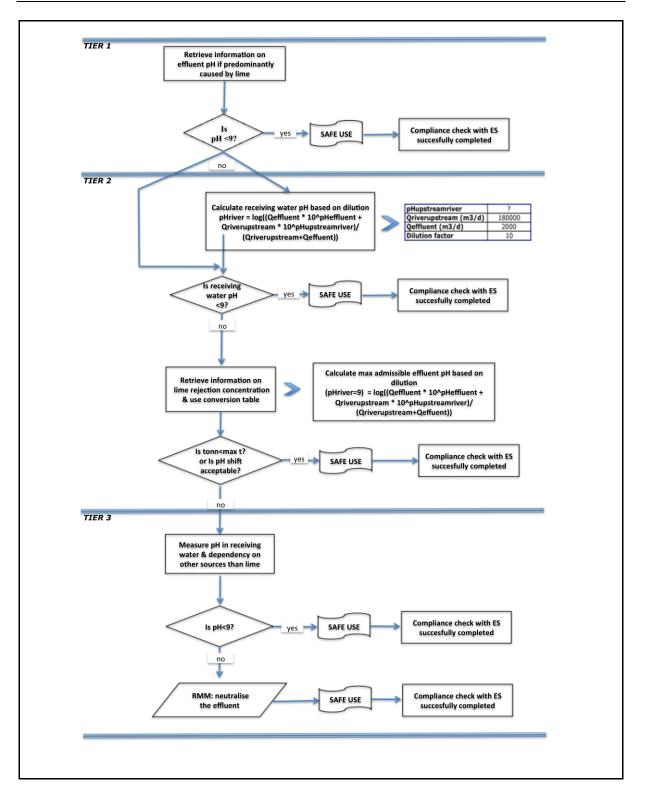
**Tier 3**: measure the pH in the receiving water after the discharge point. If pH is below 9, safe use is reasonably demonstrated and the ES ends here. If pH is found to be above 9, risk management measures have to be implemented: the effluent has to undergo neutralisation, thus ensuring safe use of lime during production or use phase.



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# ES number 9.5: Manufacture and industrial uses of massive objects containing lime substances

Exposure Scenario	o Format (1) addressing uses carried o	out by workers			
1. Title					
Free short title	Manufacture and industrial uses of massive objects containing lime substances				
Systematic title based on use descriptor	SU3, SU1, SU2a, SU2b, SU4, SU5, SU6a, SU6b, SU7, SU8, SU9, SU10, SU11, SU12, SU13, SU14,         SU15,       SU16,       SU17,       SU18,       SU19,       SU20,       SU23,       SU24         PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18,       PC19, PC20, PC21, PC23, PC24, PC25, PC26, PC27, PC28, PC29, PC30, PC31, PC32, PC33,       PC34,       PC35,       PC36,       PC37,       PC38,       PC39,       PC40         AC1, AC2, AC3, AC4, AC5, AC6, AC7, AC8, AC10, AC11, AC13       (appropriate PROCs and ERCs are given in Section 2 below)       PC10, PC10, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18, PC19, PC30, PC30, PC31, PC32, PC30, PC3				
Processes, tasks and/or activities covered	Processes, tasks and/or activities covered are des	cribed in Section 2 below.			
Assessment Method	The assessment of inhalation exposure is based of	on the exposure estimation	n tool MEASE.		
2. Operational con	ditions and risk management measure	es			
PROC/ERC	REACH definition	Involved tasks			
PROC 6	Calendering operations				
PROC 14	Production of preparations or articles by tabletting, compression, extrusion, pelletisation				
PROC 21	Low energy manipulation of substances bound in materials and/or articles				
PROC 22	Potentially closed processing operations with minerals/metals at elevated temperature Industrial setting	Further information is provided in the ECHA Guidance on information requirements and			
PROC 23	Open processing and transfer operations with minerals/metals at elevated temperature	chemical safety assessment, Chapter R.12: Use			
PROC 24	High (mechanical) energy work-up of substances bound in materials and/or articles	tances descriptor system (ECHA-2010-G-05-EN).			
PROC 25	Other hot work operations with metals				
ERC 1-7, 12	Manufacture, formulation and all types of industrial uses				
ERC 10, 11	Wide-dispersive outdoor and indoor use of long- life articles and materials				
2.1 Control of worl	kers exposure				
Product characteristic					
is reflected by an assign at ambient temperature temperature based, takir	According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. Whereas in hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, high abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential.				
PROC	Used in preparation? Content in preparation	Physical form	Emission potential		
PROC 22, 23,25	not restricted	massive objects, molten	high		
PROC 24	not restricted	massive objects	high		
All other applicable PROCs	not restricted	massive objects	very low		
Amounts used					
combination of the scale	adled per shift is not considered to influence the e of operation (industrial vs. Professional) and lev minant of the process intrinsic emission potential.				



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	on of use/exposure				
PROC	Duration of exposure				
PROC 22	≤ 240 minutes				
All other applicable PROCs	480 minutes (not restricted	ed)			
Human factors not inf	luenced by risk managen	nent			
The shift breathing volu	me during all process steps	s reflected in th	ne PROCs	is assumed to be 10 m³/sł	nift (8 hours).
Other given operation	al conditions affecting w	orkers exposi	ure		
exposure assessment in temperatures are expect estimation. Thus all pro- Technical conditions a	ducted processes. In proce n MEASE is however base ted to vary within the indus cess temperatures are auto and measures at process sures at the process level	ed on the ratio stry the highest omatically cove level (source	of process t ratio was t ered in this of to prever	temperature and melting taken as a worst case ass exposure scenario for PRO ht release	point. As the associate umption for the exposur OC 22, 23 and PROC 25
required in the processe					
Technical conditions a	and measures to control	•	om source	towards the worker	
PROC	Level of separation	Localised (LC)	controls	Efficiency of LC (according to MEASE)	Further information
PROC 6, 14, 21	Any potentially required separation of workers	not required		na	-
from the emission source is indicated above under "Frequency and duration of exposure". A reduction of exposure duration can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with relevant exposure.       local       exhaust         78 %       -					
	involved with relevant				
Organisational measu	involved with relevant	ises, dispersio	on and exp	oosure	

Avoid inhalation or ingestion. General occupational hygiene measures are required to ensure a safe handling of the substance. These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), no eating and smoking at the workplace, the wearing of standard working clothes and shoes unless otherwise stated below. Shower and change clothes at end of work shift. Do not wear contaminated clothing at home. Do not blow dust off with compressed air.



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Conditions and measures related to personal protection, hygiene and health evaluation					
PROC	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further personal protective equipment (PPE)	
PROC 22	FFP1 mask	APF=4	Since calcium magnesium oxide is classified as irritating to	Eye protection equipment (e.g. goggles or visors) must be worn, unless potential contact with the eye can be	
All other applicable PROCs	not required	na	skin, the use of protective gloves is mandatory for all process steps.	excluded by the nature and type of application (i.e. closed process). Additionally, face protection, protective clothing and safety shoes are required to be worn as appropriate.	
(compare with "duration of resistance and mass of considered that the work For reasons as given ab the use of RPE), (ii) have hair). The recommended contours of the face prop The employer and self- devices and the manage	Any RPE as defined above shall only be worn if the following principles are implemented in parallel: The duration of work (compare with "duration of exposure" above) should reflect the additional physiological stress for the worker due to the breathing resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the wearing of RPE. For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the face properly and securely. The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and the worker use in the workplace. Therefore, they should define and document a suitable policy for a respiratory protective device programme including training of the workers.				
2.2 Control of environmental exposure					
Amounts used					
The daily and annual an exposure.	mount per site (for point	sources) is not consider	ed to be the main detern	ninant for environmental	
Frequency and duratio	n of use				
Intermittent (< 12 time pe	er year) or continuous use	/release			
Environment factors no	ot influenced by risk ma	nagement			
Flow rate of receiving su	rface water: 18000 m³/da	y			
Other given operationa	I conditions affecting er	nvironmental exposure			
Effluent discharge rate: 2	Effluent discharge rate: 2000 m³/day				
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil					
Risk management measures related to the environment aim to avoid discharging lime solutions into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes. Regular control of the pH value during introduction into open waters is required. In general discharges should be carried out such that pH changes in receiving surface waters are minimised (e.g. through neutralisation). In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms. The justification for this risk management measure can be found in the introduction section.					
Conditions and measu	res related to waste				
Solid industrial waste of lime should be reused or discharged to the industrial wastewater and further neutralized if needed.					



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poisoning)

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## 3. Exposure estimation and reference to its source

#### Occupational exposure

The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium magnesium oxide of 1 mg/m<sup>3</sup> (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.

PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)
PROC 6, 14, 21, 22, 23, 24, 25	MEASE		Since calcium magnesium oxide is classified as irritating to skin, dermal exposure has to be minimised as far as technically feasible. A DNEL for dermal effects has not been derived. Thus, dermal exposure is not assessed in this exposure scenario.	
Environmental emissions				

The environmental exposure assessment is only relevant for the aquatic environment, when applicable including STPs/WWTPs, as emissions of calcium magnesium oxide in the different life-cycle stages (production and use) mainly apply to (waste) water. The aquatic effect and risk assessment only deal with the effect on organisms/ecosystems due to possible pH changes related to OH- discharges, being the toxicity of Ca2+ and Mg2+ is expected to be negligible compared to the (potential) pH effect. Only the local scale is being addressed, including municipal sewage treatment plants (STPs) or industrial waste water treatment plants (WWTPs) when applicable, both for production and industrial use as any effects that might occur would be expected to take place on a local scale. The high water solubility and very low vapour pressure indicate that calcium magnesium oxide will be found predominantly in water. Significant emissions or exposure to air are not expected due to the low vapour pressure of calcium magnesium oxide. Significant emissions or exposure to the terrestrial environment are not expected either for this exposure scenario. The exposure assessment for the aquatic environment will therefore only deal with the possible pH changes in STP effluent and surface water related to the OH- discharges at the local scale. The exposure assessment is approached by assessing the resulting pH impact: the surface water pH should not increase above 9.

Environmental emissions	The production of calcium magnesium oxide can potentially result in an aquatic emission and locally increase the calcium and magnesium concentrations and affect the pH in the aquatic environment. When the pH is not neutralised, the discharge of effluent from calcium magnesium oxide production sites may impact the pH in the receiving water. The pH of effluents is normally measured very frequently and can be neutralised easily as often required by national laws.
Exposure	Waste water from calcium magnesium oxide production is an inorganic wastewater stream and
concentration in	therefore there is no biological treatment. Therefore, wastewater streams from calcium magnesium
waste water treatment	oxide production sites will normally not be treated in biological waste water treatment plants (WWTPs),
plant (WWTP)	but can be used for pH control of acid wastewater streams that are treated in biological WWTPs.
	When calcium magnesium oxide is emitted to surface water, sorption to particulate matter and
Exposure	sediment will be negligible. When lime is rejected to surface water, the pH may increase, depending
concentration in	on the buffer capacity of the water. The higher the buffer capacity of the water, the lower the effect on
aquatic pelagic	
compartment	regulated by the equilibrium between carbon dioxide (CO2), the bicarbonate ion (HCO3-) and the
	carbonate ion (CO32-).
Exposure	The sediment compartment is not included in this ES, because it is not considered relevant for calcium
	magnesium oxide: when calcium magnesium oxide is emitted to the aquatic compartment, sorption of
sediments	to sediment particles is negligible.
Exposure concentrations in soil and groundwater	The terrestrial compartment is not included in this exposure scenario, because it is not considered to be relevant.
Exposure concentration in atmospheric compartment	The air compartment is not included in this CSA because it is considered not relevant for calcium magnesium oxide: when emitted to air as an aerosol in water, calcium magnesium oxide is neutralised as a result of its reaction with CO2 (or other acids), into HCO3- and Ca2+. Subsequently, the salts (e.g. calcium(bi)carbonate) are washed out from the air and thus the atmospheric emissions of neutralised calcium magnesium oxide largely end up in soil and water.
Exposure concentration relevant for the food chain (secondary	Bioaccumulation in organisms is not relevant for calcium magnesium oxide: a risk assessment for secondary poisoning is therefore not required.



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### 4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

#### Occupational exposure

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. This has to be done by showing that they limit the inhalation and dermal exposure to a level below the respective DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (<u>www.ebrc.de/mease.html</u>) to estimate the associated exposure. The dustiness of the substance used can be determined according to the MEASE glossary. For example, substances with a dustiness less than 2.5 % according to the Rotating Drum Method (RDM) are defined as "low dusty", substances with a dustiness less than 10 % (RDM) are defined as "medium dusty"

#### DNEL<sub>inhalation</sub>: 1 mg/m<sup>3</sup> (as respirable dust)

Important note: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m<sup>3</sup>. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).

#### Environmental exposure

If a site does not comply with the conditions stipulated in the safe use ES, it is recommended to apply a tiered approach to perform a more site-specific assessment. For that assessment, the following stepwise approach is recommended.

**Tier 1**: retrieve information on effluent pH and the contribution of the calcium magnesium oxide on the resulting pH. Should the pH be above 9 and be predominantly attributable to lime, then further actions are required to demonstrate safe use.

**Tier 2a**: retrieve information on receiving water pH after the discharge point. The pH of the receiving water shall not exceed the value of 9. If the measures are not available, the pH in the river can be calculated as follows:

$$pHriver = Log \left[ \frac{Qeffluent * 10^{pHeffluent} + Qriverupstream * 10^{pHupstream}}{Qriverupstream + Qeffluent} \right]$$
(Eq 1)

Where:

Q effluent refers to the effluent flow (in m³/day)

Q river upstream refers to the upstream river flow (in m<sup>3</sup>/day)

pH effluent refers to the pH of the effluent

pH upstream river refers to the pH of the river upstream of the discharge point

Please note that initially, default values can be used:

- Q river upstream flows: use the 10th of existing measurements distribution or use default value of 18000 m<sup>3</sup>/day
- Q effluent: use default value of 2000 m<sup>3</sup>/day
- The upstream pH is preferably a measured value. If not available, one can assume a neutral pH of 7 if this can be justified.

Such equation has to be seen as a worst case scenario, where water conditions are standard and not case specific.

**Tier 2b**: Equation 1 can be used to identify which effluent pH causes an acceptable pH level in the receiving body. In order to do so, pH of the river is set at value 9 and pH of the effluent is calculated accordingly (using default values as reported previously, if necessary). As temperature influences lime solubility, pH effluent might require to be adjusted on a case-by-case basis. Once the maximum admissible pH value in the effluent is established, it is assumed that the OH- concentrations are all dependent on lime discharge and that there is no buffer capacity conditions to consider (this is a unrealistic worst case scenario, which can be modified where information is available). Maximum load of lime that can be annually rejected without negatively affecting the pH of the receiving water is calculated assuming chemical equilibrium. OH- expressed as moles/litre are multiplied by average flow of the effluent and then divided by the molar mass of the calcium magnesium oxide.

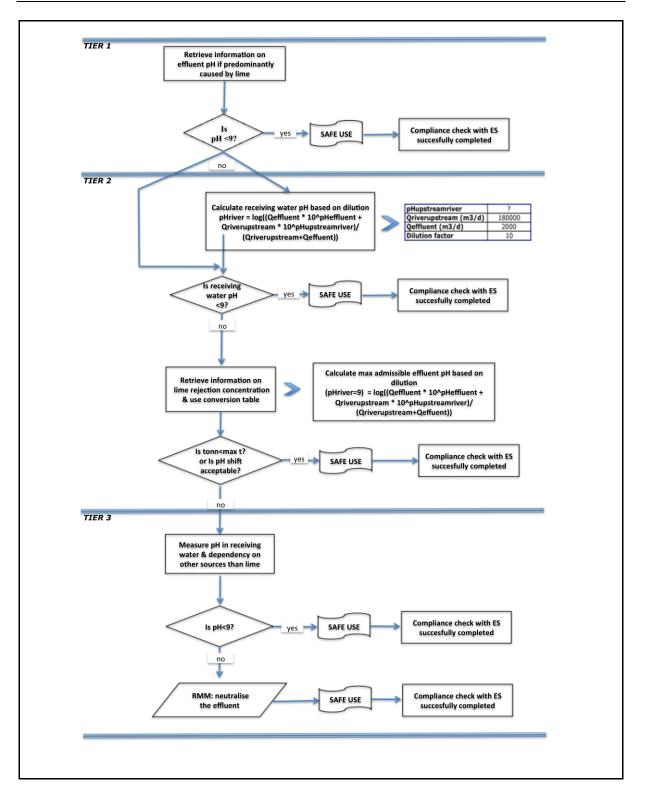
**Tier 3**: measure the pH in the receiving water after the discharge point. If pH is below 9, safe use is reasonably demonstrated and the ES ends here. If pH is found to be above 9, risk management measures have to be implemented: the effluent has to undergo neutralisation, thus ensuring safe use of lime during production or use phase.



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# ES number 9.6: Professional uses of aqueous solutions of lime substances

Exposure Scenario	o Format (1) addressing uses carried o	out by workers			
1. Title	1. Title				
Free short title	Professional uses of aqueous solutions of lime substances				
Systematic title based on use descriptor	SU22, SU1, SU5, SU6a, SU6b, SU7, SU10, SU11, SU12, SU13, SU16, SU17, SU18, SU19, SU20, SU23,         PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18, PC19, PC20, PC21, PC23, PC24, PC25, PC26, PC27, PC28, PC29, PC30, PC31, PC32, PC33, PC34, PC35, PC36, PC37, PC39, PC40         AC1, AC2, AC3, AC4, AC5, AC6, AC7, AC8, AC10, AC11, AC13         (appropriate PROCs and ERCs are given in Section 2 below)				
Processes, tasks and/or activities covered	Processes, tasks and/or activities covered are des	cribed in Section 2 below.			
Assessment Method	The assessment of inhalation exposure is base environmental assessment is based on FOCUS-E	d on the exposure estimation tool MEASE. The xposit.			
2. Operational con	ditions and risk management measure	es			
PROC/ERC	REACH definition	Involved tasks			
PROC 2	Use in closed, continuous process with occasional controlled exposure				
PROC 3	Use in closed batch process (synthesis or formulation)				
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises				
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)				
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities				
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities				
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	Further information is provided in the ECHA Guidance on information requirements and chemical safety assessment, Chapter R.12: Use			
PROC 10	Roller application or brushing	descriptor system (ECHA-2010-G-05-EN).			
PROC 11	Non industrial spraying				
PROC 12	Use of blowing agents in manufacture of foam				
PROC 13	Treatment of articles by dipping and pouring				
PROC 15	Use as laboratory reagent				
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected				
PROC 17	Lubrication at high energy conditions and in partly open process				
PROC 18	Greasing at high energy conditions				
PROC 19	Hand-mixing with intimate contact and only PPE available				
ERC2, ERC8a, ERC8b, ERC8c, ERC8d, ERC8e, ERC8f	Wide dispersive indoor and outdoor use of reactive substances or processing aids in open systems	Calcium magnesium oxide is applied in numerous cases of wide dispersive uses: agricultural, forestry, fish and shrimps farming, soil treatment and environmental protection.			



