COLORS ROHSTOFF FÜR IDEEN		PRODUCT SAFETY DATA SHEET for Calcium $(OH)_2$ – CaCO <sub>3</sub> – m prepared in accordance with Annex II of the REACH Regulation 1907/2006, Regulation (EC) No 1272/2008 and Regulation (EU) 2015/830	ixture on EC
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# SECTION 1: IDENTIFICATION OF THE SUBSTANCE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier	
Substance name:	Calcium dihydroxide – Calciumcarbonate - mixture
Synonyms:	Hydrated lime, Slaked lime, Air slaked lime, Building lime, Fat lime, Chemical lime, Finishing lime, Mason's lime, Calcium dihydroxide, Calcium hydroxide, Calcium hydrate, Lime, Lime water.
	Please note that this list may not be exhaustive.
Chemical name and formula:	Calcium dihydroxide – Ca(OH) <sub>2</sub> / Calciumcarbonate – CaCO <sub>3</sub>
Trade name:	Carbocal® clean 3-fein, Carbocal® clean 5-fein, Carbocal® clean 3-fein-feucht, Carbocal® clean 5-fein-feucht, Carbocal® clean 5-grob-feucht.

# 1.2 Relevant identified uses of the substance and uses advised against

# Use of the substance:

The substance is intended for the following non-exhaustive list of uses:

biocidal applications: disinfection of running and yard surfaces, high and deep boxes, claw hygiene; Agriculture, environmental protection (e.g. sewage sludge and slurry treatment), identified uses.

# 1.2.1 Identified uses

All uses listed in table 1 of the Appendix of this SDS are identified uses.

# 1.2.2 Uses advised against

No use identified in Table 1 of the Appendix of this SDS is advised against.

# 1.3 Details of the supplier of the Safety Data Sheet

Name:	Calcis Warstein GmbH & Co. KG
Address:	Rangetriftweg 108, 59581 Warstein
Phone N°:	+49 (5483) 7392-0
Fax N°:	+49 (5483) 7392-92
E-mail of competent person responsible for SDS in the MS or in the EU:	reach@calcis.de

# 1.4 Emergency telephone number

European Emergency N°:	112

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National centre for Prevention and Treatment of Intoxications N°:	Emergency Hospital: Krankenhaus Maria Hilf, Warstein +49 (2902) 8910		
Emergency telephone at the company	+49 (5483) 7392-0/-18 m	obil: +49 (71) 6572191	
Available outside office hours:	Yes	-No	

# SECTION 2: HAZARDS IDENTIFICATION

# 2.1. Classification of the substance

2.1.1. Classification according to Regulation (EC) 1272/2008 Eye Dam. 1, H318

#### 2.1.2. Additional information

For full text of H-statements and R- phrases: see SECTION 16

#### 2.2. Label elements

# 2.2.1. Labelling according to Regulation (EC) 1272/2008

# Signal word: Danger

Hazard pictogram:



# Hazard statements:

H318:

Causes serious eye damage

Precautionary statements:

P102:	Keep out of reach of children
P280:	Wear protective gloves/protective clothing/eye protection/face protection
P305+P351+P338:	If in eyes: Rinse cautiously with water for several minutes. Remove contact
	lenses, if present and easy to do. Continue rinsing.
P302+P352:	IF ON SKIN: Wash with plenty of water
P310:	Immediately call a poison center or doctor/physician.
P261:	Avoid breathing dust/spray
P304+P340:	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P501:	Dispose of contents/container in accordance with national regulation

#### 2.3. Other hazards

The substance does not meet the criteria for PBT or vPvB substance. No other hazards identified.

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# SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

# 3.1. Substance

#### Main constituent

CAS number	EC number	Registration	Identification	Weight %	Classification according to
		No	name	content	Regulation (EC) No 1272/2008
				(or range)	[CLP]
1305-62-0	215-137-3	01-	Calcium	3 - 5%	Eye Dam 1 H318
		2119475151-	dihydroxide		Skin Irrit. 2 H315
		45-0025	-		STOT SE 3 (inhalation) H335

Substances of Very High Concern (SVHC), which have been published pursuant to Article 59 of Regulation (EC) No 1907/2006, are not contained in a concentration of more than 0.1 percent by mass.

# SECTION 4: FIRST AID MEASURES

#### 4.1. Description of first aid measures

#### General notes

No known delayed effects. Consult a physician for all exposures except for minor instances.

#### Following inhalation

Move source of dust or move person to fresh air. Obtain medical attention immediately.

#### Following skin contact

Carefully and gently brush the contaminated body surfaces in order to remove all traces of product. Wash affected area immediately with plenty of water. Remove contaminated clothing. If necessary seek medical advice.

#### Following eye contact

Rinse eyes immediately with plenty of water and seek medical advice.

#### Following ingestion

Clean mouth with water and drink afterwards plenty of water. Do NOT induce vomiting. Obtain medical attention.

#### Self-protection of the first aider

Avoid contact with skin, eyes, and clothing – wear suitable protective equipment (see section 8). Avoid inhalation of dust – ensure that sufficient ventilation or suitable respiratory protective equipment is used, wear suitable protective equipment (see section 8).

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

Calcium dihydroxide is not acutely toxic via the oral, dermal, or inhalation route. The substance is classified as irritating to skin and the respiratory tract, and entails a risk of serious damage to the eye. There is no concern for adverse systemic effects because local effects (pH-effect) are the major health hazard.

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

Follow the advises given in section 4.1

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# SECTION 5: FIRE FIGHTING MEASURES

#### 5.1. Extinguishing media

#### 5.1.1. Suitable extinguishing media

The product is not combustible. Use a dry powder, foam or  $CO_2$  fire extinguisher to extinguish the surrounding fire.

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

# 5.1.2. Unsuitable extinguishing media

Do not use water.

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

None

#### 5.3. Advice for fire fighters

Avoid generation of dust. Use breathing apparatus. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

# SECTION 6: ACCIDENTAL RELEASE MEASURES

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

# 6.1.1. For non-emergency personnel

Ensure adequate ventilation.

Keep dust levels to a minimum.

Keep unprotected persons away.

Avoid contact with skin, eyes, and clothing – wear suitable protective equipment (see section 8). Avoid inhalation of dust – ensure that sufficient ventilation or suitable respiratory protective equipment is used, wear suitable protective equipment (see section 8).

#### 6.1.2. For emergency responders

Ensure adequate ventilation.

Keep dust levels to a minimum.

Keep unprotected persons away.

Avoid contact with skin, eyes, and clothing – wear suitable protective equipment (see section 8). Avoid inhalation of dust – ensure that sufficient ventilation or suitable respiratory protective equipment is used, wear suitable protective equipment (see section 8).

#### 6.2. Environmental precautions

Contain the spillage. Keep the material dry if possible. Cover area if possible to avoid unnecessary dust hazard. Avoid uncontrolled spills to watercourses and drains (pH increase). Any large spillage into watercourses must be alerted to the Environment Agency or other regulatory body.

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

In all cases avoid dust formation. Keep the material dry if possible.

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Pick up the product mechanically in a dry way. Use vacuum suction unit, or shovel into bags.

#### 6.4. Reference to other sections

For more information on exposure controls/personal protection or disposal considerations, please check section 8 and 13 and the annex of this safety data sheet.

# SECTION 7: HANDLING AND STORAGE

#### 7.1. Precautions for safe handling

#### 7.1.1. Protective measures

Avoid contact with skin and eyes. Wear protective equipment (refer to section 8 of this safety data sheet). Do not wear contact lenses when handling this product. It is also advisable to have individual pocket eyewash. Keep dust levels to a minimum. Minimize dust generation. Enclose dust sources, use exhaust ventilation (dust collector at handling points). Handling systems should preferably be enclosed. When handling bags usual precautions should be paid to the risks outlined in the Council Directive 90/269/EEC.

#### 7.1.2. Advice on general occupational hygiene

Avoid inhalation or ingestion and contact with skin and eyes. General occupational hygiene measures are required to ensure safe handling of the substance. These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), no drinking, eating and smoking at the workplace. Shower and change clothes at end of work shift. Do not wear contaminated clothing at home.

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

The substance should be stored under dry conditions. Any contact with air and moisture should be avoided. 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.

#### 7.3. Specific end use(s)

Please check the identified uses in table 1 of the Appendix of this SDS. For more information please see the relevant exposure scenario, available via your supplier/given in the Appendix, and check section 2.1: Control of worker exposure.

# SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

# 8.1. Control parameters

DNELs:

_							
		Workers					
	Route of exposure	Acute effect local	Acute effects systemic	Chronic effects local	Chronic effects systemic		
	Oral	Not required					

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Inhalation	4 mg / m³ (Respirable dust)	No hazard identified	1 mg / m³ (Respirable dust)	No hazard identified
Dermal	Hazard identified but no DNEL available	No hazard identified	Hazard identified but no DNEL available	No hazard identified

	Consumers			
Route of exposure	Acute effect local	Acute effects systemic	Chronic effects local	Chronic effects systemic
Oral	No exposure expected	No hazard identified	No exposure expected	No hazard identified
Inhalation	4 mg / m³ (Respirable dust)	No hazard identified	1 mg / m³ (Respirable dust)	No hazard identified
Dermal	Hazard identified but no DNEL available	No hazard identified	Hazard identified but no DNEL available	No hazard identified

# PNECs:

Environment protection target	PNEC	Remarks
Fresh water	0.49 mg / L	
Freshwater sediments	No PNEC available	Insufficient data available
Marine water	0.32 mg / L	
Marine sediments	No PNEC available	Insufficient data available
Food (bioaccumulation)	No hazard identified	No potential for bioaccumulation
Microorganisms in sewage treatment	3 mg / L	
Soil (agricultural)	1080 mg / kg soil dw	
Air	No hazard identified	

# OELs:

8 hours limit value	1 mg/m <sup>3</sup> respirable fraction
Short-term limit value	4 mg/m <sup>3</sup> respirable fraction

According to Directive (EU) 2017/164 of 31 January 2017

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- A = respirable (alveoli) dust fraction
- E = inhalable (total) dust fraction

# 8.2. Exposure controls

To control potential exposures, generation of dust should be avoided. Further, appropriate protective equipment is recommended. Eye protection equipment (e.g. goggles or visors) must 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.

Please check the relevant exposure scenario, given in the Appendix available via your supplier.

# 8.2.1. Appropriate engineering controls

If user operations generate dust, use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne dust levels below recommended exposure limits.

#### 8.2.2. Individual protection measures, such as personal protective equipment

# 8.2.2.1. Eye/face protection

Do not wear contact lenses. For powders, tight fitting goggles with side shields, or wide vision full goggles. It is also advisable to have individual pocket eyewash.

# 8.2.2.2. Skin protection

Since calcium dihydroxide is classified as irritating to skin, dermal exposure has to be minimised as far as technically feasible. The use of protective gloves (nitrile), protective standard working clothes fully covering skin, full length trousers, long sleeved overalls, with close fittings at openings and shoes resistant to caustics and avoiding dust penetration are required to be worn.

# 8.2.2.3. Respiratory protection

Local ventilation to keep levels below established threshold values is recommended. A suitable particle filter mask is recommended, depending on the expected exposure levels - please check the relevant exposure scenario, given in the Appendix/available via your supplier.

# 8.2.2.4. Thermal hazards

The substance does not represent a thermal hazard, thus special consideration is not required.

#### 8.2.3. Environmental exposure controls

All ventilation systems should be filtered before discharge to atmosphere.

Avoid releasing to the environment.

Contain the spillage. Any large spillage into watercourses must be alerted to the regulatory authority responsible for environmental protection or other regulatory body.

For detailed explanations of the risk management measures that adequately control exposure of the environment to the substance please check the relevant exposure scenario, available via your supplier.

For further detailed information, please check the Appendix of this SDS.

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# SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

#### 9.1. Information on basic physical and chemical properties

Appearance:	White or off white (beige) fine powder
Odour:	odourless
Odour threshold:	not applicable
pH:	12.4 (saturated solution at 20 °C)
Melting point:	> 450 °C (study result, EU A.1 method)
Boiling point:	not applicable (solid with a melting point > 450 °C)
Flash point:	not applicable (solid with a melting point > 450 °C)
Evaporation rate:	not applicable (solid with a melting point > 450 °C)
Flammability:	non flammable (study result, EU A.10 method)
Explosive limits:	non explosive (void of any chemical structures commonly associated with explosive properties)
Vapour pressure:	not applicable (solid with a melting point > 450 °C)
Vapour density:	not applicable
Relative density:	2.24 (study result, EU A.3 method)
Solubility in water:	1844.9 mg/L (study results, EU A.6 method)
Partition coefficient:	not applicable (inorganic substance)
Auto ignition temperature:	no relative self-ignition temperature below 400 $^{\circ}\text{C}$ (study result, EU A.16 method)
Decomposition temperature:	When heated above 580 °C, calcium dihydroxide decomposes to produce calcium oxide (CaO) and water ( $H_2O$ )
Viscosity:	not applicable (solid with a melting point > 450 °C)
Explosive properties:	non explosive (considered to be "inert" in the context of explosivity, since it represents calcium and oxygen being already in their preferred oxidation state)
Oxidising properties:	no oxidising properties (Based on the chemical structure, the substance does not contain a surplus of oxygen or any structural groups known to be correlated with a tendency to react exothermally with combustible material)
0.0. Other information	

#### 9.2. Other information

Not available

#### SECTION 10: STABILITY AND REACTIVITY

# 10.1. Reactivity

In aqueous media  $Ca(OH)_2$  dissociates resulting in the formation of calcium cations and hydroxyl anions (when below the limit of water solubility).

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#### 10.2. Chemical stability

Under normal conditions of use and storage, calcium dihydroxide is stable.

#### 10.3. Possibility of hazardous reactions

Calcium dihydroxide reacts exothermically with acids. When heated above 580 °C, calcium dihydroxide decomposes to produce calcium oxide (CaO) and water (H<sub>2</sub>O): Ca(OH)<sub>2</sub>  $\rightarrow$  CaO + H<sub>2</sub>O. Calcium oxide reacts with water and generates heat. This may cause risk to flammable material.

#### 10.4. Conditions to avoid

Minimise exposure to air and moisture to avoid degradation.

#### 10.5. Incompatible materials

Calcium dihydroxide reacts exothermically with acids to form salts. Calcium dihydroxide reacts with aluminium and brass in the presence of moisture leading to the production of hydrogen.  $Ca(OH)_2 + 2 AI + 6 H_2O \rightarrow Ca[AI(OH)_4]_2 + 3 H_2$ 

#### 10.6. Hazardous decomposition products

None.

Further information: Calcium dihydroxide reacts with carbon dioxide to form calcium carbonate, which is a common material in nature.

# SECTION 11: TOXICOLOGICAL INFORMATION

#### 11.1. Information on toxicological effects

#### a. Acute toxicity

#### b. Skin corrosion/irritation

Calcium dihydroxide is irritating to skin (*in vivo*, rabbit).

Calcium dihydroxide is not corrosive to skin (in vitro, OECD 431)

#### c. Serious eye damage/irritation

Calcium dihydroxide entails a risk of serious damage to the eye (in vivo, rabbit).

#### d. Respiratory or skin sensitisation

#### No data available.

Calcium dihydroxide is considered not to be a skin sensitiser, based on the nature of the effect (pH shift) and the essential requirement of calcium for human nutrition.

#### e. Germ cell mutagenicity

Calcium dihydroxide is not genotoxic (in vitro, OECD 471, 473 and 476).

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In view of the omnipresence and essentiality of Ca and of the physiological non-relevance of any pH shift induced by lime in aqueous media, lime is obviously void of any genotoxic potential.

# f. Carcinogenicity

Calcium (administered as Ca-lactate) is not carcinogenic (experimental result, rat). The pH effect of calcium dihydroxide does not give rise to a carcinogenic risk. Human epidemiological data support lack of any carcinogenic potential of calcium dihydroxide.

# g. Reproductive toxicity

Calcium (administered as Ca-carbonate) is not toxic to reproduction (experimental result, mouse). The pH effect does not give rise to a reproductive risk.

Human epidemiological data support lack of any potential for reproductive toxicity of calcium dihydroxide.

Both in animal studies and human clinical studies on various calcium salts no reproductive or developmental effects were detected. Also see the Scientific Committee on Food (Section 16.6). Thus, calcium dihydroxide is not toxic for reproduction and/or development.

# h. STOT-single exposure

From human data it is concluded that  $Ca(OH)_2$  is irritating to the respiratory tract. As summarised and evaluated in the SCOEL recommendation (Anonymous, 2008), based on human data calcium dihydroxide is irritating to the respiratory system.