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2.1 Control of workers exposure						
Product characteristic						
is reflected by an assign at ambient temperature temperature based, takin abrasive tasks are based	According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. Whereas in hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, high abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. The spraying of aqueous solutions (PROC7 and 11) is assumed to be involved with a medium emission.					
PROC	Use in preparation	Content in preparation	Physical form	Emission potential		
All applicable PROCs	not restricted		aqueous solution	very low		
Amounts used						
combination of the scale	ndled per shift is not con of operation (industrial vs. of the process intrinsic em	professional) and level of				
Frequency and duratio	n of use/exposure					
PROC	Duration of exposure					
PROC 11	≤ 240 minutes					
All other applicable PROCs	480 minutes (not restricted	ed)				
Human factors not infl	uenced by risk managen	nent				
The shift breathing volur	ne during all process step	s reflected in the PROCs	is assumed to be 10 m <sup>3</sup> /sł	nift (8 hours).		
Other given operationa	al conditions affecting w	orkers exposure				
	s are not used in hot-met ot considered relevant for					
	nd measures at process					
Risk management meas required in the processe	sures at the process level s.	(e.g. containment or seg	regation of the emission s	source) are generally not		
Technical conditions a	nd measures to control	dispersion from source	towards the worker			
PROC	Level of separation	Localised controls (LC)	Efficiency of LC (according to MEASE)	Further information		
PROC 19	Separation of workers from the emission source is generally not	not applicable	na	-		
All other applicable PROCs	required in the conducted processes.	not required	na	-		
Organisational measur	es to prevent /limit relea	ses, dispersion and exp	oosure			
Avoid inhelation or indestion. General occupational hydrane measures are required to ensure a safe handling of the substance						

Avoid inhalation or ingestion. General occupational hygiene measures are required to ensure a safe handling of the substance. These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), no eating and smoking at the workplace, the wearing of standard working clothes and shoes unless otherwise stated below. Shower and change clothes at end of work shift. Do not wear contaminated clothing at home. Do not blow dust off with compressed air.



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	Specification of	RPE efficiency		Further personal
PROC	respiratory protective equipment (RPE)	(assigned protection factor, APF)	Specification of gloves	protective equipment (PPE)
PROC 11	FFP3 mask	APF=20	Since calcium	Eye protection equipment (e.g. goggles or visors) must be worn, unless
PROC 17	FFP1 mask	APF=4	magnesium oxide is classified as irritating to skin, the use of protective gloves is	potential contact with the eye can be excluded by the nature and type of application (i.e. closed process).
All other applicable PROCs	not required	na	mandatory for all process steps.	Additionally, face protection, protective clothing and safety shoes are required to be worn as appropriate.
contours of the face prop The employer and self-e		and reasonabilities for th		
devices and the manage policy for a respiratory p An overview of the APFs 2.2 Control of envi Product characteristics	ement of their correct use rotective device programm s of different RPE (accordi ironmental exposur s	e in the workplace. There ne including training of the ing to BS EN 529:2005) ca re – only relevant fo	fore, they should define a workers. an be found in the glossar <mark>, r agricultural soil p</mark>	and document a suitable y of MEASE. <mark>rotection</mark>
devices and the manage policy for a respiratory p An overview of the APFs 2.2 Control of envi Product characteristics	ement of their correct use rotective device programm s of different RPE (accordi ironmental exposur s e estimate based on data	e in the workplace. There ne including training of the ing to BS EN 529:2005) ca re – only relevant fo from dust measurements	fore, they should define a workers. an be found in the glossar <mark>, r agricultural soil p</mark>	and document a suitable y of MEASE. <mark>rotection</mark>
devices and the manage policy for a respiratory p An overview of the APFs 2.2 Control of envi Product characteristics	ement of their correct use rotective device programm s of different RPE (accordin tronmental exposur s te estimate based on data	e in the workplace. There ne including training of the ing to BS EN 529:2005) ca re – only relevant for from dust measurements ntity of dust	fore, they should define a workers. an be found in the glossar <mark>, r agricultural soil p</mark>	and document a suitable y of MEASE. <mark>rotection</mark>
devices and the manage policy for a respiratory p An overview of the APFs 2.2 Control of envi Product characteristics	ement of their correct use rotective device programm s of different RPE (accordin tronmental exposur s te estimate based on data	e in the workplace. There ne including training of the ing to BS EN 529:2005) ca re – only relevant fo from dust measurements	fore, they should define a workers. an be found in the glossar <mark>, r agricultural soil p</mark>	and document a suitable y of MEASE. rotection distance from application)
devices and the manage policy for a respiratory p An overview of the APFs 2.2 Control of envi Product characteristics	ement of their correct use rotective device programm s of different RPE (accordin tronmental exposure s the estimate based on data Quar per 120 100 80	e in the workplace. There ne including training of the ing to BS EN 529:2005) ca re – only relevant for from dust measurements ntity of dust	fore, they should define a workers. an be found in the glossar <b>r agricultural soil p</b> in air as a function of the d	and document a suitable y of MEASE. rotection distance from application
devices and the manage policy for a respiratory p An overview of the APFs 2.2 Control of envi Product characteristics	ement of their correct use rotective device programm s of different RPE (accordin tronmental exposur s te estimate based on data Quar per 120 100	e in the workplace. There ne including training of the ing to BS EN 529:2005) ca re – only relevant for from dust measurements ntity of dust	fore, they should define a workers. an be found in the glossar r agricultural soil p in air as a function of the c Wind speed - 3.5 m/s - 6 m/s	and document a suitable y of MEASE. rotection distance from application
devices and the manage policy for a respiratory p An overview of the APFs 2.2 Control of envi Product characteristics	ement of their correct use rotective device programm s of different RPE (accordin ironmental exposur s e estimate based on data Quar per 120 100 80 60 40	e in the workplace. There ne including training of the ing to BS EN 529:2005) ca <b>re – only relevant fo</b> from dust measurements ntity of dust m3 (in mg)	fore, they should define a e workers. an be found in the glossar r agricultural soil p in air as a function of the c Wind speed - 3.5 m/s - 6 m/s - 3.5 m/s	and document a suitable y of MEASE. rotection distance from application
devices and the manage policy for a respiratory p An overview of the APFs 2.2 Control of envi Product characteristics	ement of their correct use rotective device programm s of different RPE (accordin ironmental exposur s e estimate based on data Quar per 120 100 80 60 40	e in the workplace. There ne including training of the ing to BS EN 529:2005) ca re – only relevant for from dust measurements ntity of dust	fore, they should define a e workers. an be found in the glossar r agricultural soil p in air as a function of the c Wind speed - 3.5 m/s - 6 m/s - 3.5 m/s	and document a suitable y of MEASE. rotection distance from application
devices and the manage policy for a respiratory p An overview of the APFs 2.2 Control of envi Product characteristics	ement of their correct use rotective device programm s of different RPE (accordin ironmental exposur s e estimate based on data Quar per 120 100 80 60 40	e in the workplace. There ne including training of the ing to BS EN 529:2005) ca <b>re – only relevant fo</b> from dust measurements ntity of dust m3 (in mg)	fore, they should define a workers. an be found in the glossar r agricultural soil p in air as a function of the c Wind speed - 3.5 m/s - 6 m/s - 3.5 m/s - 3.5 m/s	m the



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Amounts used	
CaO.MgO 1,478 kg/ha	
Frequency and duration of use	
1 day/year (one application per year). Mu 1,478kg/ha is not exceeded (CaO.MgO)	ultiple applications during the year are allowed, provided the total yearly amount of
Environment factors not influenced by	risk management
Volume of surface water: 300 L/m <sup>2</sup> Field surface area: 1 ha	
Other given operational conditions affe	ecting environmental exposure
Outdoor use of products Soil mixing depth: 20 cm	
	process level (source) to prevent release
There are no direct releases to adjacent s	surface waters.
Technical conditions and measures to	reduce or limit discharges, air emissions and releases to soil
Drift should be minimised.	
Organizational measures to prevent/lin	nit release from site
In line with the requirements for good agr the application rate should be adjusted ac	icultural practice, agricultural soil should be analysed prior to application of lime and cording to the results of the analysis.
2.2 Control of environmental ex	xposure – only relevant for urban soil treatment
Product characteristics	
	Quantity of dust per m3 (in mg) Wind speed: - 3.5 m/s - 6 m/s - 3.5 m/s - 3.5 m/s Distance from the spreader(in m)
Amounts used	Figure taken from: Laudet, A. et al., 1999)
CaO.MgO 156,969 kg/ha	
Frequency and duration of use	
	lultiple applications during the year are allowed, provided the total yearly amount of D)
Environment factors not influenced by	risk management
Field surface area: 1 ha	



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Other given operational conditions affecting environmental exposure

Outdoor use of products Soil mixing depth: 20 cm

Technical conditions and measures at process level (source) to prevent release

Lime is only applied onto the soil in the technosphere zone before road construction. There are no direct releases to adjacent surface waters.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Drift should be minimised.

3. Exposure estimation and reference to its source

**Occupational exposure** 

The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium magnesium oxide of 1 mg/m<sup>3</sup> (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.

PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)
PROC 2, 3, 4, 5, 8a, 8b, 9, 10, 11, 12, 13, 15, 16, 17, 18, 19	MEASE	< 1 mg/m³ (<0.001 – 0.6)	irritating to skin, derma minimised as far as tech for dermal effects has r	

Environmental exposure for agricultural soil protection

The PEC calculation for soil and surface water was based on the FOCUS soil group (FOCUS, 1996) and on the "draft guidance on the calculation of predicted environmental concentration values (PEC) of plant protection products for soil, ground water, surface water and sediment (Kloskowksi et al., 1999). The FOCUS/EXPOSIT modelling tool is preferred to the EUSES as it is more appropriate for agricultural-like application as in this case where parameter as the drift needs to be included in the modelling. FOCUS is a model typically developed for biocidal applications and was further elaborated on the basis of the German EXPOSIT 1.0 model, where parameters such as drifts can be improved according to collected data: once applied on the soil, calcium magnesium oxide can indeed migrate then towards surface waters, via drift.

Environmental emissions	See amounts used				
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for agricultural soil protection				
Exposure	Substance	PEC (ug/L)	PNEC (ug/L)	RCR	
concentration in aquatic pelagic compartment	CaO.MgO	4.93	320	0.015	
Exposure concentration in sediments	waters the hydroxide ion reacting with Ca2+. The	As described above, no exposure of surface water nor sediment to lime is expected. Further, in natural waters the hydroxide ions react with HCO3– to form water and CO32 CO32- forms CaCO3 by reacting with Ca2+. The calcium carbonate precipitates and deposits on the sediment. Calcium carbonate is of low solubility and a constituent of natural soils.			
Exposure	Substance				
concentrations in soil and groundwater	CaO.MgO	434	712	0.61	
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium magnesium oxide is not volatile. The vapour pressures is below $10^{-5}$ Pa.				
Exposure concentration relevant for the food chain (secondary poisoning)	and essential in the envi	t because calcium magne ironment. The uses cover nd OH <sup>-</sup> ) in the environmen	ed do not significantly inf		



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#### Environmental exposure for urban soil treatment

The urban soil treatment scenario is based on a road border scenario. At the special road border technical meeting (Ispra, September 5, 2003), EU Member States and industry agreed on a definition for a "road technosphere". The road technosphere can be defined as "the engineered environment that carries the geotechnical functions of the road in connection with its structure, operation and maintenance including the installations to ensure road safety and manage run off. This technosphere, which includes the hard and soft shoulder at the edge of the carriageway, is vertically dictated by the groundwater watertable. The road authority has responsibility for this road technosphere including road safety, road support, prevention of pollution and water management". The road technosphere was therefore excluded as assessment endpoint for risk assessment for the purpose of the existing/new substances regulations. The target zone is the zone beyond the technosphere, to which the environmental risk assessment applies.

The PEC calculation for soil was based on the FOCUS soil group (FOCUS, 1996) and on the "draft guidance on the calculation of predicted environmental concentration values (PEC) of plant protection products for soil, ground water, surface water and sediment (Kloskowksi et al., 1999). The FOCUS/EXPOSIT modelling tool is preferred to the EUSES as it is more appropriate for agricultural-like application as in this case where parameter as the drift needs to be included in the modelling. FOCUS is a model typically developed for biocidal applications and was further elaborated on the basis of the German EXPOSIT 1.0 model, where parameters such as drifts can be improved according to collected data.

where parameters such	as units can be improved	according to concoled dat	.u.		
Environmental emissions	See amounts used				
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for road border scenario				
Exposure concentration in aquatic pelagic compartment	Not relevant for road border scenario				
Exposure concentration in sediments	Not relevant for road bor	Not relevant for road border scenario			
Exposure concentrations in soil	Substance	PEC (mg/L)	PNEC (mg/L)	RCR	
and groundwater	CaO.MgO	462	712	0.65	
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium magnesium oxide is not volatile. The vapour pressures is below 10 <sup>-5</sup> Pa.				
Exposure concentration relevant for the food chain (secondary poisoning)	This point is not relevant because calcium can be considered to be omnipresent and essential in the environment. The uses covered do not significantly influence the distribution of the constituents (Ca <sup>2+</sup> and OH <sup>2</sup> ) in the environment.				
Environmental exposu	Environmental exposure for other uses				
<ul> <li>The operation protection or u</li> </ul>	antitative environmental e al conditions and risk man ırban soil treatment redient and chemically bou	agement measures are le	ess stringent than those or	0	

Entre is an ingredient and chemically bound into a matrix. Releases are negligible and insufficient to cause a pre-similar in soil, wastewater or surface water
 Lime is pre-sifically used to release CO2 free breathable siz user relation with CO2. Such applications only relation

• Lime is specifically used to release CO2-free breathable air, upon reaction with CO2. Such applications only relates to the air compartment, where the lime properties are exploited

• Neutralisation/pH-shift is the intended use and there are no additional impacts beyond those desired.



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#### 4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. This has to be done by showing that they limit the inhalation and dermal exposure to a level below the respective DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (<u>www.ebrc.de/mease.html</u>) to estimate the associated exposure. The dustiness of the substance used can be determined according to the MEASE glossary. For example, substances with a dustiness less than 2.5 % according to the Rotating Drum Method (RDM) are defined as "low dusty", substances with a dustiness less than 10 % (RDM) are defined as "medium dusty" and substances with a dustiness ≥10 % are defined as "high dusty".

### DNEL<sub>inhalation</sub>: 1 mg/m<sup>3</sup> (as respirable dust)

Important note: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m<sup>3</sup>. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).



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# ES number 9.7: Professional uses of low dusty solids/powders of lime substances

Exposure Scenario	o Format (1) addressing uses carried o	out by workers		
1. Title	1. Title			
Free short title	Professional uses of low dusty solids/powders of lime substances			
Systematic title based on use descriptor	SU22, SU1, SU5, SU6a, SU6b, SU7, SU10, SU11, SU12, SU13, SU16, SU17, SU18, SU19, SU20, SU23, PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18, PC19, PC20, PC21, PC23, PC24, PC25, PC26, PC27, PC28, PC29, PC30, PC31, PC32, PC33, PC34, PC35, PC36, PC37, PC39, PC39, PC40 AC1, AC2, AC3, AC4, AC5, AC6, AC7, AC8, AC10, AC11, AC13 (appropriate PROCs and ERCs are given in Section 2 below)			
Processes, tasks and/or activities covered	Processes, tasks and/or activities covered are des	cribed in Section 2 below.		
Assessment Method	The assessment of inhalation exposure is base environmental assessment is based on FOCUS-E	d on the exposure estimation tool MEASE. The xposit.		
2. Operational con	ditions and risk management measure	es		
PROC/ERC	REACH definition	Involved tasks		
PROC 2	Use in closed, continuous process with occasional controlled exposure			
PROC 3	Use in closed batch process (synthesis or formulation)			
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises			
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)			
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities			
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities			
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)			
PROC 10	Roller application or brushing	Further information is provided in the ECH Guidance on information requirements ar chemical safety assessment, Chapter R.12: Us		
PROC 11	Non industrial spraying			
PROC 13	Treatment of articles by dipping and pouring	descriptor system (ECHA-2010-G-05-EN).		
PROC 15	Use as laboratory reagent			
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected			
PROC 17	Lubrication at high energy conditions and in partly open process			
PROC 18	Greasing at high energy conditions			
PROC 19	Hand-mixing with intimate contact and only PPE available			
PROC 21	Low energy manipulation of substances bound in materials and/or articles			
PROC 25	Other hot work operations with metals			
PROC 26	Handling of solid inorganic substances at ambient temperature			
ERC2, ERC8a, ERC8b, ERC8c,	Wide dispersive indoor and outdoor use of reactive substances or processing aids in open systems			



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ERC8d, ERC ERC8f	8e,					
2.1 Control of w	orkers exposure					
Product characteris	stic					
is reflected by an as at ambient temperati temperature based,	ASE approach, the substance signment of a so-called fugac ure the fugacity is based on ti taking into account the proces ased on the level of abrasion	ity class in the MEASE too he dustiness of that subst is temperature and the me instead of the substance i	ol. For operations conduct ance. Whereas in hot me elting point of the substan	ted with solid substances tal operations, fugacity is ce. As a third group, high		
PROC	Use in preparation	Use in preparation Content in Physical form Emission potential				
PROC 25	not restricted		solid/powder, molten	high		
All other applica PROCs	ble not restricted		solid/powder	low		
Amounts used						
combination of the so	handled per shift is not cor cale of operation (industrial vs. ant of the process intrinsic en	professional) and level of				
Frequency and dur	ation of use/exposure					
PROC	Duration of exposure					
PROC 17	≤ 240 minutes					
All other applica PROCs	ble 480 minutes (not restrict	ed)				
Human factors not	influenced by risk manager	nent				
The shift breathing v	olume during all process step	s reflected in the PROCs i	is assumed to be 10 m <sup>3</sup> /sl	hift (8 hours).		
Other given operati	ional conditions affecting w	orkers exposure				
assessment of the c exposure assessment temperatures are exp	ns like process temperature a conducted processes. In proc nt in MEASE is however base pected to vary within the indus process temperatures are auto	ess steps with considerated ad on the ratio of process stry the highest ratio was t	oly high temperatures (i.e temperature and melting aken as a worst case ass	<ul> <li>PROC 22, 23, 25), the point. As the associated umption for the exposure</li> </ul>		
	ns and measures at process	• •				
Risk management m required in the proce	neasures at the process level	(e.g. containment or seg	regation of the emission s	source) are generally no		
Technical condition	ns and measures to control	dispersion from source	towards the worker			
PROC	Level of separation	Localised controls (LC)	Efficiency of LC (according to MEASE)	Further information		
PROC 19	Any potentially required separation of workers from the emission source is indicated above under "Frequency and duration of exposure".	not applicable	na	-		
All other applica PROCs	A reduction of exposure duration can be achieved, for example, by the installation of	not required	na	-		



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#### Organisational measures to prevent /limit releases, dispersion and exposure

Avoid inhalation or ingestion. General occupational hygiene measures are required to ensure a safe handling of the substance. These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), no eating and smoking at the workplace, the wearing of standard working clothes and shoes unless otherwise stated below. Shower and change clothes at end of work shift. Do not wear contaminated clothing at home. Do not blow dust off with compressed air.