# i. STOT-repeated exposure

Toxicity of calcium via the oral route is addressed by upper intake levels (UL) for adults determined by the Scientific Committee on Food (SCF), being

UL = 2500 mg/d, corresponding to 36 mg/kg bw/d (70 kg person) for calcium.

Toxicity of  $Ca(OH)_2$  via the dermal route is not considered as relevant in view of the anticipated insignificant absorption through skin and due to local irritation as the primary health effect (pH shift). Toxicity of  $Ca(OH)_2$  via inhalation (local effect, irritation of mucous membranes) is addressed by an 8-h TWA determined by the Scientific Committee on Occupational Exposure Limits (SCOEL) of 1 mg/m<sup>3</sup> respirable dust (see Section 8.1).

# j. Aspiration hazard

Calcium hydroxide is not known to present an aspiration hazard.

# SECTION 12: ECOLOGICAL INFORMATION

# 12.1. Toxicity

# 12.1.1. Acute/Prolonged toxicity to fish

 $LC_{50}$  (96h) for freshwater fish: 50.6 mg/l  $LC_{50}$  (96h) for marine water fish: 457 mg/l

#### 12.1.2. Acute/Prolonged toxicity to aquatic invertebrates

 $EC_{50}$  (48h) for freshwater invertebrates: 49.1 mg/l LC<sub>50</sub> (96h) for marine water invertebrates: 158 mg/l

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# 12.1.3. Acute/Prolonged toxicity to aquatic plants

EC<sub>50</sub> (72h) for freshwater algae: 184.57 mg/l NOEC (72h) for freshwater algae: 48 mg/l

# 12.1.4. Toxicity to micro-organisms e.g. bacteria

At high concentration, through the rise of temperature and pH, calcium dihydroxide is used for disinfection of sewage sludges.

# 12.1.5. Chronic toxicity to aquatic organisms

NOEC (14d) for marine water invertebrates: 32 mg/l

#### 12.1.6. Toxicity to soil dwelling organisms

 $EC_{10}/LC_{10}$  or NOEC for soil macroorganisms: 2000 mg/kg soil dw  $EC_{10}/LC_{10}$  or NOEC for soil microorganisms: 12000 mg/kg soil dw

# 12.1.7. Toxicity to terrestrial plants

NOEC (21d) for terrestrial plants: 1080 mg/kg

#### 12.1.8. General effect

Acute pH-effect. Although this product is useful to correct water acidity, an excess of more than 1 g/l may be harmful to aquatic life. pH-value of > 12 will rapidly decrease as result of dilution and carbonation.

# 12.2. Persistence and degradability

Not relevant for inorganic substances

#### 12.3. Bioaccumulative potential

Not relevant for inorganic substances

#### 12.4. Mobility in soil

Calcium dihydroxide, which is sparingly soluble, presents a low mobility in most soils

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

Not relevant for inorganic substances

#### 12.6. Other adverse effects

No other adverse effects are identified

#### SECTION 13: DISPOSAL CONSIDERATIONS

#### 13.1. Waste treatment methods

Disposal of calcium dihydroxide should be in accordance with local and national legislation. Processing, use or contamination of this product may change the waste management options. Dispose of container and unused contents in accordance with applicable member state and local requirements.

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The used packing is only meant for packing this product; it should not be reused for other purposes. After usage, empty the packing completely.

# SECTION 14: TRANSPORT INFORMATION

#### 14.1. UN-Number

Not regulated

14.2. UN proper shipping name

Not regulated

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

Calcium dihydroxide is not classified as hazardous for transport [ADR (road), RID (rail), ICAO/IATA (air), ADN (inland waterways) and IMDG (sea)].

# 14.4. Packing group

Not regulated

#### 14.5. Environmental hazards

None

#### 14.6. Special precautions for user

Avoid any release of dust during transportation, by using air-tight tanks

# 14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

Not regulated

# SECTION 15: REGULATORY INFORMATION

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

Authorisations according to REACH:	Not required
Restrictions on use according to REACH:	None
EU regulations:	Calcium oxide is not a substance acc. to directive 96/82/EC ("SEVESO"), not an ozone depleting substance and not a persistent organic pollutant.
National regulations Germany:	
Water hazard class:	WGK 1 (slightly hazardous for water)
	Self-assessment acc. to VwVwS
Storage class:	LGK 13 by TRGS 510 (non-flammable solids)

#### 15.2. Chemical safety assessment

A chemical safety assessment has been carried out for this substance.

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# SECTION 16: OTHER INFORMATION

Data are based on our latest knowledge but do not constitute a guarantee for any specific product features and do not establish a legally valid contractual relationship.

#### Revision

The following sections have been revised:

- 2.1 Classification of the substance
- 3.1 Substance
- 9.2 Other Information
- 13.1 Waste treatment methods
- 16.2 Other Information

#### 16.1. Abbreviations

- EC<sub>50</sub>: median effective concentration
- LC<sub>50</sub>: median lethal concentration
- LD<sub>50</sub>: median lethal dose
- NOEC: no observable effect concentration
- OEL: occupational exposure limit
- PBT: persistent, bioaccumulative, toxic chemical
- PNEC: predicted no-effect concentration
- STEL: short-term exposure limit
- TWA: time weighted average
- vPvB: very persistent, very bioaccumulative chemical

#### 16.2. Key literature references

Anonymous, 2006: Tolerable upper intake levels for vitamins and minerals Scientific Committee on Food, European Food Safety Authority, ISBN: 92-9199-014-0 [SCF document] Anonymous, 2008: Recommendation from the Scientific Committee on Occupational Exposure Limits (SCOEL) for calcium oxide (CaO) and calcium dihydroxide (Ca(OH)<sub>2</sub>), European Commission, DG Employment, Social Affairs and Equal Opportunities, SCOEL/SUM/137 February 2008

#### 16.3. Relevant H-statements

#### Hazard Statements

H318: Causes serious eye damage

#### <u>Disclaimer</u>

This safety data sheet (SDS) is based on the legal provisions of the REACH Regulation (EC 1907/2006; article 31 and Annex II), as amended. Its contents are intended as a guide to the appropriate precautionary handling of the material. It is the responsibility of recipients of this SDS to ensure that the information contained therein is properly read and understood by all people who may use, handle, dispose or in any way come in contact with the product. Information and instructions provided in this SDS are based on the current state of scientific and technical knowledge at the date of issue indicated. It should not be construed as any guarantee of technical performance, suitability for particular applications, and does not establish a legally valid contractual relationship. This version of the SDS supersedes all previous versions.

APPENDIX including Exposure Scenarios 9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 9.11, 9.12, 9.13, 9.14, 9.15 and 9.16

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End of the Safety Data Sheet

		PRODUCT SAFETY DATA SHEET for Ca(OH) <sub>2</sub> /CaCO <sub>3</sub> - Mixture					
	COLCIS DHSTOFF FUR IDEEN	prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) No 1272/2008 and Regulation (EU) 2015/830					
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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 dihydroxide 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

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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 dihydroxide 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.

#### Methodology used for occupational exposure assessment

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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 (http://www.ebrc.de/mease.html) 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).

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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 dihydroxide 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

ES number Sce	Exposure scenario title			Identified uses		ed	Resultin g life cycle stage		tified Use			Process	Article	Environmental
		Manufacture	Formulation	End use	Consumer	Service life	(for articles)	Linked to Iden	Sector of use category (SU)	Chemical Product Category (PC)	category (PROC)	categor y (AC)	release category (ERC)	
9.1	Manufacture and industrial uses of aqueous solutions of lime substances	x	x	x		х	(	1	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, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	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	х	x	x		х	(	2	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, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	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	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	

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ES number	Exposure scenario title		Identified uses		Resultin g life cycle stage		tified Use			Process	Article	Environmental	
		Manufacture	Formulation	End use	Consumer	Service life	(for articles)	Linked to Iden	Sector of use category (SU)	Chemical Product Category (PC)	category (PROC)	categor y (AC)	release category (ERC)
9.3	Manufacture and industrial uses of medium dusty solids/powders of lime substances	х	x	x		х		3	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, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 13, 14, 15, 16, 17, 18, 19, 22, 23, 24, 25, 26, 27a, 27b	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
9.4	Manufacture and industrial uses of high dusty solids/powders of lime substances	x	x	x		х		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, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 13, 14, 15, 16, 17, 18, 19, 22, 23, 24, 25, 26, 27a, 27b	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 13	1, 2, 3, 4, 5, 6a, 6b, 6c, 6d, 7, 12a, 12b, 10a, 11a
9.5	Manufacture and industrial uses of massive objects containing lime substances	X	x	x		Х		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, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	6, 14, 21, 22, 23, 24, 25	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

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			Identified uses		ed	Resultin g life cycle stage		ified Use			Process	Articlo	Environmental
ES number	Exposure scenario title		Formulation	End use	Consumer	Service life		Linked to Ident	Sector of use category (SU)	Chemical Product Category (PC)	category (PROC)	categor y (AC)	release category (ERC)
9.6	Professional uses of aqueous solutions of lime substances		x	x		x		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, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	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		х		7	22; 1, 5, 6a, 6b, 7, 10, 11, 12, 13, 16, 17, 18, 19, 20, 23, 24	1, 2, 3, 7, 8, 9a, 9b, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	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
9.8	Professional uses of medium dusty solids/powders of lime substances		x	x		х		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, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	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

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			Identified uses		ed	Resultin g life cycle stage		tified Use			Brocoss	Articlo	Environmental
ES number	Exposure scenario title	Manufacture	Formulation	End use	Consumer	Service life	(for articles)	Linked to Ident	Sector of use category (SU)	Chemical Product Category (PC)	category (PROC)	categor y (AC)	release category (ERC)
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	1, 2, 3, 7, 8, 9a, 9b, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	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
9.11	Professional uses of articles/container s containing lime substances			x			Х	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

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			Identified uses		Resultin g life cycle stage				Process	Article	Environmental	
ES number	umber Exposure scenario title Mauntactine End use Hormonia		Consumer	Service life (for articles)	Linked to Iden	Sector of use category (SU)	Chemical Product Category (PC)	category (PROC)	categor y (AC)	release category (ERC)		
9.12	Consumer use of building and construction material (DIY)				х		12	21	9b, 9a			8
9.13	Consumer use of $CO_2$ absorbent in breathing apparatuses				х		13	21	2			8
9.14	Consumer use of garden lime/fertilizer				х		14	21	20, 12			8e

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		Identified uses		ed	Resultin g life cycle stage				Process	Article	Environmental	
ES number	Exposure scenario title	Manufacture	Formulation	End use	Consumer	Service life (for articles)	Linked     Sector of use     Ch       Category (SU)     Ca       Category     Ca		Chemical Product Category (PC)	category (PROC)	categor y (AC)	release category (ERC)
9.15	Consumer use of lime substances as water treatment chemicals in aquaria				х		15	21	20, 37			8
9.16	Consumer use of cosmetics containing lime substances				х		16	21	39			8

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

Exposure Scenario	Exposure Scenario Format (1) addressing uses carried out by workers						
1. Title							
Free short title	Manufacture and industrial uses of aque	eous solutions of lime substances					
Systematic title based on use descriptor	<ul> <li>SU3, SU1, SU2a, SU2b, SU4, SU5, SU6a, SU6b, SU7, SU8, SU9, SU10, SU11, SU12, SU13, SU1</li> <li>SU15, SU16, SU17, SU18, SU19, SU20, SU23, SU24</li> <li>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, PC34, PC35, PC36, PC37, PC38, PC39, PC40</li> <li>AC1, AC2, AC3, AC4, AC5, AC6, AC7, AC8, AC10, AC11, AC13</li> <li>(appropriate PROCs and ERCs are given in Section 2 below)</li> </ul>						
Processes, tasks and/or activities covered	Processes, tasks and/or activities covered	d are described in Section 2 below.					
Assessment Method	The assessment of inhalation exposure is based	I on the exposure estimation tool MEASE.					
2. Operational con	ditions and risk management measures						
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	Further information is provided in the ECHA Guidance on information requirements and chemical safety assessment, Chapter R.12: Use descriptor system (ECHA-2010-G-05-					
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities	EN).					
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)						
PROC 10	Roller application or brushing						
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						

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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
2.1 Control of work	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. 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
PROC 7	not restricted		aqueous solution	medium
All other applicable PROCs	not restricted		aqueous solution	very low

#### 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	≤ 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

Since aqueous solutions are not used in hot-metallurgical processes, 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.

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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 7	Any potentially required separation of workers from the emission source is indicated above under "Erequency and	local exhaust ventilation	78 %	-		
PROC 19	above under "Frequency and duration of exposure". A reduction of exposure duration can be achieved, for example, by the installation of ventilated (positive	not applicable	na	-		
All other applicable PROCs	pressure) control rooms or by removing the worker from workplaces involved with relevant exposure.	not required	na	-		

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 dihydroxide is	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	classified as irritating to 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.

COLOR DE LA COLOR		PRODUCT SAFETY DATA SHEET for Ca(OH) <sub>2</sub> /CaCO <sub>3</sub> - Mixture prepared in accordance with Annex II of the REACH Regulation 1907/2006, Regulation (EC) No 1272/2008 and Regulation (EU) 2015/830	on EC
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	Revision date:		
	August 2019	created:	01.08.2019

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 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.

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3. Exposure estimation and reference to its source						
Occupational exposure						
The exposure estimation is the quotient of the refir demonstrate a safe use. respirable dust) and the r includes an additional sa 481.	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 dihydroxide 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)	Since calcium dihyd irritating to skin, derr minimised as far as DNEL for dermal derived. Thus, de assessed in this	roxide are classified as mal exposure has to be technically feasible. A effects has not been rmal exposure is not exposure scenario.		
Environmental exposur	e					
The environmental expos as emissions of lime sub- effect and risk assessme discharges, being the tox being addressed, includir when applicable, both for local scale. The high wat water. Significant emissio emissions or exposure to assessment for the aqua related to the OH- discha the surface water pH sho	sure assessment is only relevant for t stance in the different life-cycle stage nt only deal with the effect on organis icity of Ca2+ is expected to be neglig ng municipal sewage treatment plants production and industrial use as any er solubility and very low vapour pres ons or exposure to air are not expected the terrestrial environment are not e tic environment will therefore only de arges at the local scale. The exposure ould not increase above 9.	the aquatic environm (production and u sms/ecosystems du gible compared to th s (STPs) or industria y effects that might of ssure indicate that lift ed due to the low van expected either for the al with the possible e assessment is app	nent, when applicable i ise) mainly apply to (wa e to possible pH chang ie (potential) pH effect. al waste water treatmer occur would be expecte me substance will be for apour pressure of lime s nis exposure scenario. pH changes in STP eff proached by assessing	Including STPs/WWTPs, aste) water. The aquatic ges related to OH- Only the local scale is nt plants (WWTPs) ed to take place on a bund predominantly in substance. Significant The exposure fluent and surface water the resulting pH impact:		
Environmental emissions	The production of lime substance ca lime substance concentration and a neutralised, the discharge of effluer receiving water. The pH of effluents easily as often required by national	an potentially result affect the pH in the a nt from lime substan s is normally measur laws.	in an aquatic emission aquatic environment. W ice production sites ma red very frequently and	and locally increase the /hen the pH is not ay impact the pH in the l can be neutralised		
Exposure concentration in waste water treatment plant (WWTP)	Exposure concentration in waste water treatmentWaste water from lime substance production is an inorganic wastewater stream and therefore there is no biological treatment. Therefore, wastewater streams from lime substance 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 lime substance 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 in substance: when lime substance is particles is negligible.	ncluded in this ES, b emitted to the aqua	because it is not consid tic compartment, sorpt	lered relevant for lime ion of to sediment		
Exposure concentrations in soil and groundwater	The terrestrial compartment is not in be relevant.	ncluded in this expo	osure scenario, because	e it is not considered to		