#### Conditions and measures related to personal protection, hygiene and health evaluation

PROC	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further personal protective equipment (PPE)
PROC 4, 5, 11, 26	FFP1 mask	APF=4		Eye protection
PROC 16, 17, 18, 25	FFP2 mask	APF=10		equipment (e.g. goggles or visors) must
All other applicable PROCs	not required	na	Since calcium magnesium oxide is classified as irritating to skin, the use of protective gloves is mandatory for all process steps.	be worn, unless potential contact with the eye can be excluded by the nature and type of application (i.e. closed process). Additionally, face protection, protective clothing and safety shoes are required to be worn as appropriate.

Any RPE as defined above shall only be worn if the following principles are implemented in parallel: The duration of work (compare with "duration of exposure" above) should reflect the additional physiological stress for the worker due to the breathing resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the wearing of RPE.

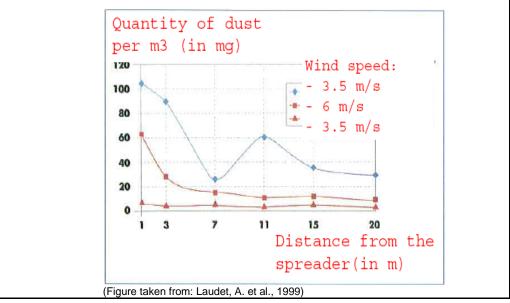
For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the face properly and securely.

The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and the management of their correct use in the workplace. Therefore, they should define and document a suitable policy for a respiratory protective device programme including training of the workers. An overview of the APFs of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE.

2.2 Control of environmental exposure – only relevant for agricultural soil protection

#### **Product characteristics**

Drift: 1% (very worst-case estimate based on data from dust measurements in air as a function of the distance from application)





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Amounts used	
CaO.MgO	1,478 kg/ha
Frequency and duration	n of use
1 day/year (one applica 1,478kg/ha is not excee	tion per year) . Multiple applications during the year are allowed, provided the total yearly amount of ded (CaO.MgO).
Environment factors n	ot influenced by risk management
Volume of surface wate Field surface area: 1 ha	r: 300 L/m²
	al conditions affecting environmental exposure
Outdoor use of products Soil mixing depth: 20 cm	
Technical conditions a	ind measures at process level (source) to prevent release
There are no direct relea	ases to adjacent surface waters.
Technical conditions a	nd measures to reduce or limit discharges, air emissions and releases to soil
Drift should be minimise	d.
Organizational measu	res to prevent/limit release from site
	ents for good agricultural practice, agricultural soil should be analysed prior to application of lime and Ild be adjusted according to the results of the analysis.
2.2 Control of env	ironmental exposure – only relevant for urban soil treatment
Product characteristic	S
	Quantity of dust per m3 (in mg) Wind speed: - 3.5 m/s - 6 m/s - 3.5 m/s - 3.5 m/s - 3.5 m/s Distance from the spreader(in m)
Amounts used	(Figure taken from: Laudet, A. et al., 1999)
Amounts used CaO.MgO	156,969 kg/ha
Frequency and duration	n of use
	ce in a lifetime. Multiple applications during the year are allowed, provided the total yearly amount of
Environment factors n	ot influenced by risk management
Field surface area: 1 ha	



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Other given operational conditions affecting environmental exposure

Outdoor use of products Soil mixing depth: 20 cm

Technical conditions and measures at process level (source) to prevent release

Lime is only applied onto the soil in the technosphere zone before road construction. There are no direct releases to adjacent surface waters.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Drift should be minimised.

3. Exposure estimation and reference to its source

**Occupational exposure** 

The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium magnesium oxide of 1 mg/m<sup>3</sup> (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.

PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)
PROC 2, 3, 4, 5, 8a, 8b, 9, 10, 11, 13, 15, 16, 17, 18, 19, 21, 25, 26		< 1 mg/m³ (0.01 – 0.75)	irritating to skin, derma minimised as far as tech for dermal effects has r	Im oxide is classified as al exposure has to be nically feasible. A DNEL not been derived. Thus, ssessed in this exposure

Environmental exposure for agricultural soil protection

The PEC calculation for soil and surface water was based on the FOCUS soil group (FOCUS, 1996) and on the "draft guidance on the calculation of predicted environmental concentration values (PEC) of plant protection products for soil, ground water, surface water and sediment (Kloskowksi et al., 1999). The FOCUS/EXPOSIT modelling tool is preferred to the EUSES as it is more appropriate for agricultural-like application as in this case where parameter as the drift needs to be included in the modelling. FOCUS is a model typically developed for biocidal applications and was further elaborated on the basis of the German EXPOSIT 1.0 model, where parameters such as drifts can be improved according to collected data: once applied on the soil, calcium magnesium oxide can indeed migrate then towards surface waters, via drift.

Environmental emissions	See amounts used	See amounts used				
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for agricultural soil protection					
Exposure	Substance	PEC (ug/L)	PNEC (ug/L)	RCR		
concentration in aquatic pelagic compartment	CaO.MgO	4.93	320	0.015		
Exposure concentration in sediments	As described above, no exposure of surface water nor sediment to lime is expected. Further, in natural waters the hydroxide ions react with HCO3- to form water and CO32 CO32- forms CaCO3 by reacting with Ca2+. The calcium carbonate precipitates and deposits on the sediment. Calcium carbonate is of low solubility and a constituent of natural soils.					
Exposure	Substance	PEC (mg/L)	PNEC (mg/L)	RCR		
concentrations in soil and groundwater	CaO.MgO	434	712	0.61		
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium magnesium oxide is not volatile. The vapour pressures is below 10 <sup>-5</sup> Pa.					
Exposure concentration relevant for the food chain (secondary poisoning)	This point is not relevant because calcium can be considered to be omnipresent and essential in the environment. The uses covered do not significantly influence the distribution of the constituents (Ca <sup>2+</sup> and OH <sup>-</sup> ) in the environment.					



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#### Environmental exposure for urban soil treatment

The urban soil treatment scenario is based on a road border scenario. At the special road border technical meeting (Ispra, September 5, 2003), EU Member States and industry agreed on a definition for a "road technosphere". The road technosphere can be defined as "the engineered environment that carries the geotechnical functions of the road in connection with its structure, operation and maintenance including the installations to ensure road safety and manage run off. This technosphere, which includes the hard and soft shoulder at the edge of the carriageway, is vertically dictated by the groundwater watertable. The road authority has responsibility for this road technosphere including road safety, road support, prevention of pollution and water management". The road technosphere was therefore excluded as assessment endpoint for risk assessment for the purpose of the existing/new substances regulations. The target zone is the zone beyond the technosphere, to which the environmental risk assessment applies.

The PEC calculation for soil was based on the FOCUS soil group (FOCUS, 1996) and on the "draft guidance on the calculation of predicted environmental concentration values (PEC) of plant protection products for soil, ground water, surface water and sediment (Kloskowksi et al., 1999). The FOCUS/EXPOSIT modelling tool is preferred to the EUSES as it is more appropriate for agricultural-like application as in this case where parameter as the drift needs to be included in the modelling. FOCUS is a model typically developed for biocidal applications and was further elaborated on the basis of the German EXPOSIT 1.0 model, where parameters such as drifts can be improved according to collected data.

miere parametere eaen	as units can be improved	according to concetted dat				
Environmental emissions	See amounts used					
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for road border scenario					
Exposure concentration in aquatic pelagic compartment	Not relevant for road bor	Not relevant for road border scenario				
Exposure concentration in sediments	Not relevant for road border scenario					
Exposure concentrations in soil	Substance	PEC (mg/L)	PNEC (mg/L)	RCR		
and groundwater	CaO.MgO	462	712	0.65		
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium magnesium oxide is not volatile. The vapour pressures is below 10 <sup>-5</sup> Pa.					
Exposure concentration relevant for the food chain (secondary poisoning)	This point is not relevant because calcium can be considered to be omnipresent and essential in the environment. The uses covered do not significantly influence the distribution of the constituents (Ca <sup>2+</sup> and OH <sup>-</sup> ) in the environment.					
Environmental exposure for other uses						
<ul> <li>The operation protection or u</li> </ul>	urban soil treatment	agement measures are le	ess stringent than those or	utlined for agricultural soil ficient to cause a pH-shift		

 Entre is an ingredient and chemically bound into a matrix. Releases are negligible and insufficient to cause a pri-sinit in soil, wastewater or surface water
 Lime is propriet and the release CO2 free breathable air, upon reaction with CO2. Such applications only related

• Lime is specifically used to release CO2-free breathable air, upon reaction with CO2. Such applications only relates to the air compartment, where the lime properties are exploited

• Neutralisation/pH-shift is the intended use and there are no additional impacts beyond those desired.



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#### 4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. This has to be done by showing that they limit the inhalation and dermal exposure to a level below the respective DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (<u>www.ebrc.de/mease.html</u>) to estimate the associated exposure. The dustiness of the substance used can be determined according to the MEASE glossary. For example, substances with a dustiness less than 2.5 % according to the Rotating Drum Method (RDM) are defined as "low dusty", substances with a dustiness less than 10 % (RDM) are defined as "medium dusty" and substances with a dustines is stan 2.5 %.

#### DNEL<sub>inhalation</sub>: 1 mg/m<sup>3</sup> (as respirable dust)

<u>Important note</u>: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m<sup>3</sup>. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).



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# ES number 9.8: Professional uses of medium dusty solids/powders of lime substances

Exposure Scenario	o Format (1) addressing uses carried o	out by workers		
1. Title				
Free short title	Professional uses of medium dusty solids/powders	s of lime substances		
Systematic title based on use descriptor	SU23, PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11,			
Processes, tasks and/or activities covered	Processes, tasks and/or activities covered are des	cribed in Section 2 below.		
Assessment Method	The assessment of inhalation exposure is base environmental assessment is based on FOCUS-E	d on the exposure estimation tool MEASE. The xposit.		
2. Operational con	ditions and risk management measure	es		
PROC/ERC	REACH definition	Involved tasks		
PROC 2	Use in closed, continuous process with occasional controlled exposure			
PROC 3	Use in closed batch process (synthesis or formulation)			
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises			
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)			
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities			
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities			
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)			
PROC 10	Roller application or brushing	Further information is provided in the ECHA Guidance on information requirements and		
PROC 11	Non industrial spraying	chemical safety assessment, Chapter R.12: Use		
PROC 13	Treatment of articles by dipping and pouring	descriptor system (ECHA-2010-G-05-EN).		
PROC 15	Use as laboratory reagent			
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected			
PROC 17	Lubrication at high energy conditions and in partly open process			
PROC 18	Greasing at high energy conditions	1		
PROC 19	Hand-mixing with intimate contact and only PPE available	]		
PROC 25	Other hot work operations with metals	1		
PROC 26	Handling of solid inorganic substances at ambient temperature			
ERC2, ERC8a, ERC8b, ERC8c, ERC8d, ERC8e, ERC8f	Wide dispersive indoor and outdoor use of reactive substances or processing aids in open systems			



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2.1 Control of wor	kers exposure						
Product characteristic							
is reflected by an assign at ambient temperature temperature based, takir	ment of a so-called fugaci the fugacity is based on the ng into account the proces	e-intrinsic emission potent ity class in the MEASE toon ne dustiness of that substrass temperature and the me instead of the substance in	bl. For operations conduct ance. Whereas in hot me elting point of the substan	ed with solid substances cal operations, fugacity is ce. As a third group, high			
PROC	Use in preparation	Content in preparation	Physical form	Emission potential			
PROC 25	not restricted		solid/powder, molten	high			
All other applicable PROCs	not restricted		solid/powder	medium			
Amounts used							
combination of the scale		sidered to influence the professional) and level of ission potential.					
Frequency and duratio	n of use/exposure						
PROC	Duration of exposure						
PROC 11, 16, 17, 18, 19	≤ 240 minutes						
All other applicable PROCs	480 minutes (not restrict	ed)					
Human factors not influ	uenced by risk managen	nent					
The shift breathing volum	ne during all process step	s reflected in the PROCs i	is assumed to be 10 m³/sl	nift (8 hours).			
Other given operationa	I conditions affecting w	orkers exposure					
assessment of the cond exposure assessment in temperatures are expect	ucted processes. In proc MEASE is however base red to vary within the indust	nd process pressure are ess steps with considerab ed on the ratio of process stry the highest ratio was t pomatically covered in this e	bly high temperatures (i.e temperature and melting aken as a worst case ass	. PROC 22, 23, 25), the point. As the associated umption for the exposure			
		level (source) to prever					
Risk management meas required in the processe		(e.g. containment or seg	regation of the emission s	source) are generally not			
Technical conditions a	nd measures to control	dispersion from source	-				
PROC	Level of separation	(LC)	Efficiency of LC (according to MEASE)	Further information			
PROC 11, 16	Any potentially required separation of workers from the emission	generic local exhaust ventilation	72 %	-			
PROC 17, 18	source is indicated above under	source is indicated integrated local exhaust 87 %					
PROC 19	"Frequency and duration of exposure". not applicable na -						
All other applicable PROCs	duration can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with relevant exposure.	A reduction of exposure luration can be inchieved, for example, by the installation of entilated (positive pressure) control rooms or by removing the vorker from workplaces					



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#### Organisational measures to prevent /limit releases, dispersion and exposure

Avoid inhalation or ingestion. General occupational hygiene measures are required to ensure a safe handling of the substance. These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), no eating and smoking at the workplace, the wearing of standard working clothes and shoes unless otherwise stated below. Shower and change clothes at end of work shift. Do not wear contaminated clothing at home. Do not blow dust off with compressed air.

#### Conditions and measures related to personal protection, hygiene and health evaluation

PROC	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further personal protective equipment (PPE)
PROC 2, 3, 16, 19	FFP1 mask	APF=4		Eye protection equipment (e.g.
PROC 4, 5, 8a, 8b, 9, 10, 13, 17, 18, 25, 26	FFP2 mask	APF=10		goggles or visors) must be worn, unless
PROC 11	FFP1 mask	APF=10	Since calcium magnesium oxide is classified as irritating to skin, the use of protective gloves is mandatory for all process steps.	potential contact with the eye can be excluded by the nature and type of application (i.e. closed process). Additionally, face protection, protective clothing and safety shoes are required to be worn as appropriate.

Any RPE as defined above shall only be worn if the following principles are implemented in parallel: The duration of work (compare with "duration of exposure" above) should reflect the additional physiological stress for the worker due to the breathing resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the wearing of RPE.

For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the face properly and securely.

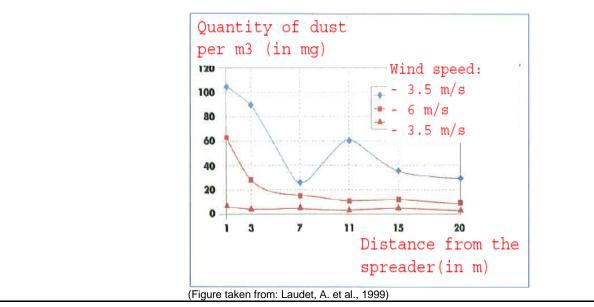
The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and the management of their correct use in the workplace. Therefore, they should define and document a suitable policy for a respiratory protective device programme including training of the workers.

An overview of the APFs of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE.

2.2 Control of environmental exposure – only relevant for agricultural soil protection

#### **Product characteristics**

Drift: 1% (very worst-case estimate based on data from dust measurements in air as a function of the distance from application)





prepared in accordance with Annex II of the REACH Regulation EC

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Amounts used	
CaO.MgO	1,478 kg/ha
Frequency and d	uration of use
	pplication per year) . Multiple applications during the year are allowed, provided the total yearly amount of exceeded (CaO.MgO).
	tors not influenced by risk management
Volume of surface Field surface area	
Other given oper	ational conditions affecting environmental exposure
Outdoor use of pro Soil mixing depth:	
<b>U</b> 1	ions and measures at process level (source) to prevent release
There are no direc	ct releases to adjacent surface waters.
Technical condit	ions and measures to reduce or limit discharges, air emissions and releases to soil
Drift should be min	nimised.
Organizational m	neasures to prevent/limit release from site
	quirements for good agricultural practice, agricultural soil should be analysed prior to application of lime and e should be adjusted according to the results of the analysis.
2.2 Control of	environmental exposure – only relevant for urban soil treatment
Product characte	ristics
	per m3 (in mg) Wind speed: -3.5  m/s -6  m/s -3.5  m/s -
	(Figure taken from: Laudet, A. et al., 1999)
Amounts used	
CaO.MgO	156,969 kg/ha
Frequency and d	uration of use
1 day/year and or 156,969 kg/ha is r	nly once in a lifetime. Multiple applications during the year are allowed, provided the total yearly amount of not exceeded (CaO.MgO).
Environment fac	tors not influenced by risk management
Field surface area	: 1 ha



prepared in accordance with Annex II of the REACH Regulation EC

1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

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Other given operational conditions affecting environmental exposure

Outdoor use of products Soil mixing depth: 20 cm

Technical conditions and measures at process level (source) to prevent release

Lime is only applied onto the soil in the technosphere zone before road construction. There are no direct releases to adjacent surface waters.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Drift should be minimised.

3. Exposure estimation and reference to its source

**Occupational exposure** 

The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium magnesium oxide of 1 mg/m<sup>3</sup> (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.

PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)
PROC 2, 3, 4, 5, 8a, 8b, 9, 10, 11, 13, 15, 16, 17, 18, 19, 25, 26		< 1 mg/m³ (0.25 – 0.825)	irritating to skin, derma minimised as far as tech for dermal effects has r	Im oxide is classified as al exposure has to be inically feasible. A DNEL not been derived. Thus, ssessed in this exposure

Environmental exposure for agricultural soil protection

The PEC calculation for soil and surface water was based on the FOCUS soil group (FOCUS, 1996) and on the "draft guidance on the calculation of predicted environmental concentration values (PEC) of plant protection products for soil, ground water, surface water and sediment (Kloskowksi et al., 1999). The FOCUS/EXPOSIT modelling tool is preferred to the EUSES as it is more appropriate for agricultural-like application as in this case where parameter as the drift needs to be included in the modelling. FOCUS is a model typically developed for biocidal applications and was further elaborated on the basis of the German EXPOSIT 1.0 model, where parameters such as drifts can be improved according to collected data: once applied on the soil, calcium magnesium oxide can indeed migrate then towards surface waters, via drift.

Environmental emissions	See amounts used	See amounts used				
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for agricultural soil protection					
Exposure	Substance	PEC (ug/L)	PNEC (ug/L)	RCR		
concentration in aquatic pelagic compartment	CaO.MgO	4.93	320	0.015		
Exposure concentration in sediments	As described above, no exposure of surface water nor sediment to lime is expected. Further, in natural waters the hydroxide ions react with HCO3- to form water and CO32 CO32- forms CaCO3 by reacting with Ca2+. The calcium carbonate precipitates and deposits on the sediment. Calcium carbonate is of low solubility and a constituent of natural soils.					
Exposure	Substance	PEC (mg/L)	PNEC (mg/L)	RCR		
concentrations in soil and groundwater	CaO.MgO	434	712	0.61		
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium magnesium oxide is not volatile. The vapour pressures is below 10 <sup>-5</sup> Pa.					
Exposure concentration relevant for the food chain (secondary poisoning)		overed do not significantly	considered to be omnipre y influence the distribution			



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#### Environmental exposure for urban soil treatment

The urban soil treatment scenario is based on a road border scenario. At the special road border technical meeting (Ispra, September 5, 2003), EU Member States and industry agreed on a definition for a "road technosphere". The road technosphere can be defined as "the engineered environment that carries the geotechnical functions of the road in connection with its structure, operation and maintenance including the installations to ensure road safety and manage run off. This technosphere, which includes the hard and soft shoulder at the edge of the carriageway, is vertically dictated by the groundwater watertable. The road authority has responsibility for this road technosphere including road safety, road support, prevention of pollution and water management". The road technosphere was therefore excluded as assessment endpoint for risk assessment for the purpose of the existing/new substances regulations. The target zone is the zone beyond the technosphere, to which the environmental risk assessment applies.

The PEC calculation for soil was based on the FOCUS soil group (FOCUS, 1996) and on the "draft guidance on the calculation of predicted environmental concentration values (PEC) of plant protection products for soil, ground water, surface water and sediment (Kloskowksi et al., 1999). The FOCUS/EXPOSIT modelling tool is preferred to the EUSES as it is more appropriate for agricultural-like application as in this case where parameter as the drift needs to be included in the modelling. FOCUS is a model typically developed for biocidal applications and was further elaborated on the basis of the German EXPOSIT 1.0 model, where parameters such as drifts can be improved according to collected data.

where parameters such	as units can be improved	according to concered dat			
Environmental emissions	See amounts used				
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for road border scenario				
Exposure concentration in aquatic pelagic compartment	Not relevant for road bor	Not relevant for road border scenario			
Exposure concentration in sediments	Not relevant for road border scenario				
Exposure concentrations in soil	Substance	PEC (mg/L)	PNEC (mg/L)	RCR	
and groundwater	CaO.MgO	462	712	0.65	
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium magnesium oxide is not volatile. The vapour pressures is below 10 <sup>-5</sup> Pa.				
Exposure concentration relevant for the food chain (secondary poisoning)					
Environmental exposure for other uses					
<ul> <li>The operation protection or u</li> </ul>	antitative environmental e al conditions and risk man Irban soil treatment redient and chemically bou	agement measures are le	ess stringent than those ou	utlined for agricultural soil ficient to cause a pH-shift	

Entre is an ingredient and chemically bound into a matrix. Releases are negligible and insufficient to cause a pre-similar in soil, wastewater or surface water
 Lime is pre-sifically used to release CO2 free breathable siz user relation with CO2. Such applications only relation

• Lime is specifically used to release CO2-free breathable air, upon reaction with CO2. Such applications only relates to the air compartment, where the lime properties are exploited

• Neutralisation/pH-shift is the intended use and there are no additional impacts beyond those desired.



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#### 4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. This has to be done by showing that they limit the inhalation and dermal exposure to a level below the respective DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (<u>www.ebrc.de/mease.html</u>) to estimate the associated exposure. The dustiness of the substance used can be determined according to the MEASE glossary. For example, substances with a dustiness less than 2.5 % according to the Rotating Drum Method (RDM) are defined as "low dusty", substances with a dustiness less than 10 % (RDM) are defined as "medium dusty" and substances with a dustiness with a dustines with a dustiness with a dustiness less than 10 % (RDM) are defined as "medium dusty" and substances with a dustiness are the associated as "high dusty".

#### DNEL<sub>inhalation</sub>: 1 mg/m<sup>3</sup> (as respirable dust)

<u>Important note</u>: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m<sup>3</sup>. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).



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# ES number 9.9: Professional uses of high dusty solids/ powders of lime substances

Exposure Scenario	o Format (1) addressing uses carried o	out by workers			
1. Title	1. Title				
Free short title	Professional uses of high dusty solids/powders of	lime substances			
Systematic title based on use descriptor	SU23, PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11,				
Processes, tasks and/or activities covered	Processes, tasks and/or activities covered are des	cribed in Section 2 below.			
Assessment Method	The assessment of inhalation exposure is base environmental assessment is based on FOCUS-E	d on the exposure estimation tool MEASE. The xposit.			
2. Operational con	ditions and risk management measure	es			
PROC/ERC	REACH definition	Involved tasks			
PROC 2	Use in closed, continuous process with occasional controlled exposure				
PROC 3	Use in closed batch process (synthesis or formulation)				
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises				
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)				
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities				
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities				
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)				
PROC 10	Roller application or brushing	Further information is provided in the ECHA Guidance on information requirements and			
PROC 11	Non industrial spraying	chemical safety assessment, Chapter R.12: Use			
PROC 13	Treatment of articles by dipping and pouring	descriptor system (ECHA-2010-G-05-EN).			
PROC 15	Use as laboratory reagent				
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected				
PROC 17	Lubrication at high energy conditions and in partly open process				
PROC 18	Greasing at high energy conditions	1			
PROC 19	Hand-mixing with intimate contact and only PPE available	]			
PROC 25	Other hot work operations with metals	1			
PROC 26	Handling of solid inorganic substances at ambient temperature				
ERC2, ERC8a, ERC8b, ERC8c, ERC8d, ERC8e, ERC8f	Wide dispersive indoor and outdoor use of reactive substances or processing aids in open systems				



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2.1 Control of worl	kers exposure			
Product characteristic				
is reflected by an assign at ambient temperature t temperature based, takir	ment of a so-called fugaci the fugacity is based on the ng into account the proces	e-intrinsic emission potent ity class in the MEASE too ne dustiness of that substa is temperature and the me instead of the substance in	bl. For operations conduc ance. Whereas in hot me elting point of the substan	ted with solid substances tal operations, fugacity is ce. As a third group, high
PROC	Use in preparation	Content in preparation	Physical form	Emission potential
All applicable PROCs	not restricted		solid/powder	high
Amounts used				
combination of the scale		sidered to influence the professional) and level of ission potential.		
Frequency and duratio	n of use/exposure			
PROC	Duration of exposure			
PROC 4, 5, 8a, 8b, 9, 10, 16, 17, 18, 19, 26	≤ 240 minutes			
PROC 11	≤ 60 minutes			
All other applicable PROCs	480 minutes (not restrict	ed)		
Human factors not influ	uenced by risk managen	nent		
The shift breathing volun	ne during all process step	s reflected in the PROCs i	is assumed to be 10 m <sup>3</sup> /s	hift (8 hours).
Other given operationa	I conditions affecting w	orkers exposure		
assessment of the cond exposure assessment in temperatures are expect	ucted processes. In proc MEASE is however base ed to vary within the indus	nd process pressure are in ess steps with considerable ad on the ratio of process stry the highest ratio was to pratically covered in this e	bly high temperatures (i.e temperature and melting aken as a worst case ass	e. PROC 22, 23, 25), the point. As the associated umption for the exposure
	· · · · · · · · · · · · · · · · · · ·	level (source) to prever		
Risk management meas required in the processes		(e.g. containment or seg	regation of the emission s	source) are generally not
Technical conditions a	nd measures to control	dispersion from source	-	
PROC	Level of separation	Localised controls (LC)	Efficiency of LC (according to MEASE)	Further information
PROC 4, 5, 8a, 8b, 9, 11, 16, 26	Any potentially required separation of workers from the emission	generic local exhaust ventilation	72 %	-
PROC 17, 18	source is indicated above under	integrated local exhaust ventilation	87 %	-
PROC 19	"Frequency and duration of exposure". A reduction of exposure	not applicable	na	only in well ventilated rooms or outdoors (efficiency 50 %)-
All other applicable PROCs	duration can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with relevant exposure.	not required	na	-



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#### Organisational measures to prevent /limit releases, dispersion and exposure

Avoid inhalation or ingestion. General occupational hygiene measures are required to ensure a safe handling of the substance. These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), no eating and smoking at the workplace, the wearing of standard working clothes and shoes unless otherwise stated below. Shower and change clothes at end of work shift. Do not wear contaminated clothing at home. Do not blow dust off with compressed air.

#### Conditions and measures related to personal protection, hygiene and health evaluation

PROC	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further personal protective equipment (PPE)
PROC 9, 26	FFP1 mask	APF=4		Eye protection equipment (e.g.
PROC 11, 17, 18, 19	FFP3 mask	APF=20	Since calcium	goggles or visors) must be worn, unless
PROC 25	FFP2 mask	APF=10	magnesium oxide is classified as irritating to	potential contact with the eye can be
All other applicable PROCs	FFP2 mask	APF=10	skin, the use of protective gloves is mandatory for all process steps.	excluded by the nature and type of application (i.e. closed process). Additionally, face protection, protective clothing and safety shoes are required to be worn as appropriate.

Any RPE as defined above shall only be worn if the following principles are implemented in parallel: The duration of work (compare with "duration of exposure" above) should reflect the additional physiological stress for the worker due to the breathing resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the wearing of RPE.

For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the face properly and securely.

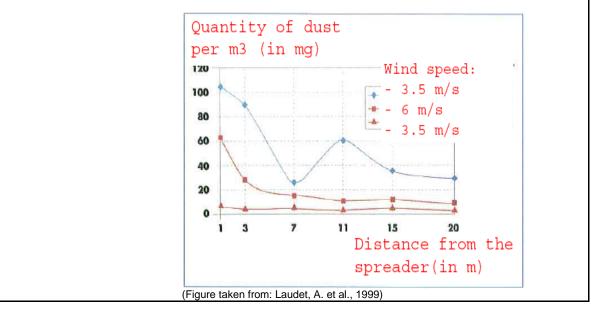
The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and the management of their correct use in the workplace. Therefore, they should define and document a suitable policy for a respiratory protective device programme including training of the workers.

An overview of the APFs of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE.

2.2 Control of environmental exposure – only relevant for agricultural soil protection

#### **Product characteristics**

Drift: 1% (very worst-case estimate based on data from dust measurements in air as a function of the distance from application)





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Amounts used	
CaO.MgO 1,478	kg/ha
Frequency and duration of us	Se
1 day/year (one application pe 1,478kg/ha is not exceeded (Ca	r year) . Multiple applications during the year are allowed, provided the total yearly amount of aO.MgO).
Environment factors not influ	enced by risk management
Volume of surface water: 300 L Field surface area: 1 ha	/m2
	litions affecting environmental exposure
Outdoor use of products Soil mixing depth: 20 cm	
	asures at process level (source) to prevent release
There are no direct releases to	adjacent surface waters.
Technical conditions and me	asures to reduce or limit discharges, air emissions and releases to soil
Drift should be minimised.	
Organizational measures to p	prevent/limit release from site
	r good agricultural practice, agricultural soil should be analysed prior to application of lime and adjusted according to the results of the analysis.
2.2 Control of environm	nental exposure – only relevant for urban soil treatment
Product characteristics	
	Quantity of dust per m3 (in mg) Wind speed: - 3.5 m/s - 6 m/s - 3.5 m/s - 3.5 m/s - 3.5 m/s Distance from the spreader(in m)
	(Figure taken from: Laudet, A. et al., 1999)
Amounts used	
<b>°</b>	69 kg/ha
Frequency and duration of us	
156,969 kg/ha is not exceeded	
Environment factors not influ	enced by risk management
Field surface area: 1 ha	



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Other given operational conditions affecting environmental exposure

Outdoor use of products Soil mixing depth: 20 cm

Technical conditions and measures at process level (source) to prevent release

Lime is only applied onto the soil in the technosphere zone before road construction. There are no direct releases to adjacent surface waters.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Drift should be minimised.

3. Exposure estimation and reference to its source

**Occupational exposure** 

The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium magnesium oxide of 1 mg/m<sup>3</sup> (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.

PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)
PROC 2, 3, 4, 5, 8a, 8b, 9, 10, 11, 13, 15, 16, 17, 18, 19, 25, 26		<1 mg/m³ (0.5 – 0.825)	Since calcium magnesiu irritating to skin, derma minimised as far as tech for dermal effects has in dermal exposure is not a scenario.	al exposure has to be nically feasible. A DNEL

Environmental exposure for agricultural soil protection

The PEC calculation for soil and surface water was based on the FOCUS soil group (FOCUS, 1996) and on the "draft guidance on the calculation of predicted environmental concentration values (PEC) of plant protection products for soil, ground water, surface water and sediment (Kloskowksi et al., 1999). The FOCUS/EXPOSIT modelling tool is preferred to the EUSES as it is more appropriate for agricultural-like application as in this case where parameter as the drift needs to be included in the modelling. FOCUS is a model typically developed for biocidal applications and was further elaborated on the basis of the German EXPOSIT 1.0 model, where parameters such as drifts can be improved according to collected data: once applied on the soil, calcium magnesium oxide can indeed migrate then towards surface waters, via drift.

Environmental emissions	See amounts used				
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for agricultural soil protection				
Exposure	Substance	PEC (ug/L)	PNEC (ug/L)	RCR	
concentration in aquatic pelagic compartment	CaO.MgO	4.93	320	0.015	
Exposure concentration in sediments	waters the hydroxide ion reacting with Ca2+. The	As described above, no exposure of surface water nor sediment to lime is expected. Further, in natural waters the hydroxide ions react with HCO3- to form water and CO32 CO32- forms CaCO3 by reacting with Ca2+. The calcium carbonate precipitates and deposits on the sediment. Calcium carbonate is of low solubility and a constituent of natural soils.			
Exposure	Substance	PEC (mg/L)	PNEC (mg/L)	RCR	
concentrations in soil and groundwater	CaO.MgO	434	712	0.61	
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium magnesium oxide is not volatile. The vapour pressures is below 10 <sup>-5</sup> Pa.				
Exposure concentration relevant for the food chain (secondary poisoning)		overed do not significantly	considered to be omnipre y influence the distribution		



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#### Environmental exposure for urban soil treatment

The urban soil treatment scenario is based on a road border scenario. At the special road border technical meeting (Ispra, September 5, 2003), EU Member States and industry agreed on a definition for a "road technosphere". The road technosphere can be defined as "the engineered environment that carries the geotechnical functions of the road in connection with its structure, operation and maintenance including the installations to ensure road safety and manage run off. This technosphere, which includes the hard and soft shoulder at the edge of the carriageway, is vertically dictated by the groundwater watertable. The road authority has responsibility for this road technosphere including road safety, road support, prevention of pollution and water management". The road technosphere was therefore excluded as assessment endpoint for risk assessment for the purpose of the existing/new substances regulations. The target zone is the zone beyond the technosphere, to which the environmental risk assessment applies.

The PEC calculation for soil was based on the FOCUS soil group (FOCUS, 1996) and on the "draft guidance on the calculation of predicted environmental concentration values (PEC) of plant protection products for soil, ground water, surface water and sediment (Kloskowksi et al., 1999). The FOCUS/EXPOSIT modelling tool is preferred to the EUSES as it is more appropriate for agricultural-like application as in this case where parameter as the drift needs to be included in the modelling. FOCUS is a model typically developed for biocidal applications and was further elaborated on the basis of the German EXPOSIT 1.0 model, where parameters such as drifts can be improved according to collected data.

•	as units can be improved	according to concetted dat			
Environmental emissions	See amounts used				
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for road border scenario				
Exposure concentration in aquatic pelagic compartment	Not relevant for road border scenario				
Exposure concentration in sediments	Not relevant for road bor	Not relevant for road border scenario			
Exposure concentrations in soil	Substance	PEC (mg/L)	PNEC (mg/L)	RCR	
and groundwater	CaO.MgO	462	712	0.65	
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium magnesium oxide is not volatile. The vapour pressures is below 10 <sup>-5</sup> Pa.				
Exposure concentration relevant for the food chain (secondary poisoning)	This point is not relevant because calcium can be considered to be omnipresent and essential in the environment. The uses covered do not significantly influence the distribution of the constituents (Ca <sup>2+</sup> and OH <sup>2</sup> ) in the environment.				
Environmental exposu	Environmental exposure for other uses				
The operation     protection or u	ırban soil treatment	agement measures are le	ess stringent than those or	utlined for agricultural soil ficient to cause a pH-shift	

 Entre is an ingredient and chemically bound into a matrix. Releases are negligible and insufficient to cause a pri-sinit in soil, wastewater or surface water

• Lime is specifically used to release CO2-free breathable air, upon reaction with CO2. Such applications only relates to the air compartment, where the lime properties are exploited

• Neutralisation/pH-shift is the intended use and there are no additional impacts beyond those desired.



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#### 4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. This has to be done by showing that they limit the inhalation and dermal exposure to a level below the respective DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (<u>www.ebrc.de/mease.html</u>) to estimate the associated exposure. The dustiness of the substance used can be determined according to the MEASE glossary. For example, substances with a dustiness less than 2.5 % according to the Rotating Drum Method (RDM) are defined as "low dusty", substances with a dustiness less than 10 % (RDM) are defined as "medium dusty" and substances with a dustiness site a dustines site as "high dusty".

#### DNEL<sub>inhalation</sub>: 1 mg/m<sup>3</sup> (as respirable dust)

<u>Important note</u>: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m<sup>3</sup>. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).