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	1		Regulation (EC) No 1272/2008 and Regulation (EO) 2015/830	, 	
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	Revis	sion date:			
	Augu	st 2019	created:	01.08.2019	
Exposure concentration in atmospheric compartment		The air compar substance: whe reaction with Co calcium(bi)carb lime substance	tment is not included in this CSA because it is considered not relevant for en emitted to air as an aerosol in water, lime substance is neutralised as a O2 (or other acids), into HCO3- and Ca2+. Subsequently, the salts (e.g. onate) are washed out from the air and thus the atmospheric emissions o largely end up in soil and water.	r lime a result of its of neutralised	
Exposure concentration relevant for the f chain (secondar poisoning)	ood y	Bioaccumulatio poisoning is the	n in organisms is not relevant for lime substance: a risk assessment for s refore not required.	econdary	
4. Guidance t	o DU 1	to evaluate v	whether he works inside the boundaries set by the ES		
Occupational ex	posure				
	44 - '		, substances with a dustiness less than 10 % (RDM) are defined as "med	ium dusty"	
and substances v DNEL <sub>inhalation</sub> : Important note: Ti exists at a level of acute DNEL is the term exposure duration 40 %	/ith a du 1 mg ne DU h f 4 mg/m erefore a timates n should	stiness ≥10 % a g/m <sup>3</sup> (as resp as to be aware o <sup>3</sup> . By demonstra also covered (ac by a factor of 2), only be reduced	, substances with a dustiness less than 10 % (RDM) are defined as "med re defined as "high dusty". irable dust) of the fact that apart from the long-term DNEL given above, a DNEL for a ating a safe use when comparing exposure estimates with the long-term I cording to R.14 guidance, acute exposure levels can be derived by multip . When using MEASE for the derivation of exposure estimates, it is noted d to half-shift as a risk management measure (leading to an exposure red	lium dusty" cute effects DNEL, the olying long- that the luction of	
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and substances v DNEL <sub>inhalation</sub> : <u>Important note</u> : T exists at a level o acute DNEL is that term exposure duration 40 %). Environmental e If a site does not perform a more si Tier 1: retrieve ir above 9 and be p Tier 2a: retrieve i value of 9. If the n <i>pHriver</i> = <i>Lo</i> Where: Q efflue Q river pH efflu pH upsi Please	with a du 1 mg he DU h f 4 mg/m erefore a timates b h should xposure comply te-special formation redomination formation redomination formation normation ent refersulation upstream tream rivinote tha Q rivin m <sup>3</sup> /da Q effit The u	stiness ≥10 % a g/m <sup>3</sup> (as resp as to be aware on as to be aware on a sub e aware on a sub e aware on by a factor of 2), only be reduced evention on effluent p antly attributable on on effluent p antly attributable on on receiving s are not available ffluent * 10 <sup>p</sup> Qri s to the effluent m refers to the units of the pH of the ver refers to the units to the pH of the ver refers to the units to the attributable available of the the stinitially, defaul er upstream flow available of the stinitially of the stinitially of the available of the stinitially of the stinitially of the stinitially of the available of the stinitially of the stinitial stinitial stinitially of the stinitial	substances with a dustness less than 10 % (RDM) are defined as "med re defined as "high dusty". irrable dust) of the fact that apart from the long-term DNEL given above, a DNEL for a ating a safe use when comparing exposure estimates with the long-term IC cording to R.14 guidance, acute exposure levels can be derived by multip. When using MEASE for the derivation of exposure estimates, it is noted to half-shift as a risk management measure (leading to an exposure red fions stipulated in the safe use ES, it is recommended to apply a tierer. For that assessment, the following stepwise approach is recommended. H and the contribution of the lime substance on the resulting pH. Sho a to lime, then further actions are required to demonstrate safe use. water pH after the discharge point. The pH of the receiving water shall no ble, the pH in the river can be calculated as follows: $\frac{Heffluent}{Verupstream} + Qeffluent$ flow (in m <sup>3</sup> /day) pstream river flow (in m <sup>3</sup> /day) he effluent pH of the river upstream of the discharge point t values can be used: ws: use the 10th of existing measurements distribution or use default v t value of 2000 m <sup>3</sup> /day preferably a measured value. If not available, one can assume a neutral	lium dusty" cute effects DNEL, the olying long- that the luction of d approach t uld the pH b not exceed th alue of 1800 pH of 7 if th	

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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	Format (1) addressing uses carried out b	y workers	
1. Title			
Free short title	Manufacture and industrial uses of low 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	d are described in Section 2 below.	
Assessment Method	The assessment of inhalation exposure is based	I on the exposure estimation tool MEASE.	
2. Operational conc	litions and risk management measures		
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	Further information is provided in the ECHA Guidance on information requirements and	
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities	chemical safety assessment, Chapter R.12: Use descriptor system (ECHA-2010-G-05- EN).	
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		
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		

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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 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	Use 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				
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.

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Frequency and duration of use/exposure				
PROC	Duration of exposure			
PROC 22		≤ 240 min	utes	
All other applicable PROCs		480 minutes (not	restricted)	
Human factors not influe	enced by risk management			
The shift breathing volume	e during all process steps reflected in	n the PROCs is ass	sumed to be 10 m³/shift	(8 hours).
Other given operational	conditions affecting workers expo	osure		
Operational conditions like assessment of the conduc exposure assessment in N temperatures are expecte estimation. Thus all proce	e process temperature and process cted processes. In process steps with MEASE is however based on the rati d to vary within the industry the high ss temperatures are automatically co	pressure are not co h considerably high io of process tempe est ratio was taken overed in this expos	nsidered relevant for or temperatures (i.e. PRC rature and melting poin as a worst case assum sure scenario for PROC	ccupational exposure DC 22, 23, 25), the it. As the associated option for the exposure C 22, 23 and PROC 25.
Technical conditions an	d measures at process level (sou	rce) to prevent rele	ease	
Risk management measurequired in the processes	ures at the process level (e.g. conta	ainment or segrega	tion of the emission so	ource) are generally not
Technical conditions an	d measures to control dispersion	from source towa	rds 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 from the emission source is indicated above under "Frequency and duration of exposure". A reduction of exposure duration can be achieved, for example, by	general ventilation	17 %	-
PROC 19		not applicable	na	-
PROC 22, 23, 24, 25, 26, 27a		local exhaust ventilation	78 %	-
All other applicable PROCs	(positive pressure) control rooms or by removing the worker from workplaces involved with relevant exposure.	not required	na	-
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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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, 24, 27a	FFP1 mask	APF=4	Since calcium	Eye protection equipment (e.g. goggles or visors)	
All other applicable PROCs	not required	na	dihydroxide is classified as irritating to skin, the use of protective gloves is mandatory for all process steps.	must 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

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

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 f is the quotient of the refin- demonstrate a safe use. F respirable dust) and the re includes an additional safe 481.	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 dihydroxide 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 assessmentInhalation exposure estimate (RCR)Method used for dermal exposure assessmentDermal 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	<ul> <li>7, 15, 2, 27b</li> <li>MEASE</li> <li>&lt;1 mg/m<sup>3</sup> (0.01 – 0.83)</li> <li>&lt;1 mg/m<sup>3</sup> (0.01 – 0.83)</li> <li>Since calcium dihydroxide is classified irritating to skin, dermal exposure has to minimised as far as technically feasible DNEL for dermal effects has not bee derived. Thus, dermal exposure is no assessed in this exposure scenario</li> </ul>		droxide is classified as mal exposure has to be technically feasible. A effects has not been rmal exposure is not exposure scenario.		
Environmental emission	IS				
The environmental exposi- as emissions of calcium d aquatic effect and risk ass OH- discharges, being the scale is being addressed, (WWTPs) when applicable place on a local scale. Th predominantly in water. S dihydroxide. Significant er The exposure assessmen surface water related to th resulting pH impact: the s	The environmental exposure assessment is only relevant for the aquatic environment, when applicable including STPs/WWTPs, as emissions of calcium dihydroxide 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 dihydroxide will be found predominantly in water. Significant emissions or exposure to air are not expected due to the low vapour pressure of calcium dihydroxide. 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				
Environmental emissions	The production of calcium dihydroxide can potentially result in an aquatic emission and locally increase the calcium dihydroxide concentration and affect the pH in the aquatic environment. When the pH is not neutralised, the discharge of effluent from calcium dihydroxide 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 dihydroxide production is an inorganic wastewater stream and therefore there is no biological treatment. Therefore, wastewater streams from calcium dihydroxide 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 dihydroxide 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 dihydroxide: when calcium dihydroxide is emitted to the aquatic compartment, sorption of to sediment particles is negligible.				
Exposure concentrations in soil and groundwater	The terrestrial compartment is not be relevant.	included in this expo	osure scenario, becaus	e it is not considered to	
Exposure concentration in atmospheric compartment	The air compartment is not included in this CSA because it is considered not relevant for calcium dihydroxide: when emitted to air as an aerosol in water, calcium dihydroxide 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 dihydroxide largely end up in soil and water.				