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# ES number 9.10: Professional use of lime substances in soil treatment

Exposure Scenario Format (1) addressing uses carried out by workers					
1. Title					
Free short title	Professional use of lime substances in soil treatment				
Systematic title based on use descriptor	SU22 (appropriate PROCs and ERCs are given in Section	on 2 below)			
Processes, tasks and/or activities covered	Processes, tasks and/or activities covered are des	cribed in Section 2 below			
Assessment Method	The assessment of inhalation exposure is based of tool The environmental assessment is based on FOCL		the exposure estimation MEASE.		
2. Operational cor	ditions and risk management measure	es			
Task/ERC	REACH definition	Involved tasks			
Milling	PROC 5				
Loading of spreader	PROC 8b, PROC 26	Preparation and use of c for soil treatment.	alcium magnesium oxide		
Application to soil (spreading)	PROC 11				
ERC2, ERC8a, ERC8b, ERC8c, ERC8d, ERC8e, ERC8f	Wide dispersive indoor and outdoor use of reactive substances or processing aids in open systems Calcium magnesium oxide is applied in numer cases of wide dispersive uses: agricultur forestry, fish and shrimps farming, soil treatm and environmental protection.				
2.1 Control of workers exposure					
	kers exposure				
	kers exposure				
2.1 Control of wor Product characteristic According to the MEASI is reflected by an assign at ambient temperature temperature based, taki	E approach, the substance-intrinsic emission potent ment of a so-called fugacity class in the MEASE too the fugacity is based on the dustiness of that subst ng into account the process temperature and the me	ol. For operations conduct ance. Whereas in hot met elting point of the substand	ted with solid substances tal operations, fugacity is ce. As a third group, high		
2.1 Control of wor Product characteristic According to the MEASI is reflected by an assign at ambient temperature temperature based, taki	E approach, the substance-intrinsic emission potent ment of a so-called fugacity class in the MEASE too the fugacity is based on the dustiness of that subst	ol. For operations conduct ance. Whereas in hot met elting point of the substand	ted with solid substances tal operations, fugacity is ce. As a third group, high		
2.1 Control of wor Product characteristic According to the MEASI is reflected by an assigr at ambient temperature temperature based, taki abrasive tasks are base	E approach, the substance-intrinsic emission potent ment of a so-called fugacity class in the MEASE too the fugacity is based on the dustiness of that subst ing into account the process temperature and the me d on the level of abrasion instead of the substance in Use in preparation	ol. For operations conduct ance. Whereas in hot met elting point of the substand ntrinsic emission potential	ted with solid substances tal operations, fugacity is ce. As a third group, high l.		
2.1 Control of wor Product characteristic According to the MEASI is reflected by an assign at ambient temperature temperature based, taki abrasive tasks are base Task Milling Loading of spreader	E approach, the substance-intrinsic emission potent ment of a so-called fugacity class in the MEASE to the fugacity is based on the dustiness of that subst ing into account the process temperature and the me d on the level of abrasion instead of the substance i Use in preparation Content in preparation	ol. For operations conduct ance. Whereas in hot met elting point of the substand ntrinsic emission potential Physical form	ted with solid substances tal operations, fugacity is ce. As a third group, high l. Emission potential		
2.1 Control of wor Product characteristic According to the MEASI is reflected by an assigr at ambient temperature temperature based, taki abrasive tasks are base Task Milling	E approach, the substance-intrinsic emission potent ment of a so-called fugacity class in the MEASE too the fugacity is based on the dustiness of that subst ing into account the process temperature and the me d on the level of abrasion instead of the substance i Use in preparation Content in preparation not restricted	ol. For operations conduct ance. Whereas in hot met elting point of the substand ntrinsic emission potential <b>Physical form</b> solid/powder	ted with solid substances tal operations, fugacity is ce. As a third group, high I. Emission potential high		
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Other given operational conditions affecting workers exposure

Operational conditions (e.g. process temperature and process pressure) are not considered relevant for occupational exposure assessment of the conducted processes.

Technical conditions and measures at process level (source) to prevent release

Risk management measures at the process level (e.g. containment or segregation of the emission source) are generally not required in the processes.

Technical conditions and measures to control dispersion from source towards the worker

Task	Level of separation	Localised controls (LC)	Efficiency of LC	Further information
Milling	Separation of workers is generally not	not required	na	-
Loading of spreader	required in the conducted processes.	not required	na	-
Application to soil (spreading)	During application the worker is sitting in the cabin of the spreader	Cabin with filtered air supply	99%	-
Organisational measures to prevent /limit releases, dispersion and exposure				

Organisational measures to prevent /limit releases, dispersion and exposure

Avoid inhalation or ingestion. General occupational hygiene measures are required to ensure a safe handling of the substance. These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), no eating and smoking at the workplace, the wearing of standard working clothes and shoes unless otherwise stated below. Shower and change clothes at end of work shift. Do not wear contaminated clothing at home. Do not blow dust off with compressed air.

Conditions and measures related to personal protection, hygiene and health evaluation

Task	Specification of respiratory protective equipment (RPE)		Specification of gloves	Further personal protective equipment (PPE)	
Milling	FFP3 mask	APF=20	Since calcium	Eye protection equipment (e.g. goggles or visors) must be worn, unless	
Loading of spreader	FFP3 mask	APF=20	magnesium oxide is classified as irritating to skin, the use of protective gloves is	potential contact with the eye can be excluded by the nature and type of application (i.e. closed process).	
Application to soil (spreading)	not required	na	mandatory for all process steps.	Additionally, face protection, protective clothing and safety shoes are required to be worn as appropriate.	

Any RPE as defined above shall only be worn if the following principles are implemented in parallel: The duration of work (compare with "duration of exposure" above) should reflect the additional physiological stress for the worker due to the breathing resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the wearing of RPE.

For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the face properly and securely.

The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and the management of their correct use in the workplace. Therefore, they should define and document a suitable policy for a respiratory protective device programme including training of the workers.

An overview of the APFs of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE.

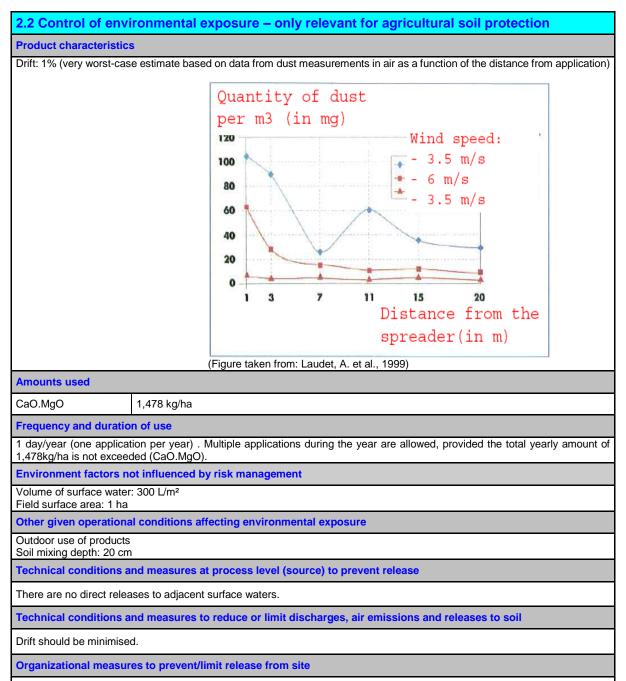


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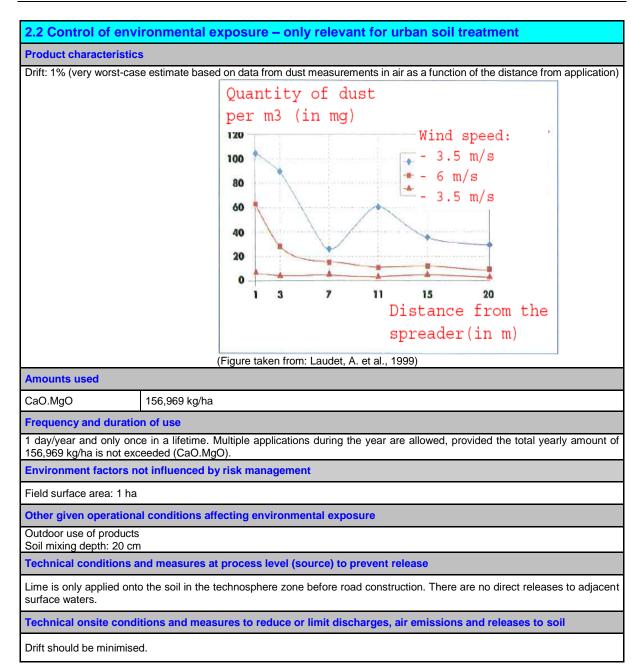
In line with the requirements for good agricultural practice, agricultural soil should be analysed prior to application of lime and the application rate should be adjusted according to the results of the analysis.



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### 3. Exposure estimation and reference to its source

#### Occupational exposure

Measured data and modelled exposure estimates (MEASE) were used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium magnesium oxide of 1 mg/m<sup>3</sup> (as respirable dust).

Task	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment Dermal exposure estimate (RCR)
Milling	MEASE	0.488 mg/m <sup>3</sup> (0.48)	Since calcium magnesium oxide is classified as irritating to skin, dermal exposure has to be
Loading of spreader	MEASE (PROC 8b)	0.488 mg/m <sup>3</sup> (0.48)	minimised as far as technically feasible. A DNEL
Application to soil (spreading)	measured data	0.880 mg/m³ (0.88)	for dermal effects has not been derived. Thus, dermal exposure is not assessed in this exposure scenario

#### Environmental exposure for agricultural soil protection

The PEC calculation for soil and surface water was based on the FOCUS soil group (FOCUS, 1996) and on the "draft guidance on the calculation of predicted environmental concentration values (PEC) of plant protection products for soil, ground water, surface water and sediment (Kloskowksi et al., 1999). The FOCUS/EXPOSIT modelling tool is preferred to the EUSES as it is more appropriate for agricultural-like application as in this case where parameter as the drift needs to be included in the modelling. FOCUS is a model typically developed for biocidal applications and was further elaborated on the basis of the German EXPOSIT 1.0 model, where parameters such as drifts can be improved according to collected data: once applied on the soil, calcium magnesium oxide can indeed migrate then towards surface waters, via drift.

the son, calcium magnes	sum onde can mueeu mig	grate then towards surface			
Environmental emissions	See amounts used				
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for agricultural soil protection				
Exposure	Substance	PEC (ug/L)	PNEC (ug/L)	RCR	
concentration in aquatic pelagic compartment	CaO.MgO	4.93	320	0.015	
Exposure concentration in sediments	waters the hydroxide io reacting with Ca2+. The	As described above, no exposure of surface water nor sediment to lime is expected. Further, in natural waters the hydroxide ions react with HCO3- to form water and CO32 CO32- forms CaCO3 by reacting with Ca2+. The calcium carbonate precipitates and deposits on the sediment. Calcium carbonate is of low solubility and a constituent of natural soils.			
Exposure	Substance	PEC (mg/L)	PNEC (mg/L)	RCR	
concentrations in soil and groundwater	CaO.MgO	434	712	0.61	
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium magnesium oxide is not volatile. The vapour pressures is below 10 <sup>-5</sup> Pa.				
Exposure concentration relevant for the food chain (secondary poisoning)		overed do not significantly	considered to be omnipre y influence the distribution	esent and essential in the of the constituents (Ca <sup>2+</sup>	



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#### Environmental exposure for urban soil treatment

The urban soil treatment scenario is based on a road border scenario. At the special road border technical meeting (Ispra, September 5, 2003), EU Member States and industry agreed on a definition for a "road technosphere". The road technosphere can be defined as "the engineered environment that carries the geotechnical functions of the road in connection with its structure, operation and maintenance including the installations to ensure road safety and manage run off. This technosphere, which includes the hard and soft shoulder at the edge of the carriageway, is vertically dictated by the groundwater watertable. The road authority has responsibility for this road technosphere including road safety, road support, prevention of pollution and water management". The road technosphere was therefore excluded as assessment endpoint for risk assessment for the purpose of the existing/new substances regulations. The target zone is the zone beyond the technosphere, to which the environmental risk assessment applies.

The PEC calculation for soil was based on the FOCUS soil group (FOCUS, 1996) and on the "draft guidance on the calculation of predicted environmental concentration values (PEC) of plant protection products for soil, ground water, surface water and sediment (Kloskowksi et al., 1999). The FOCUS/EXPOSIT modelling tool is preferred to the EUSES as it is more appropriate for agricultural-like application as in this case where parameter as the drift needs to be included in the modelling. FOCUS is a model typically developed for biocidal applications and was further elaborated on the basis of the German EXPOSIT 1.0 model, where parameters such as drifts can be improved according to collected data.

where parameters such	as units can be improved	according to conected da	la.			
Environmental emissions	See amounts used					
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for road border scenario					
Exposure concentration in aquatic pelagic compartment	Not relevant for road border scenario					
Exposure concentration in sediments	Not relevant for road bor	der scenario				
Exposure	Substance	Substance PEC (mg/L) PNEC (mg/L) RCR				
concentrations in soil and groundwater	CaO.MgO	462	712	0.65		
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium magnesium oxide is not volatile. The vapour pressures is below 10 <sup>-5</sup> Pa.					
Exposure concentration relevant for the food chain (secondary poisoning)	This point is not relevant because calcium can be considered to be omnipresent and essential in the environment. The uses covered do not significantly influence the distribution of the constituents (Ca <sup>2+</sup> and OH <sup>-</sup> ) in the environment.					
Environmental exposure for other uses						
<ul> <li>The operation protection or u</li> <li>Lime is an ingu</li> </ul>	Irban soil treatment	agement measures are le	ess stringent than those of	outlined for agricultural soil ufficient to cause a pH-shift		

in soil, wastewater or surface water
Lime is specifically used to release CO2-free breathable air, upon reaction with CO2. Such applications only relates

to the air compartment, where the lime properties are exploited
Neutralisation/pH-shift is the intended use and there are no additional impacts beyond those desired.



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#### 4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. This has to be done by showing that they limit the inhalation and dermal exposure to a level below the respective DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below. If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (<u>www.ebrc.de/mease.html</u>) to estimate the associated exposure. The dustiness of the substance used can be determined according to the MEASE glossary. For example, substances with a dustiness less than 2.5 % according to the Rotating Drum Method (RDM) are defined as "low dusty", substances with a dustiness less than 10 % (RDM) are defined as "medium dusty" and substances with a dustiness with a dustines with a dustiness with a dustiness less than 10 % (RDM) are defined as "medium dusty" and substances with a dustiness are the associated as "high dusty".

#### DNEL<sub>inhalation</sub>: 1 mg/m<sup>3</sup> (as respirable dust)

<u>Important note</u>: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m<sup>3</sup>. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).



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# ES number 9.11: Professional uses of articles/containers containing lime substances

Exposure Scenario	o Format (1) addressing uses carried o	out by workers		
1. Title				
Free short title	Professional uses of articles/containers containing lime substances			
Systematic title based on use descriptor	SU22, SU1, SU5, SU6a, SU6b, SU7, SU10, SU1 SU23, AC1, AC2, AC3, AC4, AC5, AC6, AC7, AC8, AC1 (appropriate PROCs and ERCs are given in Secti	0, AC11, AC13	J17, SU18, SU19, SU20, SU24	
Processes, tasks and/or activities covered	Processes, tasks and/or activities covered are des	scribed in Section 2 below		
Assessment Method	The assessment of inhalation exposure is based of	on the exposure estimation	n tool MEASE.	
2. Operational con	ditions and risk management measure	es		
PROC/ERC	REACH definition	Involved tasks		
PROC 0	Other process (PROC 21 (low emission potential) as proxy for exposure estimation)	Use of containers contai oxide/preparations as breathing apparatus)	CO <sub>2</sub> absorbents (e.g	
PROC 21	Low energy manipulation of substances bound in materials and/or articles	Handling of substances articles	bound in materials and/o	
PROC 24	High (mechanical) energy work-up of substances bound in materials and/or articles	Grinding, mechanical cu	tting	
PROC 25	Other hot work operations with metals	Welding, soldering		
ERC10, ERC11, ERC 12	Wide dispersive indoor and outdoor use of long- life articles and materials with low release	kide bound into or onto such as: wooden and I building materials (e.g. g, furniture, toys, leathe I cardboard products ws paper and packaging ment (casing)		
2.1 Control of worl	kers exposure			
Product characteristic				
is reflected by an assign at ambient temperature temperature based, takir	approach, the substance-intrinsic emission poten ment of a so-called fugacity class in the MEASE to the fugacity is based on the dustiness of that subst ing into account the process temperature and the m d on the level of abrasion instead of the substance	ol. For operations conduc tance. Whereas in hot me elting point of the substan	ted with solid substance tal operations, fugacity is ce. As a third group, higl	
PROC	Used in preparation? Content in preparation	Physical form	Emission potential	
PROC 0	not restricted not restricted not restricted not restricted not restricted not restricted not restricted not restricted not restricted not restricted			
PROC 21	not restricted	massive objects	very low	
PROC 24, 25	not restricted	massive objects	high	
Amounts used	l 		1	
combination of the scale	ndled per shift is not considered to influence the of operation (industrial vs. professional) and level of of the process intrinsic emission potential.			



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PROC	Duration of exposure			
PROC 0			calcium magnesium oxide	
PROC 21	480 minutes (not restrict	ed)		2
PROC 24, 25	≤ 240 minutes			
Human factors not inf	luenced by risk manager	nent		
The shift breathing volu	me during all process step	s reflected in the PROCs	is assumed to be 10 m <sup>3</sup> /sl	hift (8 hours).
Other given operation	al conditions affecting w	orkers exposure		
temperatures are exped	n MEASE is however base sted to vary within the indus cess temperatures are auto	stry the highest ratio was omatically covered in this	taken as a worst case ass exposure scenario for PRO	umption for the exposu
0	sures at the process level	· · · ·		source) are generally no
required in the process	sures at the process level es.	(e.g. containment or seg	regation of the emission s	source) are generally no
required in the process	sures at the process level	(e.g. containment or seg	regation of the emission s	source) are generally no

Avoid inhalation of ingestion. General occupational hygiene measures are required to ensure a safe handling of the substance. These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), no eating and smoking at the workplace, the wearing of standard working clothes and shoes unless otherwise stated below. Shower and change clothes at end of work shift. Do not wear contaminated clothing at home. Do not blow dust off with compressed air.



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PROC	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further persona protective equipment (PPE)	
PROC 0	not required	na		Eye protection equipment (e.g goggles or visors) mus	
PROC 21	not required	na	Since calcium magnesium oxide is classified as irritating to	be worn, unless potential contact with the eye can be excluded by the nature	
PROC 24, 25	FFP1 mask	APF=4	skin, the use of protective gloves is mandatory for all process steps.	excluded by the natur and type of applicatio (i.e. closed process Additionally, fac protection, protectiv clothing and safet shoes are required t be worn as appropriate	
the use of RPE), (ii) have hair). The recommended contours of the face pro The employer and self- devices and the manag policy for a respiratory p An overview of the APF	employed persons have le ement of their correct use rotective device programm s of different RPE (accordi	istics reducing leakages b on a tight face seal will no egal responsibilities for th in the workplace. There he including training of the ng to BS EN 529:2005) ca	between face and mask (ir of provide the required pro e maintenance and issue fore, they should define a e workers.	n view of scars and facia tection unless they fit the of respiratory protective and document a suitable	
2.2 Control of env	ironmental exposur	e			
Product characteristic	S				
Lime is chemically boun	d into/onto a matrix with ve	ery low release potential			
3. Exposure estim	ation and reference	to its source			
Occupational exposur	e				
is the quotient of the re demonstrate a safe use respirable dust) and the	n tool MEASE was used for fined exposure estimate a For inhalation exposure, t e respective inhalation exp afety margin since the resp	nd the respective DNEL the RCR is based on the I posure estimate derived u	(derived no-effect level) a DNEL for calcium magnes using MEASE (as inhalab	ind has to be below 1 to ium oxide of 1 mg/m³ (as le dust). Thus, the RCF	
PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)	
PROC 0	MEASE (PROC 21)	0.5 mg/m³ (0.5)	Since calcium magnesiu		
PROC 21	MEASE	0.05 mg/m³ (0.05)	irritating to skin, derma minimised as far as tech		
PROC 24	MEASE	0.825 mg/m <sup>3</sup> (0.825)	for dermal effects has	not been derived. Thus	
			<ul> <li>dermal exposure is not assessed in this exposise scenario.</li> </ul>		

#### **Environmental exposure**

Lime is an ingredient and is chemically bound into a matrix: there is no intended release of lime during normal and reasonable foreseeable conditions of use. Releases are negligible and insufficient to cause a pH-shift in soil, wastewater or surface water.



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#### DNEL<sub>inhalation</sub>: 1 mg/m<sup>3</sup> (as respirable dust)

Important note: The DU has to be aware of the fact that apart from the long-term DNEL given above, a DNEL for acute effects exists at a level of 4 mg/m<sup>3</sup>. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).



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# ES number 9.12: Consumer use of building and construction material (DIY – do it yourself)

<b>E</b>	-	((0))					
Exposure Scenario	Forma	t (2) add	iressin	g uses carried out b	y consur	ners	
1. Title							
Free short title				Consumer use of build	ling and co	nstruction materia	al
Systematic title based	on use	descript	or	SU21, PC9a, PC9b, E			
Processes, tasks acti			-	Handling (mixing and f Application of liquid, pa	illing) of po	wder formulation	S
Assessment Method*				Human health: A qualitative assessme	ent has bee to the eye model (va	en performed for c 2. Inhalation expo an Hemmen, 1992	oral and dermal exposure osure to dust has been 2).
2. Operational cor	dition	s and i	risk ma	anagement measu	res		
RMM				ated risk management r		re in place	
PC/ERC		Descript categori	ion of a	ctivity referring to art	icle categ	ories (AC) and	environmental release
PC 9a, 9b		Application Post-app	on of lime lication e	g of powder containing e plaster, putty or slurry exposure.	to the walls	s or ceiling.	
ERC 8c, 8d, 8e, 8f		Wide dis Wide dis	persive c	ndoor use resulting in in putdoor use of processin putdoor use of reactive s putdoor use resulting in i	g aids in o ubstances	pen systems in open systems	
2.1 Control of con	sume	rs expo	sure				
Product characteristic							
Description of the		entration	of the	Physical state of	Dustine	ss (if relevant)	Packaging design
preparation		ance ir		the preparation	Duotinio		
Lime substance	100 %			Solid, powder	High, me	edium and low,	Bulk in bags of up to
Plaster, Mortar	20-409	%		Solid, powder	depending on the kind of lime substance (indicative value from DIY <sup>1</sup> fact sheet see section 9.0.3)		35 kg.
Plaster, Mortar	20-409	%		Pasty	,		
Putty, filler	30-559	%		Pasty, highly viscous, thick liquid	-		In tubes or buckets
Pre-mixed lime wash paint	~30%			Solid, powder			Bulk in bags of up to 35 kg.
Lime wash paint/milk of lime preparation	~ 30 %	, 0		Milk of lime preparation	-		-
Amounts used							
Description of preparation	the	Amour	nt used	per event			
Filler, putty 250 g – 1 kg po				owder (2:1 powder water) rmine, because the amount is heavily dependent on the depth and size of the d.			
Plaster/lime wash paint	~ 25 kg	depend	ling on the size of the room, wall to be treated.				
Floor/wall equalizer	~ 25 kc	depend	ing on the size of the room, wall to be equalized.				
Frequency and duration	on of us			-			
Description of task				on of exposure per eve	ent	frequency of e	vents
				min (DIY <sup>1</sup> -fact sheet			
Mixing and loading of powder.	lime co	ntaining		er 2.4.2 Mixing and Ic		2/year (DIY <sup>1</sup> fac	ct sheet)
Application of lime pl slurry to the walls or cei		outty or		I minutes - hours		2/year (DIY <sup>1</sup> fac	ct sheet)



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Human factors not infl	uenced b	y risk manage	ment				
Description of the				to Exposed body part			Corresponding skin
task	Fopulat	ion exposed	Breathing rat	le	Exposed body part		area [cm <sup>2</sup> ]
Handling of powder	Adult		1.25 m³/hr		Half of both hands		430 (DIY <sup>1</sup> fact sheet)
Application of liquid,							
pasty lime	Adult		NR		Hands and forearms		1900 (DIY <sup>1</sup> fact sheet)
preparations.							
Other given operationa						1	
Description of the task	(	Indoor/outdo	or		volume		exchange rate
Handling of powder		indoor			ersonal space, small	0.6	hr <sup>-1</sup> (unspecified room)
	t P	la de en			ound the user)		
Application of liquid, pa	asty lime	indoor		NR		NR	
preparations.	ree relate	d to informativ	on and babavia	ural adv	vice to consumere	I	
Conditions and measu						o whi	ich apply to professional
workplaces:	uamage L		omply with the	same su	ici protective measure	S WII	ich apply to professional
	1 - (l. <sup>1</sup>		Second all a failed				
enange nere	-	noes and gloves	•				
							on products which should
				protectio	on, cleansing and care	). Cle	eanse the skin thoroughly
		a care product		less stars			
Conditions and measu	ires relate	ed to personal	protection and	nygiene		a	ich ennly to nucleasie al
	damage L	Ji yers should c	omply with the	same str	ict protective measure	s wn	ich apply to professional
workplaces:		na huildina ma	hariala durina d	omolition	or coulling and char		I during overbood work
		as well as face				ve ai	I, during overhead work,
						rnc I	When working in a wet
							es during overhead work
					which permeates the w		
2.2 Control of env		,					
Product characteristic		nui oxpoou					
Not relevant for exposur		ment					
Amounts used*	0 000000						
Not relevant for exposur	e assessr	ment					
Frequency and duration							
Not relevant for exposur		nent				-	
Environment factors n			anagement				
Default river flow and di		,					
Other given operation	al condition	ons affecting e	nvironmental of	exposur	9		
Indoor							
Direct discharge to the	vastewate	r is avoided.					
Conditions and measu	ires relate	ed to municipa	sewage treatr	nent pla	nt		
Default size of municipa	l sewage :	system/treatme	nt plant and slu	dge treat	ment technique		
Conditions and measu	ires relate	d to external	treatment of w	aste for	disposal		
Not relevant for exposur	Not relevant for exposure assessment						
Conditions and measures related to external recovery of waste							
	Not relevant for exposure assessment						
3. Exposure estim	ation a	nd reference	e to its sour	се			
					ure estimate and the r	espe	ective DNEL (derived no-
							he acute DNEL for lime
							ble dust). Thus, the RCR
includes an additional sa	afety marg	in since the res	pirable fraction i	s a sub-f	raction of the inhalable	fract	tion according to EN 481.
	d as irritat	ing to skin and	eyes a qualitativ	/e assess	sment has been perfor	med	for dermal exposure and
exposure to the eye.							



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Human exposure						
Handling of p	owder					
Route exposure	of	Exposure estimate	Method used, comments			
Oral		-	Qualitative assessment Oral exposure does not occur as part of the intended product use.			
Dermal		small task: 0.1 µg/cm <sup>2</sup> (-)	Qualitative assessment			
2 on the		large task: 1 µg/cm² (-)	If risk reduction measures are taken into account no human exposure is expected. However, dermal contact to dust from loading of lime substances or direct contact to the lime cannot be excluded if no protective gloves are worn during application. This may occasionally result in mild irritation easily avoided by prompt rinsing with water. Quantitative assessment The constant rate model of ConsExpo has been used. The contact rate to dust formed while pouring powder has been taken from the DIY <sup>1</sup> -fact sheet (RIVM report 320104007).			
Eye		Dust	Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. Dust from loading of the lime substances cannot be excluded if no protective goggles are used. Prompt rinsing with water and seeking medical advice after accidental exposure is advisable.			
Inhalation		Small task: 12 μg/m³ (0.003) Large task: 120 μg/m³ (0.03)	Quantitative assessment Dust formation while pouring the powder is addressed by using the dutch model (van Hemmen, 1992, as described in section 9.0.3.1 above).			
Application o	f liquio	d, pasty lime preparations.				
Route exposure	of	Exposure estimate	Method used, comments			
Oral		-	Qualitative assessment Oral exposure does not occur as part of the intended product use.			
Dermal		Splashes	Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, splashes on the skin cannot be excluded if no protective gloves are worn during the application. Splashes may occasionally result in mild irritation easily avoided by immediate rinsing of the hands with water.			
Eye		Splashes	Qualitative assessment If appropriate goggles are worn no exposure to the eyes needs to be expected. However, splashes into the eyes cannot be excluded if no protective goggles are worn during the application of liquid or pasty lime preparations, especially during overhead work. Prompt rinsing with water and seeking medical advice after accidental exposure is advisable.			
Inhalation		-	Qualitative assessment Not expected, as the vapour pressure of limes in water is low and generation of mists or aerosols does not take place.			
Post-applicat						
No relevant ex dioxide from the	•	•	ime preparation will quickly convert to calcium carbonate with carbon			
Environment	al expo	osure				
Referring to the the pH of the biological activ used beneficia of the municip	ie OC/l influen vity. Th ally for al treat	RMMs related to the environment to t of a municipal wastewater treatme e influent of a municipal wastewate pH control of acid wastewater strea	o avoid discharging lime solutions directly into municipal wastewater, ent plant is circum-neutral and therefore, there is no exposure to the er treatment plant is often neutralized anyway and lime may even be ms that are treated in biological WWTPs. Since the pH of the influent H impact is negligible on the receiving environmental compartments, ment.			



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# ES number 9.13: Consumer use of CO2 absorbent in breathing apparatuses

• •						
Exposure Scenario	Format (2) add	lressin	g uses carried out by	y consur	ners	
1. Title						
Free short title			Consumer use of CO <sub>2</sub>	absorbent	in breathing ann	aratusas
Systematic title based	on use descript	or	SU21, PC2, ERC8b	absorbern	in breating app	alatuses
Processes, tasks activ		~	Filling of the formulatio	n into the	cartridge	
FIOLESSES, lasks activ	Use of closed circuit br					
			Cleaning of equipment		paratuses	
Assessment Method*			Human health			
Assessment method				nent has	heen performe	d for oral and dermal
						ssed by the Dutch model
			(van Hemmen, 1992).			
			Environment			
			A qualitative justificatio	n assessn	nent is provided.	
2. Operational co	onditions ar	nd risk				
RMM						mount of water (14-18%)
						uring the breathing cycle
			de will be quickly reactin			
PC/ERC	Descript	ion of a	ctivity referring to arti	icle cateo	ories (AC) and	environmental release
	categori					
PC 2				for e.a. re	creational diving	containing soda lime as
						d CO <sub>2</sub> will quickly react
	(catalyse	d by wat	er and sodium hydroxide	) with the c	calcium dihydroxid	de to form the carbonate.
			can be re-breathed agair			
	Handling	of the a				h use and refilled before
	each dive					
ERC 8b	Wide dis	persive i	ndoor use resulting in inc	clusion into	o or onto a matrix	
2.1 Control of co	onsumers ex	posu	re			
Product characteristic						
Description of the	Concentration	of the	Physical state of Dusti		ss (if relevant)	Packaging design
preparation	substance in	h the	the preparation		. ,	
	preparation					
CO <sub>2</sub> absorbent	78 - 84%		Solid, granular	Very I	ow dustiness	4.5, 18 kg canister
	Depending or	n the		(reductio	on by 10%	-
	application the				ed to powder)	
	component	has			rmation cannot	
	different additiv				out during the	
	A specific amo			0	f the scrubber	
	water is always	added		cartridge.		
"Used" CO2 absorbent	(14-18%).		Solid gropular	Vori	ow ductions	10 kg in broothing
Used CO <sub>2</sub> absorbent	~ 20%		Solid, granular	-	ow dustiness	1-3 kg in breathing
				(reduction by 10 % apparatus compared to powder)		apparatus
Amounts used	l		I	compare		
CO <sub>2</sub> -Absorbent used in	breathing appara	tus I	1-3 kg depending on th	e kind of h	reathing apparat	911
Frequency and duration					appalat	uo
Description of the task	a a a a a a a a a a a a a a a a a a a	Durati	on of exposure per eve	ent	frequency of e	vents
Filling of the formula			33 min per filling, in sum			ve (up to 4 times)
cartridge		Ua. 1.3	o min per ming, in sum		Dervie each di	
	cuit breathing	1-2 h			Up to 4 dives a	dav
apparatus	Op to 4 dives a			uuy		
Cleaning and emptying	in		After each dive	(up to 4 times)		
Human factors not infl		< 15 m				
Description of the			Breathing rate	Expose	d body part	Corresponding skin
task					- Joay puir	area [cm <sup>2</sup> ]
Filling of the	adult		1.25 m <sup>3</sup> /hr (light	hands		840
formulation into the			working activity)			(REACH guidance
			J			R.15, men)
cartridge				_		- ,
0						
Use of closed circuit						
Use of closed circuit breathing apparatus				hands		840
Use of closed circuit breathing apparatus				hands		840 (REACH guidance
Use of closed circuit breathing apparatus Cleaning and				hands		



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Other given operati	onal condition	ons affecting consumers ex	posure	
Description of the t		Indoor/outdoor	Room volume	Air exchange rate
Filling of the formula		NR	NR	NR
cartridge				
Use of closed circu	it breathing	-	-	-
apparatus				
	nptying of	NR	NR	NR
equipment			and a defendance and an and	
		ed to information and behavior	oural advice to consumers	
		clothing. Do not breathe dust avoid the soda lime to dry ou	+	
Keep out of reach of		avoid the soda line to dry of	it.	
Wash thoroughly after				
		immediately with plenty of wa	ter and seek medical advice.	
Do not mix with acids				
			ure a proper use of the breathin	g apparatus.
		ed to personal protection an		
	s, goggles an	d protective clothes during ha	ndling. Use a filtering half mask	(mask type FFP2 acc. to EN
149).				
		nental exposure		
Product characteris				
Not relevant for expo	sure assessr	nent		
Amounts used*				
Not relevant for expo		nent		
Frequency and dura Not relevant for expo		nont		
		iced by risk management		
Default river flow and		iccu by hisk management		
		ons affecting environmental	exposure	
Indoor		<b></b>	•	
		ed to municipal sewage treat		
		system/treatment plant and slu		
		ed to external treatment of v	aste for disposal	
Not relevant for expo				
		ed to external recovery of w	aste	
Not relevant for expo				
		and reference to its		
			ed exposure estimate and the	
			n exposure, the RCR is based halation exposure estimate (as in	
			is a sub-fraction of the inhalable	
			es a qualitative assessment ha	
exposure and exposu	ure to the eye	).		-
			ir own CO <sub>2</sub> scrubber) it can be	assumed that instructions will
be taken into accoun	t to reduce ex	xposure		
Human exposure				
Filling of the formul	Exposure		had used comments	
Route of exposure	Exposure	estimate we	hod used, comments	
Oral	-	Qua	alitative assessment	
<b>C</b> rai			l exposure does not occur as pa	rt of the intended product use.
Dermal	-		alitative assessment	•
			sk reduction measures are ta	
			osure is expected. However,	
			ding of granular soda lime or o	
			not be excluded if no protect	
			lication. This may occasionally ided by prompt rinsing with wate	
Eye	Dust		alitative assessment	
_,.			sk reduction measures are ta	ken into account no human
			osure is expected. Dust from loa	
		is e	xpected to be minimal, therefore	e eye exposure will be minimal
			5	vice after accidental exposure
		eve	n without protective goggles. water and seeking medical adv	Nevertheless, prompt rinsing
			dvisable.	•



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Inhalation	Small task: 1.2 µg/m³ (3 x 10 <sup>-4</sup> ) Large task: 12 µg/m³ (0.003)	Quantitative assessment Dust formation while pouring the powder is addressed by using the dutch model (van Hemmen, 1992, as described in section 9.0.3.1 above) and applying a dust reduction factor of 10 for the granular form.
Use of closed c	ircuit breathing apparatus	
Route exposure	of Exposure estimate	Method used, comments
Oral	-	Qualitative assessment Oral exposure does not occur as part of the intended product use.
Dermal	-	Qualitative assessment Due to the product characteristics, it can be concluded that dermal exposure to the absorbent in breathing apparatuses is non- existent.
Eye	-	Qualitative assessment Due to the product characteristics, it can be concluded that eye exposure to the absorbent in breathing apparatuses is non- existent.
Inhalation	negligible	Qualitative assessment Instructional advice is provided to remove any dust before finishing the assembly of the scrubber. Divers filling their own CO <sub>2</sub> scrubber represent a specific subpopulation within consumers. Proper use of equipment and materials is in their own interest; hence it can be assumed that instructions will be taken into account. Due to the product characteristics and the instructional advices given, it can be concluded that inhalation exposure to the absorbent during the use of the breathing apparatus is negligible.
Cleaning and er	nptying of equipment	· · · · · · · · · · · · · · · · · · ·
Route exposure	of Exposure estimate	Method used, comments
Oral	-	Qualitative assessment Oral exposure does not occur as part of the intended product use.
Dermal	Dust and splashes	Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, dermal contact to dust from emptying granular soda lime or direct contact to the granules cannot be excluded if no protective gloves are worn during cleaning. Furthermore, during the cleaning of the cartridge with water contact to moistened soda lime may occur. This may occasionally result in mild irritation easily avoided by immediate rinsing of with water.
Eye	Dust and splashes	Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, contact to dust from emptying granular soda limes or during the cleaning of the cartridge with water contact to moisten soda limes may occur in very rare occasions. Prompt rinsing with water and seeking medical advice after accidental exposure is advisable.
Inhalation	Small task: 0.3 μg/m³ (7.5 × 10 <sup>-5</sup> ) Large task: 3 μg/m³ (7.5 × 10 <sup>-4</sup> )	Quantitative assessment Dust formation while pouring the powder is addressed by using the Dutch model (van Hemmen, 1992, as described in section 9.0.3.1 above) and applying a dust reduction factor of 10 for the granular form and a factor of 4 to account for the reduced amount of lime in the "used" absorbent.
Environmental		
treatment plant is that are treated	s often neutralized anyway and lime may in biological WWTPs. Since the pH of th	s is expected to be negligible. The influent of a municipal wastewater even be used beneficially for pH control of acid wastewater streams le influent of the municipal treatment plant is circum neutral, the pH compartments, such as surface water, sediment and terrestrial

compartment.