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#### Exposure

concentration relevant for the food chain (secondary poisoning)	Bioaccumulation in organisms is not relevant for calcium dihydroxide: a risk assessment for secondary poisoning is therefore not required.
4 Guidance to DU t	o evaluate whether he works inside the boundaries set by the FS

#### **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".

#### 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 dihydroxide 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  $\rm m^{3}/day$
- 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

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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 dihydroxide.

**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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		prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) No 1272/2008 and Regulation (EU) 2015/830		
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# • ES number 9.3: Manufacture and industrial uses of medium 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 medium du	usty 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	d are described in Section 2 below.	
Assessment Method	The assessment of inhalation exposure is based	on the exposure estimation tool MEASE.	
2. Operational cond	litions and risk management measures		
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	Further information is provided in the ECHA Guidance on information requirements and chemical safety assessment, Chapter R.12:	
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities	EN).	
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)		
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		

S COLCIS ROHSTOFF FOR IDEEN		PRODUCT SAFETY DATA SHEET for Ca(OH) <sub>2</sub> /CaCO <sub>3</sub> - Mixture prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) No 1272/2008 and Regulation (EU) 2015/830		
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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	
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	Use 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				

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, 17, 18, 19, 22	≤ 240 minutes	
All other applicable PROCs	480 minutes (not restricted)	

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Human factors not influenced by risk management

PROC 1, 2, 15, 27b

All other applicable PROCs

PROC 3, 13, 14

PROC 19

The shift breathing volume during all process steps reflected in the PROCs is assumed to be 10 m <sup>3</sup> /shift (8 hours).					
Other given operational	conditions affecting workers expo	osure			
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 an	d measures at process level (sou	rce) to prevent rele	ease		
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	

not required

general

ventilation

not applicable

local exhaust

ventilation

na

17 %

na

78 %

-

-

-

Any potentially required

separation of workers 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.					
Organisational measures to prevent /limit releases, dispersion and exposure						
Avoid inhalation or ingest These measures involve eating and smoking at t Shower and change clot compressed air.	ion. General occupational hygiene n good personal and housekeeping p he workplace, the wearing of stand hes at end of work shift. Do not w	neasures are requir practices (i.e. regula dard working clothe wear contaminated	ed to ensure a safe ha ar cleaning with suitab es and shoes unless clothing at home. Do	ndling of the substance. le cleaning devices), no otherwise stated below.		

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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 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)	
All other applicable PROCs	not required	na	Since calcium dihydroxide is classified as irritating to skin, the use of protective gloves is mandatory for all process steps.	nust 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

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 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.

COLORS ROHSTOFF FUR IDEEN		PRODUCT SAFETY DATA SHEET for Ca(OH) <sub>2</sub> /CaCO <sub>3</sub> - Mixture prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) No 1272/2008 and Regulation (EU) 2015/830	
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3. Exposure estimation and reference to its source					
Occupational exposure					
The exposure estimation is the quotient of the refin demonstrate a safe use. I respirable dust) and the m includes an additional saf 481.	tool MEASE was used for the assess ed exposure estimate and the resper For inhalation exposure, the RCR is l espective inhalation exposure estimate ty margin since the respirable fraction	sment of inhalation ctive DNEL (derived based on the DNEL ate derived using MI ion being a sub-frac	exposure. The risk cha d no-effect level) and h for calcium dihydroxid EASE (as inhalable du tion of the inhalable fra	aracterisation ratio (RCR) as to be below 1 to e of 1 mg/m <sup>3</sup> (as st). Thus, the RCR action according to EN	
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)	Since calcium dihyo irritating to skin, derr minimised as far as DNEL for dermal derived. Thus, de assessed in this	droxide is classified as mal exposure has to be technically feasible. A effects has not been rmal exposure is not exposure scenario.	
Environmental emission	าร				
The environmental expos as emissions of calcium of aquatic effect and risk as OH- discharges, being the scale is being addressed, (WWTPs) when applicabl place on a local scale. The predominantly in water. S dihydroxide. Significant en The exposure assessment surface water related to the resulting pH impact: the s	ure assessment is only relevant for t lihydroxide in the different life-cycle s sessment only deal with the effect or e toxicity of Ca2+ is expected to be n including municipal sewage treatme e, both for production and industrial high water solubility and very low v ignificant emissions or exposure to a missions or exposure to the terrestriant of the aquatic environment will the he OH- discharges at the local scale.	he aquatic environn stages (production a n organisms/ecosyst negligible compared ent plants (STPs) or use as any effects t vapour pressure ind air are not expected al environment are r erefore only deal wit . The exposure asse above 9.	nent, when applicable i and use) mainly apply t tems due to possible pl to the (potential) pH el industrial waste water hat might occur would icate that calcium dihyd due to the low vapour not expected either for h the possible pH char essment is approached	ncluding STPs/WWTPs, o (waste) water. The H changes related to ffect. Only the local treatment plants be expected to take droxide will be found pressure of calcium this exposure scenario. nges in STP effluent and I by assessing the	
Environmental emissions	The production of calcium dihydroxide can potentially result in an aquatic emission and locally increase the calcium dihydroxide concentration and affect the pH in the aquatic environment. When the pH is not neutralised, the discharge of effluent from calcium dihydroxide 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)	Exposure concentration in waste water treatment plant (WWTP)				
Exposure concentration in aquatic pelagic compartment	When calcium dihydroxide 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 in calcium dihydroxide: when calcium sediment particles is negligible.	ncluded in this ES, I dihydroxide is emit	because it is not consid ted to the aquatic comp	dered relevant for partment, sorption of to	
Exposure concentrations in soil and groundwater	The terrestrial compartment is not i be relevant.	ncluded in this expo	osure scenario, becaus	e it is not considered to	

		DEEN	PRODUCT SAFETY DATA SHEET for Ca(OH) <sub>2</sub> /CaCO <sub>3</sub> - Mixture prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) No 1272/2008 and Regulation (EU) 2015/830	
Version:	1,0 En	gl.		
	Revis	sion date:		
	Augu	st 2019	created:	01.08.2019
Exposure concentration in atmospheric compartment		The air compared dihydroxide: who of its reaction we calcium(bi)cart calcium dihydro	rtment is not included in this CSA because it is considered not relevant fo hen emitted to air as an aerosol in water, calcium dihydroxide is neutralis- with CO2 (or other acids), into HCO3- and Ca2+. Subsequently, the salts ponate) are washed out from the air and thus the atmospheric emissions oxide largely end up in soil and water.	r calcium ed as a result (e.g. of neutralised
Exposure concentration relevant for the food chain (secondary poisoning)		Bioaccumulation secondary pois	on in organisms is not relevant for calcium dihydroxide: a risk assessmen soning is therefore not required.	t for
4. Guidance t	4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES			
Occupational exp	posure			
The DU works inst	ide the	boundaries set b	by the ES if either the proposed risk management measures as described	above are

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 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 %).

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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 dihydroxide 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 calcium dihydroxide.

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	COLCIS OHSTOFF FÜR IDEEN	prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) No 1272/2008 and Regulation (EU) 2015/830		
Version:	1,0 Engl.			
	Revision date:			
	August 2019	created:	01.08.2019	

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

Exposure Scenario	Format (1) addressing uses carried out b	y workers
1. Title		
Free short title	Manufacture and industrial uses of high dus	ty solids/powders of lime substances
Systematic title based on use descriptor	SU3, SU1, SU2a, SU2b, SU4, SU5, SU6a, SU6b, SU7 SU15, SU16, SU17, SU18, SU PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11, PC PC19, PC20, PC21, PC23, PC24, PC25, PC26, PC PC34, PC35, PC36, PC37, AC1, AC2, AC3, AC4, AC5, AC6, AC (appropriate PROCs and ERCs ar	7, SU8, SU9, SU10, SU11, SU12, SU13, SU14, I19, SU20, SU23, SU24 212, PC13, PC14, PC15, PC16, PC17, PC18, 27, PC28, PC29, PC30, PC31, PC32, PC33, PC38, PC39, PC40 C7, AC8, AC10, AC11, AC13 re given in Section 2 below)
Processes, tasks and/or activities covered	Processes, tasks and/or activities covered	d are described in Section 2 below.
Assessment Method	The assessment of inhalation exposure is based	on the exposure estimation tool MEASE.
2. Operational conc	litions and risk management measures	
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	Further information is provided in the ECHA
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities	Guidance on information requirements and chemical safety assessment, Chapter R.12: Use descriptor system (ECHA-2010-G-05- EN).
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	
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	