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## ES number 9.14: Consumer use of garden lime/fertilizer

Exposure Scenario Format (2) addressing uses carried out by consumers									
1. Title				-	_				
Free short title				Consumer use	Consumer use of garden lime/fertilizer				
Systematic title based			tor	SU21, PC20,					
Processes, tasks acti	vities	covered		Manual applic Post-application			e, fertilizer		
Assessment Method*				Human health					
						ent has bee	en performe	d for	oral and dermal exposure
									dust exposure has been
				assessed by t					
		Environment				,	,		
		A qualitative j	ustificatio	on assessn	nent is provi	ided.			
2. Operational con	nditio	ns and	risk m						
RMM				ated risk mana			are in place		
PC/ERC Description of a				activity referrin	na to ar	ticle cated	nories (AC)	and	environmental release
10/2110		categori			ig to un	noie outeg	Jones (Ao)	una	
PC 20					lime by	shovel/han	d (worst ca	se) a	nd soil incorporation.
1020				exposure to play				00) a	
PC 12		Surface	preadin	g of the garden	lime by	shovel/ hai	nd (worst ca	ise) a	nd soil incorporation.
				exposure to play				, 0	
ERC 8e				outdoor use of r			in open sv	stems	3
2.1 Control of con	sum						·		
Product characteristic		ors expt	Juie						
Description of the	1	centration	of the	Physical st	ato of	Ductino	ss (if releva	nt)	Packaging design
preparation		tance ir		the preparati		Dustines		uncy	r ackaging design
preparation		aration	i uie	the preparation					
Garden lime	100 9			Solid, powder		High dus	etv.		Bulk in bags or
Garden inne	100 /	/0				r light dus	, cy		containers of 5, 10 and
									25 kg
Fertilizer	Up to	20 %		Solid, granular		Low dusty			Bulk in bags or
	0010	20 /0		Colla, grandiar Eow		Lon add			containers of 5, 10 and
								25 kg	
Amounts used	1								20 kg
Description of the pre	paratic	on		Amount used	l per eve	ent	Sourc	e of	information
Garden lime				100g /m <sup>2</sup> (up to 200g/m <sup>2</sup> ) Information and direction of use					
Fertilizer				100g /m <sup>2</sup> (up to 1kg/m <sup>2</sup> (compost)) Information and direction of use					
Frequency and duration	on of u	se/exposi	ure		<u></u>	(	,,,		
Description of the tas	k		Durati	on of exposure	e per ev	ent	frequency	/ of e	vents
Manual application				s-hours 1 tasks per year					
				ding on the size of the treated			-		
			area	5					
Post-application				oddlers playing on grass (EPA			A Relevant for up to 7 days after		
and the second s				ure factors hand		· · · · · ·	application		,,,
Human factors not inf	luence	d by risk			,				
Description of the		lation exp		Breathing ra	te	Exposed	d body part		Corresponding skin
task						-	••		area [cm <sup>2</sup> ]
Manual application	Adult			1.25 m³/hr		Hands a	nd forearms	;	1900 (DIY fact sheet)
Post-application		/Toddlers		NR		NR			NR
Other given operation			ecting	consumers ex	posure				
Description of the tas			or/outdo			volume		Air	exchange rate
Manual application outdoor							ace, small	NR	•
					area around the user)				
Post-application outdoor NR NR									
Conditions and measu	ires re			on and behavi	oural ad	vice to co	nsumers		
Do not get in eyes, on s								type	FFP2 acc. to EN 149).
Keep container closed a						0	,		,
In case of contact with e					ter and s	eek medic	al advice.		
Wash thoroughly after h	-								
Do not mix with acids a			nes to wa	ater and not wa	ter to lim	es.			
Incorporation of the gar							vill facilitate	the e	ffect.
Conditions and measu	ires re	lated to p	ersonal	protection and	d hygien	e			
Wear suitable gloves g									

Wear suitable gloves, goggles and protection clothes.



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2.2 Control of e	nvironmental exposu	re	
<b>Product characteris</b>			
Drift: 1 % (very worst-	case estimate based on data	from dust measuren	nents in air as a function of the distance from application)
Amounts used			
Amount used	Ca(OH)2	2,244 kg/ha	In professional agricultural soil protection, it is
	CaO	1,700 kg/ha	recommended not to exceed 1700 kg CaO/ha or
	CaO.MgO	1,478 kg/ha	the corresponding amount of 2244 kg
	Ca(OH)2.Mg(OH)2 CaCO3.MgO	2,030 kg/ha 2,149 kg/ha	Ca(OH) <sub>2</sub> /ha. This rate is three times the amount
	needed to compensate the annual losses of lime		
	Ca(OH)2.MgO	1,774 kg/ha	by leaching. For this reason, the value of 1700
	Natural hydraulic lime	2,420 kg/ha	kg CaO/ha or the corresponding amount of 2244 kg Ca(OH)₂/ha is used in this dossier as the basis
			for the risk assessment. The amount used for the
			other lime variants can be calculated based on
			their composition and the molecular weight.
Frequency and dura	ation of use		their composition and the molecular weight.
		polications during th	e year are allowed, provided the total yearly amount of
1,478kg/ha is not exc	eeded (CaO MgO)	ppiloutorio during tri	e year are anowed, provided the total yearly amount of
	s not influenced by risk ma	nagement	
Not relevant for expo			
	onal conditions affecting e	nvironmental expos	ure
Outdoor use of produ			
Soil mixing depth: 20			
	s and measures at process	s level (source) to p	revent release
	eleases to adjacent surface v		
			air emissions and releases to soil
Drift should be minim		or minit discharges	
	asures related to municipa	l sowago troatmont	nlant
Not relevant for expo		i sewage i cathlent	piant
	asures related to external	treatment of waste	for disposal
Not relevant for expo		a calification of waste	
	asures related to external	recovery of waste	
Not relevant for expo			
	imation and reference	a to its source	
			posure estimate and the respective DNEL (derived no-
effect level) and is g substances of 1 mg/r includes an additiona	iven in parentheses below. n <sup>3</sup> (as respirable dust) and th al safety margin since the res es are classified as irritating	For inhalation expos e respective inhalatic pirable fraction is a si	ure, the RCR is based on the long-term DNEL for lime n exposure estimate (as inhalable dust). Thus, the RCR ub-fraction of the inhalable fraction according to EN 481. qualitative assessment has been performed for dermal
Human exposure			
Manual application			
Route of	Exposure estimate	Method u	sed, comments
exposure			
Oral	-		assessment
		Oral expos	sure does not occur as part of the intended product use.
Dermal	Dust, powder	Qualitative	
Dermal	Dust, powder	If risk red	luction measures are taken into account no human
Dermal	Dust, powder	If risk rec exposure	luction measures are taken into account no human is expected. However, dermal contact to dust from
Dermal	Dust, powder	If risk rec exposure application	uction measures are taken into account no human is expected. However, dermal contact to dust from of lime substances or by direct contact to the limes
Dermal	Dust, powder	If risk rec exposure application cannot be	uction measures are taken into account no human is expected. However, dermal contact to dust from of lime substances or by direct contact to the limes e excluded if no protective gloves are worn during
Dermal	Dust, powder	If risk rec exposure application cannot be application	uction measures are taken into account no human is expected. However, dermal contact to dust from of lime substances or by direct contact to the limes e excluded if no protective gloves are worn during b. Due to the relatively long application time, skin
Dermal	Dust, powder	If risk rec exposure application cannot be application irritation	uction measures are taken into account no human is expected. However, dermal contact to dust from no f lime substances or by direct contact to the limes e excluded if no protective gloves are worn during n. Due to the relatively long application time, skin would be expected. This can easily be avoided by
Dermal	Dust, powder	If risk rec exposure application cannot be application irritation immediate	uction measures are taken into account no human is expected. However, dermal contact to dust from of lime substances or by direct contact to the limes e excluded if no protective gloves are worn during b. Due to the relatively long application time, skin would be expected. This can easily be avoided by rinsing with water. It would be assumed that consumers
Dermal	Dust, powder	If risk rec exposure application cannot be application irritation immediate who had	uction measures are taken into account no human is expected. However, dermal contact to dust from a of lime substances or by direct contact to the limes e excluded if no protective gloves are worn during b. Due to the relatively long application time, skin would be expected. This can easily be avoided by rinsing with water. It would be assumed that consumers experience of skin irritation will protect themselves.
Dermal	Dust, powder	If risk rec exposure application cannot be application irritation immediate who had Therefore,	uction measures are taken into account no human is expected. However, dermal contact to dust from a of lime substances or by direct contact to the limes e excluded if no protective gloves are worn during h. Due to the relatively long application time, skin would be expected. This can easily be avoided by rinsing with water. It would be assumed that consumers experience of skin irritation will protect themselves. any occurring skin irritation, which will be reversible,
	Dust, powder	If risk rec exposure application cannot be application irritation immediate who had Therefore, can be ass	uction measures are taken into account no human is expected. However, dermal contact to dust from a of lime substances or by direct contact to the limes e excluded if no protective gloves are worn during b. Due to the relatively long application time, skin would be expected. This can easily be avoided by rinsing with water. It would be assumed that consumers experience of skin irritation will protect themselves.
Dermal		If risk rec exposure application cannot be application irritation v immediate who had Therefore, can be ass Qualitative	Luction measures are taken into account no human is expected. However, dermal contact to dust from no f lime substances or by direct contact to the limes e excluded if no protective gloves are worn during n. Due to the relatively long application time, skin would be expected. This can easily be avoided by rinsing with water. It would be assumed that consumers experience of skin irritation will protect themselves. any occurring skin irritation, which will be reversible, sumed to be non-recurring.
		If risk rec exposure application cannot be application irritation v immediate who had Therefore, can be ass Qualitative If risk rec exposure	Auction measures are taken into account no human is expected. However, dermal contact to dust from no of lime substances or by direct contact to the limes e excluded if no protective gloves are worn during h. Due to the relatively long application time, skin would be expected. This can easily be avoided by rinsing with water. It would be assumed that consumers experience of skin irritation will protect themselves. any occurring skin irritation, which will be reversible, sumed to be non-recurring. assessment luction measures are taken into account no human is expected. Dust from surfacing with lime cannot be
		If risk rec exposure application cannot be application irritation v immediate who had Therefore, can be ass Qualitative If risk rec exposure	Auction measures are taken into account no human is expected. However, dermal contact to dust from no of lime substances or by direct contact to the limes e excluded if no protective gloves are worn during h. Due to the relatively long application time, skin would be expected. This can easily be avoided by rinsing with water. It would be assumed that consumers experience of skin irritation will protect themselves. any occurring skin irritation, which will be reversible, sumed to be non-recurring.
		If risk rec exposure application cannot be application irritation v immediate who had Therefore, can be ass Qualitative If risk rec exposure excluded	Auction measures are taken into account no human is expected. However, dermal contact to dust from no of lime substances or by direct contact to the limes e excluded if no protective gloves are worn during h. Due to the relatively long application time, skin would be expected. This can easily be avoided by rinsing with water. It would be assumed that consumers experience of skin irritation will protect themselves. any occurring skin irritation, which will be reversible, sumed to be non-recurring. assessment luction measures are taken into account no human is expected. Dust from surfacing with lime cannot be



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available, therefore, read across from the dust formation model while pouring powders has been used as a worst case. Dust formation while pouring the powder is addressed by using the dutch model (van Hemmen, 1992, as described in section 9.0.3.1 above) and applying a dust reduction factor of 10 for the granular	Inhalation (garden lime)	Small task: 12 μg/m³ (0.0012) Large task: 120 μg/m³ (0.012)	Quantitative assessment No model describing the application of powders by shovel/hand is available, therefore, read-across from the dust formation model while pouring powders has been used as a worst case. Dust formation while pouring the powder is addressed by using the dutch model (van Hemmen, 1992, as described in section 9.0.3.1 above).
		10 ( )	No model describing the application of powders by shovel/hand is available, therefore, read across from the dust formation model while pouring powders has been used as a worst case. Dust formation while pouring the powder is addressed by using the dutch model (van Hemmen, 1992, as described in section 9.0.3.1 above) and applying a dust reduction factor of 10 for the granular form and a factor of 5 to account for the reduced amount of limes
	According to the PSI	D (UK Pesticide Safety Directorate, no	ow called CRD) post-application exposure need to be addressed for

According to the PSD (UK Pesticide Safety Directorate, now called CRD) post-application exposure need to be addressed for products which are applied in parks or amateur products used to treat lawns and plants grown in private gardens. In this case exposure of children, who may have access to these areas soon after treatment, needs to be assessed. The US EPA model predicts the post-application exposure to products used in private gardens (e.g. lawns) by toddlers crawling on the treated area and also via the oral route through hand-to-mouth activities.

Garden lime or fertilizer including lime is used to treat acidic soil. Therefore, after application to the soil and subsequent watering the hazard driving effect of lime (alkalinity) will be quickly neutralized. Exposure to lime substances will be negligible within a short time after application.

#### Environmental exposure

No quantitative environmental exposure assessment is carried out because the operational conditions and risk management measures for consumer use are less stringent than those outlined for professional agricultural soil protection. Moreover, the neutralisation/pH-effect is the intended and desired effect in the soil compartment. Releases to wastewater are not expected.



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# ES number 9.15: Consumer use of lime substances as water treatment chemicals

Exposure Seensie	Forme	1+ (2) ada	Irocain	a uses corried out by	COROLL	more	
	rorma	n (2) add	ressin	g uses carried out by	consul	ners	
1. Title							
Free short title				Consumer use of lime s		es as water treatm	nent chemicals
Systematic title based			or	SU21, PC20, PC37, ER			
Processes, tasks activ				Loading, filling or re-fill	ing of sol	id formulations ir	nto container/preparation
				of lime milk	•		
				Application of lime milk	to water		
Assessment Method*				Human health:			
							oral and dermal exposure
							e has been assessed by
				the Dutch model (van H	lemmen,	1992).	
				Environment:			
				A qualitative justification			
2. Operational co	onditi			management measures			
RMM		No furthe	r produc	t integrated risk manager	ment mea	sures are in plac	е.
PC/ERC				ctivity referring to artic	cle categ	ories (AC) and	environmental release
		categori					
PC 20/37				g (transfer of lime substa			
				ubstances (solid) into cor	ntainer fo	r further application	on.
				tion of lime milk to water.			
ERC 8b				ndoor use of reactive sub	stances i	n open systems	
2.1 Control of co		ners ex	posu	re			
Product characteristic							
Description of the		entration		Physical state of	Dustine	ss (if relevant)	Packaging design
preparation		tance ir	n the	the preparation			
		aration					
Water treatment	Up to	100 %		Solid, fine powder	high dustiness		Bulk in bags or
chemical					(indicative value from		buckets/containers.
					DIY fact sheet see		
Motor treatment	مد مرا ا	00.0/		Colid arcaular of	section 9.0.3) low dustiness		Dullstonk lanns an in
Water treatment chemical	Up to	39 %		Solid, granular of different size	(reduction by 10%		Bulk-tank lorry or in "Big Bags" or in sacks
chemical				(D50 value 0.7 compared to powder)		"BIY BAYS OF IT SACKS	
				D50 value 1.75			
				D50 value 1.75			
Amounts used	1			D00 Value 0.00)			
Description of the prep	paratio	n		Amount used per ever	nt		
Water treatment chemi			tor for	depending on the size of		er reactor to be fil	lled (~ 100a /L)
aquaria			.51 101				
Water treatment chemi	ical in	lime read	tor for	depending on the size of the water reactor to be filled (~up to 1.2 kg/L)			
drinking water				depending on the size of the water reactor to be filled (~up to 1.2 kg/L)			
Lime milk for further app	lication	)		~ 20 g / 5L			
Frequency and duration	on of us	se/exposi	ire				
Description of task				on of exposure per ever	nt	frequency of e	events
Preparation of lime milk	(loadir	ng, filling	1.33 m			1 task/month	
and refilling)	`	5. 0	(DIY-fa	act sheet, RIVM, Chapte	er 2.4.2	1task/week	
,				and loading of powders)			
Dropwise application of	of lime	milk to		al minutes - hours		1 tasks/ month	
water							
	Human factors not influenced by risk management						
task	Description of the Population exposed				Breathing rate Exposed		Corresponding skin area [cm²]
Preparation of lime	adult			1.25 m³/hr	Half of	both hands	430
milk (loading, filling							(RIVM report
and refilling)							320104007)
Dropwise application	adult			NR	Hands		860
of lime milk to water							(RIVM report
							320104007)
Other given operationa							
Description of the task	(	Indo	or/outdo	or Room v	volume	Air	exchange rate