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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
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	Use 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	≤ 240 minutes			
All other applicable PROCs	480 minutes (not restricted)			

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		Regulation (EC) No 1272/2008 and Regulation (EU) 2015/830		
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The shift breathing volume during all process steps reflected in the PROCs is assumed to be 10 m <sup>3</sup> /shift (8 hours).						
Other given operational	conditions affecting workers expo	osure				
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 an	d measures at process level (sou	rce) to prevent rele	ease			
Risk management measu required in the processes	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	Any potentially required	not required	na	-		
PROC 2, 3	separation of workers from the emission source is indicated above under "Frequency and	general ventilation	17 %	-		
PROC 7	duration of exposure". A reduction of exposure duration can be achieved, for example, by the installation of ventilated	integrated local exhaust ventilation	84 %	-		
PROC 19	(positive pressure) control rooms or by removing the worker from	not applicable	na	-		
All other applicable PROCs	workplaces involved with relevant exposure.	local exhaust ventilation	78 %	-		

Organisational measures to prevent /limit releases, dispersion and exposure

Human factors not influenced by risk management

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 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 Since of		Since calcium	must be worn, unless	
PROC 10, 13, 14, 15, 16, 22, 24, 26, 27a	FFP1 mask	APF=4	dihydroxide is classified as irritating to skin, the use of	the eye can be excluded by the nature and type of application	
PROC 19	FFP3 mask	APF=20	protective gloves is mandatory for all process steps.	(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 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.

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3. Exposure estimation and reference to its source				
Occupational exposure				
The exposure estimation is the quotient of the refin demonstrate a safe use. I respirable dust) and the re- includes an additional saf 481.	tool MEASE was used for the asses ed exposure estimate and the respe For inhalation exposure, the RCR is espective inhalation exposure estima ety margin since the respirable fract	sment of inhalation ctive DNEL (derived based on the DNEL ate derived using MI ion being a sub-frac	exposure. The risk cha d no-effect level) and ha for calcium dihydroxid EASE (as inhalable dua tion of the inhalable fra	aracterisation ratio (RCR) as to be below 1 to e of 1 mg/m <sup>3</sup> (as st). Thus, the RCR action according to EN
PROC	Method used for inhalation exposure assessmentInhalation exposure estimate (RCR)Method used for dermal exposure assessmentDermal 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	PROC 1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 13, 14, 15, 16, 17, 18, 19, 22, 23, 24, 25, 26, 27a, 27bMEASE<1 mg/m³ (0.01 - 0.96)Since calcium dihydroxide is classified a irritating to skin, dermal exposure has to minimised as far as technically feasible. DNEL for dermal effects has not been derived. Thus, dermal exposure is not assessed in this exposure scenario.			
Environmental emission	าร			
The environmental exposure assessment is only relevant for the aquatic environment, when applicable including STPs/WWTPs, as emissions of calcium dihydroxide 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 dihydroxide will be found predominantly in water. Significant emissions or exposure to air are not expected due to the low vapour pressure of calcium dihydroxide. Significant emissions or exposure to 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				
Environmental emissions	The production of calcium dihydrox increase the calcium dihydroxide c the pH is not neutralised, the disch impact the pH in the receiving wate can be neutralised easily as often r	tide can potentially r oncentration and aff arge of effluent from er. The pH of effluen required by national	esult in an aquatic emi ect the pH in the aquat o calcium dihydroxide p ts is normally measure laws.	ission and locally tic environment. When production sites may ad very frequently and
Exposure concentration in waste water treatment plant (WWTP)	Waste water from calcium dihydrox there is no biological treatment. Th sites will normally not be treated in used for pH control of acid wastew	kide production is an erefore, wastewater biological waste wa ater streams that are	inorganic wastewater streams from calcium ter treatment plants (N e treated in biological V	stream and therefore dihydroxide production /WTPs), but can be /WTPs.
Exposure concentration in aquatic pelagic compartment When calcium dihydroxide 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 dihydroxide: when calcium dihydroxide is emitted to the aquatic compartment, sorption of to sediment particles is negligible.			
Exposure concentrations in soil and groundwater	The terrestrial compartment is not i be relevant.	included in this expo	osure scenario, becaus	e it is not considered to
Exposure concentration in atmospheric compartment	The air compartment is not include dihydroxide: when emitted to air as of its reaction with CO2 (or other ac calcium(bi)carbonate) are washed calcium dihydroxide largely end up	d in this CSA becau an aerosol in water cids), into HCO3- ar out from the air and in soil and water.	se it is considered not c, calcium dihydroxide is d Ca2+. Subsequently thus the atmospheric e	relevant for calcium s neutralised as a result r, the salts (e.g. emissions of neutralised

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# Exposure<br/>concentration relevant<br/>for the food chain<br/>(secondary poisoning)Bioaccumulation in organisms is not relevant for calcium dihydroxide: a risk assessment for<br/>secondary poisoning is therefore not required.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)

and substances with a dustiness ≥10 % are defined as "high 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 %).

#### **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 dihydroxide 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 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 dihydroxide.

Tier 3: measure the pH in the receiving water after the discharge point. If pH is below 9, safe use is reasonably demonstrated

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

Exposure Scenario Format (1) addressing uses carried out by workers				
1. Title				
Free short title	Manufacture and industrial uses of massive	e 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)			
Processes, tasks and/or activities covered	Processes, tasks and/or activities covered	d are described in Section 2 below.		
Assessment Method	The assessment of inhalation exposure is based on the exposure estimation tool MEASE.			
2. Operational con	ditions and risk management measures			
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		
PROC 23	Open processing and transfer operations with minerals/metals at elevated temperature	chemical safety assessment, Chapter R.12: Use descriptor system (ECHA-2010-G-05-		
PROC 24	High (mechanical) energy work-up of substances bound in materials and/or articles	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			

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2.1 Control of workers exposure					
Product characteristic					
According to the MEASE reflected by an assignme ambient temperature the temperature based, takin abrasive tasks are based	approach, the substance-intrinsic er int of a so-called fugacity class in the fugacity is based on the dustiness of g into account the process temperate on the level of abrasion instead of the	nission potential is MEASE tool. For o that substance. W ure and the melting ne substance intrins	one of the main exposu operations conducted wind hereas in hot metal oper point of the substance. sic emission potential.	re determinants. This is ith solid substances at erations, fugacity is As a third group, high	
PROC	Use 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					
The actual tonnage hand combination of the scale PROC) is the main deter	led per shift is not considered to influ of operation (industrial vs. professior minant of the process intrinsic emissi	ence the exposure nal) and level of cor ion potential.	as such for this scenar ntainment/automation (a	io. Instead, the as reflected in the	
Frequency and duration	n of use/exposure				
PROC		Duration of ex	cposure		
PROC 22		≤ 240 minເ	utes		
All other applicable PROCs		480 minutes (not	restricted)		
Human factors not influ	enced by risk management				
The shift breathing volum	e during all process steps reflected i	n the PROCs is as	sumed to be 10 m³/shift	(8 hours).	
Other given operationa	I conditions affecting workers exp	osure			
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 (sou	rce) to prevent rel	ease		
Risk management meas required in the processes	ures at the process level (e.g. conta	ainment or segrega	ation of the emission s	ource) are generally not	

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Technical conditions ar	nd measures to control dispersion	from source towa	ards the worker	
PROC	Level of separation		Efficiency of LC (according to MEASE)	Further information
PROC 6, 14, 21	Any potentially required separation of workers from the	not required	na	-
PROC 22, 23, 24, 25	C 22, 23, 24, 25 C 22, 24, 25 C 22, 25, 25, 25, 25, 25, 25, 25, 25, 25,		78 %	-
Organisational measure	es to prevent /limit releases, dispe	rsion and exposu	re	
Avoid inhalation or ingest These measures involve eating and smoking at the Shower and change cloth compressed air.	tion. General occupational hygiene n good personal and housekeeping pr e workplace, the wearing of standard nes at end of work shift. Do not wear	neasures are requir actices (i.e. regular I working clothes ar contaminated cloth	ed to ensure a safe har cleaning with suitable of nd shoes unless otherw ing at home. Do not blo	ndling of the substance. cleaning devices), no ise stated below. w dust off with
Conditions and measur	es related to personal protection,	hygiene and healt	th 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	Eye protection equipment (e.g. goggles or visors) must be worn, unless potential contact with the eve can be
All other applicable PROCs	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 (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.