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Preparation of lime m							
filling and refilling)	nilk (loading,	Indoor/outdoor	1 m <sup>3</sup> (personal space, small area around the user)	0.6 hr <sup>-1</sup> (unspecified room indoor)			
Dropwise application to water	of lime milk	indoor	NR	NR			
	asuras relate	d to information and be	ehavioural advice to consumers				
Do not get in eyes, o Keep container close Use only with adequa	n skin, or on o ed and out of i ate ventilation	clothing. Do not breathe o reach of children. n.					
Wash thoroughly after handling. Do not mix with acids and always add limes to water and not water to limes.							
Conditions and measures related to personal protection and hygiene							
Wear suitable gloves, goggles and protective clothes. Use a filtering half mask (mask type FFP2 acc. to EN 149).							
2.2 Control of environmental exposure Product characteristics							
Not relevant for exposure assessment							
Amounts used* Not relevant for expo		nont					
Frequency and dura	ation of use	neni					
Not relevant for expo	sure assessn						
		ced by risk manageme	nt				
Default river flow and		ons affecting environme	ental exposure				
Indoor							
		d to municipal sewage					
		system/treatment plant a d to external treatmen	nd sludge treatment technique				
Not relevant for expo							
		ed to external recovery	of waste				
Not relevant for expo			-				
		and reference to					
			refined exposure estimate and the r				
	effect level) and is given in parentheses below. For inhalation exposure, the RCR is based on the acute DNEL for lime substances of 4 mg/m <sup>3</sup> (as respirable dust) and the respective inhalation exposure estimate (as inhalable dust). Thus, the RCR						
includes an additional safety margin since the respirable fraction is a sub-fraction of the inhalable fraction according to EN 481.							
includes an additiona	al safety margi	in since the respirable fra	ction is a sub-fraction of the inhalable	fraction according to EN 481.			
includes an additional Since lime substance	al safety margi es are classif	in since the respirable fra ied as irritating to skin a		fraction according to EN 481.			
includes an additional Since lime substance exposure and expose	al safety margi es are classif	in since the respirable fra ied as irritating to skin a	ction is a sub-fraction of the inhalable	fraction according to EN 481.			
includes an additional Since lime substance exposure and exposure Human exposure Preparation of lime	al safety marging es are classif ure to the eye	in since the respirable fra ied as irritating to skin a	ction is a sub-fraction of the inhalable	fraction according to EN 481.			
includes an additional Since lime substance exposure and expose Human exposure	al safety marging es are classif ure to the eye	in since the respirable fra ied as irritating to skin a a. g )	ction is a sub-fraction of the inhalable	fraction according to EN 481.			
includes an additional Since lime substance exposure and exposure Human exposure Preparation of lime Route of	al safety marging es are classif ure to the eye milk (loading	in since the respirable fra ied as irritating to skin a a. g )	ction is a sub-fraction of the inhalable nd eyes a qualitative assessment ha Method used, comments Qualitative assessment	fraction according to EN 481. Is been performed for dermal			
includes an additional Since lime substance exposure and exposure Preparation of lime Route of exposure Oral	al safety margi es are classif ure to the eye milk (loading Exposure e	in since the respirable fra ied as irritating to skin a a. g ) estimate	ction is a sub-fraction of the inhalable nd eyes a qualitative assessment ha Method used, comments Qualitative assessment Oral exposure does not occur as pa	fraction according to EN 481. Is been performed for dermal			
includes an additional Since lime substance exposure and exposure Human exposure Preparation of lime Route of exposure	al safety margi es are classif ure to the eye milk (loading Exposure e	in since the respirable fra ied as irritating to skin a a. g ) estimate 0.1 μg/cm² (-)	ction is a sub-fraction of the inhalable nd eyes a qualitative assessment ha Method used, comments Qualitative assessment Oral exposure does not occur as pa Qualitative assessment If risk reduction measures are ta	tr of the intended product use. ken into account no human			
includes an additional Since lime substance exposure and exposure Preparation of lime Route of exposure Oral	al safety margi es are classif ure to the eye milk (loading Exposure e small task:	in since the respirable fra ied as irritating to skin a a. g ) estimate 0.1 μg/cm² (-)	ction is a sub-fraction of the inhalable nd eyes a qualitative assessment ha Method used, comments Qualitative assessment Oral exposure does not occur as pa Qualitative assessment If risk reduction measures are ta exposure is expected. However,	tr of the intended product use. ken into account no human dermal contact to dust from			
includes an additional Since lime substance exposure and exposure Preparation of lime Route of exposure Oral	al safety margi es are classif ure to the eye milk (loading Exposure e small task:	in since the respirable fra ied as irritating to skin a a. g ) estimate 0.1 μg/cm² (-)	ction is a sub-fraction of the inhalable and eyes a qualitative assessment ha Method used, comments Qualitative assessment Oral exposure does not occur as pa Qualitative assessment If risk reduction measures are ta exposure is expected. However, loading of limes or direct contact to	tr of the intended product use. ken into account no human dermal contact to dust from the lime cannot be excluded			
includes an additional Since lime substance exposure and exposure Preparation of lime Route of exposure Oral	al safety margi es are classif ure to the eye milk (loading Exposure e small task:	in since the respirable fra ied as irritating to skin a a. g ) estimate 0.1 μg/cm² (-)	ction is a sub-fraction of the inhalable and eyes a qualitative assessment ha Method used, comments Qualitative assessment Oral exposure does not occur as pa Qualitative assessment If risk reduction measures are ta exposure is expected. However, loading of limes or direct contact to if no protective gloves are worn occasionally result in mild irritation	tr of the intended product use. ken into account no human dermal contact to dust from the lime cannot be excluded during application. This may			
includes an additional Since lime substance exposure and exposure Preparation of lime Route of exposure Oral	al safety margi es are classif ure to the eye milk (loading Exposure e small task:	in since the respirable fra ied as irritating to skin a a. g ) estimate 0.1 μg/cm² (-)	ction is a sub-fraction of the inhalable and eyes a qualitative assessment hat Method used, comments Qualitative assessment Oral exposure does not occur as pa Qualitative assessment If risk reduction measures are ta exposure is expected. However, of loading of limes or direct contact to if no protective gloves are worn occasionally result in mild irritation rinsing with water.	tr of the intended product use. ken into account no human dermal contact to dust from the lime cannot be excluded during application. This may			
includes an additional Since lime substance exposure and exposure Preparation of lime Route of exposure Oral	al safety margi es are classif ure to the eye milk (loading Exposure e small task:	in since the respirable fra ied as irritating to skin a a. g ) estimate 0.1 μg/cm² (-)	ction is a sub-fraction of the inhalable and eyes a qualitative assessment has <b>Method used, comments</b> Qualitative assessment Oral exposure does not occur as pa Qualitative assessment If risk reduction measures are ta exposure is expected. However, loading of limes or direct contact to if no protective gloves are worn occasionally result in mild irritation rinsing with water. Quantitative assessment The constant rate model of Con-	tr of the intended product use. ken into account no human dermal contact to dust from the lime cannot be excluded during application. This may n easily avoided by prompt sExpo has been used. The			
includes an additional Since lime substance exposure and exposure Preparation of lime Route of exposure Oral	al safety margi es are classif ure to the eye milk (loading Exposure e small task:	in since the respirable fra ied as irritating to skin a a. g ) estimate 0.1 μg/cm² (-)	ction is a sub-fraction of the inhalable and eyes a qualitative assessment ha Method used, comments Qualitative assessment Oral exposure does not occur as pa Qualitative assessment If risk reduction measures are ta exposure is expected. However, is loading of limes or direct contact to if no protective gloves are worn occasionally result in mild irritation rinsing with water. Quantitative assessment The constant rate model of Con- contact rate to dust formed while por	tr of the intended product use. ken into account no human dermal contact to dust from the lime cannot be excluded during application. This may n easily avoided by prompt sExpo has been used. The buring powder has been taken			
includes an additional Since lime substance exposure and exposure Preparation of lime Route of exposure Oral	al safety margi es are classif ure to the eye milk (loading Exposure e small task:	in since the respirable fra ied as irritating to skin a a. g ) estimate 0.1 μg/cm² (-)	ction is a sub-fraction of the inhalable and eyes a qualitative assessment ha Method used, comments Qualitative assessment Oral exposure does not occur as pa Qualitative assessment If risk reduction measures are ta exposure is expected. However, loading of limes or direct contact to if no protective gloves are worn occasionally result in mild irritation rinsing with water. Quantitative assessment The constant rate model of Con- contact rate to dust formed while por from the DIY-fact sheet (RIVM report	tr of the intended product use. ken into account no human dermal contact to dust from the lime cannot be excluded during application. This may n easily avoided by prompt sExpo has been used. The puring powder has been taken ort 320104007). For granules			
includes an additional Since lime substance exposure and exposure Preparation of lime Route of exposure Oral	al safety margi es are classif ure to the eye milk (loading Exposure e small task:	in since the respirable fra ied as irritating to skin a a. g ) estimate 0.1 μg/cm² (-)	ction is a sub-fraction of the inhalable and eyes a qualitative assessment ha Method used, comments Qualitative assessment Oral exposure does not occur as pa Qualitative assessment If risk reduction measures are ta exposure is expected. However, of loading of limes or direct contact to if no protective gloves are worn occasionally result in mild irritation rinsing with water. Quantitative assessment The constant rate model of Con- contact rate to dust formed while por from the DIY-fact sheet (RIVM rep- the exposure estimate will be even Qualitative assessment	tr of the intended product use. ken into account no human dermal contact to dust from the lime cannot be excluded during application. This may n easily avoided by prompt sExpo has been used. The puring powder has been taken ort 320104007). For granules lower.			
includes an additional Since lime substance exposure and exposure Preparation of lime Route of exposure Oral Dermal (powder)	al safety marg es are classif ure to the eye milk (loading Exposure e - small task: 1 large task: 2	in since the respirable fra ied as irritating to skin a a. g ) estimate 0.1 μg/cm² (-)	ction is a sub-fraction of the inhalable and eyes a qualitative assessment ha Method used, comments Qualitative assessment Oral exposure does not occur as pa Qualitative assessment If risk reduction measures are ta exposure is expected. However, loading of limes or direct contact to if no protective gloves are worn occasionally result in mild irritation rinsing with water. Quantitative assessment The constant rate model of Con- contact rate to dust formed while por from the DIY-fact sheet (RIVM rep- the exposure estimate will be even Qualitative assessment If risk reduction measures are ta	tr of the intended product use. ken into account no human dermal contact to dust from the lime cannot be excluded during application. This may n easily avoided by prompt sExpo has been used. The buring powder has been taken ort 320104007). For granules lower. ken into account no human			
includes an additional Since lime substance exposure and exposure Preparation of lime Route of exposure Oral Dermal (powder)	al safety marg es are classif ure to the eye milk (loading Exposure e - small task: 1 large task: 2	in since the respirable fra ied as irritating to skin a a. g ) estimate 0.1 μg/cm² (-)	ction is a sub-fraction of the inhalable and eyes a qualitative assessment ha Method used, comments Qualitative assessment Oral exposure does not occur as pa Qualitative assessment If risk reduction measures are ta exposure is expected. However, of loading of limes or direct contact to if no protective gloves are worn occasionally result in mild irritation rinsing with water. Quantitative assessment The constant rate model of Con- contact rate to dust formed while por from the DIY-fact sheet (RIVM rep- the exposure estimate will be even Qualitative assessment	tr of the intended product use. ken into account no human dermal contact to dust from the lime cannot be excluded during application. This may n easily avoided by prompt sExpo has been used. The puring powder has been taken ort 320104007). For granules lower. ken into account no human pading of the limes cannot be			
includes an additional Since lime substance exposure and exposure Preparation of lime Route of exposure Oral Dermal (powder)	al safety marg es are classif ure to the eye milk (loading Exposure e - small task: 1 large task: 2	in since the respirable fra ied as irritating to skin a a. g ) estimate 0.1 μg/cm² (-)	ction is a sub-fraction of the inhalable and eyes a qualitative assessment ha Method used, comments Qualitative assessment Oral exposure does not occur as pa Qualitative assessment If risk reduction measures are ta exposure is expected. However, loading of limes or direct contact to if no protective gloves are worn occasionally result in mild irritation rinsing with water. Quantitative assessment The constant rate model of Con- contact rate to dust formed while por from the DIY-fact sheet (RIVM repor- the exposure estimate will be even Qualitative assessment If risk reduction measures are ta exposure is expected. Dust from lo excluded if no protective goggles a water and seeking medical advice	rt of the intended product use. ken into account no human dermal contact to dust from the lime cannot be excluded during application. This may n easily avoided by prompt sExpo has been used. The puring powder has been taken ort 320104007). For granules lower. ken into account no human pading of the limes cannot be are used. Prompt rinsing with			
includes an additional Since lime substance exposure and exposure Preparation of lime Route of exposure Oral Dermal (powder)	al safety margi es are classif ure to the eye milk (loading Exposure e - small task: large task: Dust	in since the respirable fra ied as irritating to skin a  g ) estimate 0.1 μg/cm² (-) 1 μg/cm² (-)	ction is a sub-fraction of the inhalable and eyes a qualitative assessment ha Method used, comments Qualitative assessment Oral exposure does not occur as pa Qualitative assessment If risk reduction measures are ta exposure is expected. However, of loading of limes or direct contact to if no protective gloves are worn of occasionally result in mild irritation rinsing with water. Quantitative assessment The constant rate model of Con- contact rate to dust formed while por from the DIY-fact sheet (RIVM repor- the exposure estimate will be even Qualitative assessment If risk reduction measures are ta exposure is expected. Dust from loc excluded if no protective goggles a water and seeking medical advice advisable.	rt of the intended product use. ken into account no human dermal contact to dust from the lime cannot be excluded during application. This may n easily avoided by prompt sExpo has been used. The puring powder has been taken ort 320104007). For granules lower. ken into account no human pading of the limes cannot be are used. Prompt rinsing with			
includes an additional Since lime substance exposure and exposure Preparation of lime Route of exposure Oral Dermal (powder)	al safety marg es are classif ure to the eye milk (loading Exposure e - small task: large task: Dust	in since the respirable fra ied as irritating to skin a a. g ) estimate 0.1 μg/cm² (-)	ction is a sub-fraction of the inhalable and eyes a qualitative assessment ha Method used, comments Qualitative assessment Oral exposure does not occur as pa Qualitative assessment If risk reduction measures are ta exposure is expected. However, loading of limes or direct contact to if no protective gloves are worn occasionally result in mild irritation rinsing with water. Quantitative assessment The constant rate model of Con- contact rate to dust formed while por from the DIY-fact sheet (RIVM repor- the exposure estimate will be even Qualitative assessment If risk reduction measures are ta exposure is expected. Dust from lo excluded if no protective goggles a water and seeking medical advice	tr of the intended product use. ken into account no human dermal contact to dust from the lime cannot be excluded during application. This may n easily avoided by prompt sExpo has been used. The buring powder has been taken ort 320104007). For granules lower. ken into account no human bading of the limes cannot be are used. Prompt rinsing with after accidental exposure is			



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Inhalation		Small task: 1.2 µg/m <sup>3</sup> (0.0003)	Quantitative assessment		
(granules)		Large task: 12 µg/m <sup>3</sup> (0.003)	Dust formation while pouring the powder is addressed by using		
			the Dutch model (van Hemmen, 1992 as described in section		
			9.0.3.1 above) and applying a dust reduction factor of 10 for the		
			granular form.		
Dropwise application of lime milk to water					
Route	of	Exposure estimate	Method used, comments		
exposure					
Oral		-	Qualitative assessment		
			Oral exposure does not occur as part of the intended product use.		
Dermal		Droplets or splashes	Qualitative assessment		
			If risk reduction measures are taken into account no human		
			exposure is expected. However, splashes on the skin cannot be		
			excluded if no protective gloves are worn during application.		
			Splashes may occasionally result in mild irritation easily avoided		
			by immediate rinsing of the hands in water.		
Eye		Droplets or splashes	Qualitative assessment		
			If risk reduction measures are taken into account no human		
			exposure is expected. However, splashes into the eyes cannot be		
			excluded if no protective goggles are worn during the application.		
		However, it is rare for eye irritation to occur as a result of exposure			
			to a clear solution of calcium hydroxide (lime water) and mild		
			irritation can easily be avoided by immediate rinsing of the eyes		
			with water.		
Inhalation		-	Qualitative assessment		
			Not expected, as the vapour pressure of limes in water is low and		
			generation of mists or aerosols does not take place.		
Environmental					
			ed to be negligible. The influent of a municipal wastewater treatment		
plant is often ne	eutrali	zed anyway and lime may even be	used beneficially for pH control of acid wastewater streams that are		

plant is often neutralized anyway and lime may even be used beneficially for pH control of acid wastewater streams that are treated in biological WWTPs. Since the pH of the influent of the municipal treatment plant is circum neutral, the pH impact is negligible on the receiving environmental compartments, such as surface water, sediment and terrestrial compartment.



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# ES number 9.16: Consumer use of cosmetics containing lime substances

Exposure Scenario Format (2) addressir	ng uses carried out by consumers				
1. Title					
Free short title	Consumer use of cosmetics containing limes				
Systematic title based on use descriptor	SU21, PC39, ERC8a				
Processes, tasks activities covered					
,	Human health:				
Assessment Method*	According to Article 14(5) (b) of regulation (EC) 1907/2006 risks to human health need not be considered for substances included in cosmetic products within the scope of Directive 76/768/EC. Environment A qualitative justification assessment is provided.				
2. Operational conditions and risk m					
ERC 8a Wide dispersive	indoor use of processing aids in open systems				
2.1 Control of consumers exposure					
Product characteristic					
Not relevant, as the risk to human health from th	is use does not need to be considered				
Amounts used					
Not relevant, as the risk to human health from th	is use does not need to be considered				
Frequency and duration of use/exposure					
Not relevant, as the risk to human health from th	is use does not need to be considered				
Human factors not influenced by risk manage					
Not relevant, as the risk to human health from th					
Other given operational conditions affecting					
Not relevant, as the risk to human health from th					
Conditions and measures related to informat					
Not relevant, as the risk to human health from th					
Conditions and measures related to personal protection and hygiene					
Not relevant, as the risk to human health from th					
2.2 Control of environmental exposu	Ire				
Product characteristics					
Not relevant for exposure assessment					
Amounts used*					
Not relevant for exposure assessment					
Frequency and duration of use					
Not relevant for exposure assessment					
Environment factors not influenced by risk m	anagement				
Default river flow and dilution					
Other given operational conditions affecting	environmental exposure				
Indoor					
Conditions and measures related to municipal sewage treatment plant					
Default size of municipal sewage system/treatment plant and sludge treatment technique					
Conditions and measures related to external treatment of waste for disposal					
Not relevant for exposure assessment					
Conditions and measures related to external recovery of waste					
Not relevant for exposure assessment					
3. Exposure estimation and reference	e to its source				
Human exposure					
Human exposure to cosmetics will be addresse (EC) 1907/2006 according to Article 14(5) (b) of	d by other legislation and therefore need not be addressed under regulation this regulation.				
Environmental exposure					
	s expected to be negligible. The influent of a municipal wastewater treatment				
	even be used beneficially for pH control of acid wastewater streams that are e influent of the municipal treatment plant is circum neutral, the pH impact is				

treated in biological WWTPs. Since the pH of the influent of the municipal treatment plant is circum neutral, the pH impact is negligible on the receiving environmental compartments, such as surface water, sediment and terrestrial compartment.

End of the safety data sheet