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2.2 Control of envi	ronmental exposure			
Amounts used				
The daily and annual an exposure.	mount per site (for point sources)	is not considered t	to be the main determ	ninant for environmental
Frequency and duration	n of use			
Intermittent (< 12 time pe	r year) or continuous use/release			
Environment factors no	t influenced by risk management			
Flow rate of receiving sur	face water: 18000 m³/day			
Other given operational	conditions affecting environment	tal exposure		
Effluent discharge rate: 2	000 m³/day			
Technical onsite condit	ions and measures to reduce or li	mit discharges, air	emissions and release	ses to soil
Risk management measu surface water, in case su introduction into open wa waters are minimised (e.g This is also reflected in th management measure ca	ures related to the environment aim t ch discharges are expected to cause ters is required. In general discharge g. through neutralisation). In general ne description of standard OECD test an be found in the introduction section	o avoid discharging e significant pH char es should be carried most aquatic organ ts with aquatic organ n.	lime solutions into mur nges. Regular control o out such that pH chan isms can tolerate pH va nisms. The justification	hicipal wastewater or to f the pH value during ges in receiving surface alues in the range of 6-9. for this risk
Conditions and measur	es related to waste			
Solid industrial waste of I	ime should be reused or discharged	to the industrial was	stewater and further ne	utralized if needed.
3. Exposure estimation	ation and reference to its so	ource		
Occupational exposure				
The exposure estimation is the quotient of the refir demonstrate a safe use. respirable dust) and the r includes an additional sai 481.	tool MEASE was used for the asses led exposure estimate and the respe For inhalation exposure, the RCR is espective inhalation exposure estimate fety margin since the respirable fract	sment of inhalation ective DNEL (derived based on the DNEL ate derived using M ion being a sub-frac	exposure. The risk cha d no-effect level) and h for calcium dihydroxid EASE (as inhalable du tion of the inhalable fra	racterisation ratio (RCR) as to be below 1 to e of 1 mg/m <sup>3</sup> (as st). Thus, the RCR action according to EN
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, 25MEASE< 1 mg/m³ (0.01 - 0.44)Since calcium dihydroxide 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 emission	ns			
The environmental exposes as emissions of calcium of aquatic effect and risk as	sure assessment is only relevant for t dihydroxide in the different life-cycle sessment only deal with the effect or	the aquatic environr stages (production a n organisms/ecosys	nent, when applicable i and use) mainly apply t tems due to possible p	ncluding STPs/WWTPs, o (waste) water. The H changes related to

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 dihydroxide will be found predominantly in water. Significant emissions or exposure to air are not expected due to the low vapour pressure of calcium dihydroxide. 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.

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Environmental emissions	The production of calcium dihydroxide can potentially result in an aquatic emission and locally increase the calcium dihydroxide concentration and affect the pH in the aquatic environment. When the pH is not neutralised, the discharge of effluent from calcium dihydroxide 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 dihydroxide production is an inorganic wastewater stream and therefore there is no biological treatment. Therefore, wastewater streams from calcium dihydroxide 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 dihydroxide 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 dihydroxide: when calcium dihydroxide 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 dihydroxide: when emitted to air as an aerosol in water, calcium dihydroxide 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 dihydroxide largely end up in soil and water.
Exposure concentration relevant for the food chain (secondary poisoning)	Bioaccumulation in organisms is not relevant for calcium dihydroxide: 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**

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 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 dustors.

#### 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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#### **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 dihydroxide 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 dihydroxide.

**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	d 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)			
Processes, tasks and/or activities covered	Processes, tasks and/or activities	s covered are described in Section 2 below.		
Assessment Method	The assessment of inhalation exposure is environmental assessn	based on the exposure estimation tool MEASE. The nent is based on FOCUS-Exposit.		
2. Operational cond	itions and risk management measu	Ires		
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	Further information is provided in the ECHA Guidance		
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities	on information requirements and chemical safety assessment, Chapter R.12: Use descriptor system (ECHA-2010-G-05-EN).		
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)			
PROC 10	Roller application or brushing			
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			

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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 dihydroxide is applied in numerous cases of wide dispersive uses: agricultural, forestry, fish and shrimps farming, soil treatment and environmental protection.

#### 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	Use in preparation	Content in preparation	Physical form	Emission potential
All applicable PROCs	not restricted		aqueous solution	very low

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	≤ 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

Since aqueous solutions are not used in hot-metallurgical processes, 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.

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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 19	Separation of workers from the emission	not applicable	na	-		
All other applicable PROCs	required in the conducted processes.	not required	na	-		
Organisational measures	s to prevent /limit release	es, 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 measure	es related to personal pro	otection, hygiene ar	nd health evaluation			
PROC	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further personal protective equipment (PPE)		
PROC 11	OC 11 FFP3 mask APF=20 Sinc		Eye prot (e.g. gogg Since calcium be worn	Eye protection equipment (e.g. goggles or visors) must be worn, unless potential		
PROC 17	FFP1 mask	APF=4	dihydroxide is classified as irritating to skin, the use of protective gloves is	contact with the eye can be excluded by the nature and type of application (i.e. closed process).		
All other applicable		22	mandatory for all process steps.	Additionally, face protection,		

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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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 dihydroxide 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	Method used for inhalation exposure assessmentInhalation exposure estimate (RCR)Method used for dermal exposure assessmentDermal exposure estimate 				
PROC 2, 3, 4, 5, 8a, 8b, 9, 10, 11, 12, 13, 15, 16, 17, 18, 19	b,       < 1 mg/m³       Since calcium dihydroxide 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 exposure	for agricultural soil prot	tection				
The PEC calculation for so on the calculation of predia surface water and sedimer more appropriate for agric modelling. FOCUS is a mo German EXPOSIT 1.0 mo the soil, calcium dihydroxid	bil and surface water was h cted environmental concer nt (Kloskowksi et al., 1999 ultural-like application as i odel typically developed fo del, where parameters suc de can indeed migrate the	based on the FOCUS htration values (PEC ). The FOCUS/EXPC n this case where pa r biocidal application ch as drifts can be im n towards surface wa	S soil group (FOCUS, 199 ) of plant protection produ DSIT modelling tool is pre rameter as the drift needs s and was further elabora proved according to colle aters, via drift.	6) and on the "draft guidance cts for soil, ground water, ferred to the EUSES as it is s to be included in the ted on the basis of the octed data: once applied on		
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		
aquatic pelagic compartment	Ca(OH)2	7.48	490	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		
and groundwater	Ca(OH)2	660	1080	0.61		
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium dihydroxide 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 dihydroxides can be considered to be omnipresent and essential in the environment. The uses covered do not significantly influence the distribution of the constituents (Ca2+ and OH-) in the environment.						

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Environmental exposure	for soil treatment in civ	il engineering		
The soil treatment in civil engineering 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.				
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 border scenario			
Exposure	Substance	PEC (mg/L)	PNEC (mg/L)	RCR
and groundwater	Ca(OH)2	701	1080	0.65
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium dihydroxide 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 (Ca2+ and OH-) 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 soil treatment in civil engineering</li> <li>Lime is an ingredient and chemically bound into a matrix. Releases are negligible and insufficient to cause a pH-shift</li> </ul>				

- Lime is an ingredient and chemically bound into a matrix. Releases are negligible and insertion to cauce a pro-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

(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".

#### 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 out	by workers	
1. Title			
Free short title	Professional uses of low dusty solid	s/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, 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 covere	d are described in Section 2 below.	
Assessment Method	The assessment of inhalation exposure is based o environmental assessment is b	n the exposure estimation tool MEASE. The ased on FOCUS-Exposit.	
2. Operational con	ditions 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	Earth an information in any ideal in the EQUA	
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities	Guidance on information is provided in the ECHA Guidance on information requirements and chemical safety assessment, Chapter R.12: Use descriptor system (ECHA-2010-G-05-EN).	
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)		
PROC 10	Roller application or brushing		
PROC 11	Non industrial spraying		
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		

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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
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**

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.

<b>Frequency and</b>	duration of	i use/e	exposure

PROC	Duration of exposure
PROC 17	≤ 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						
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". 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 applicable	na	-		
All other applicable PROCs		not required	na	-		

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.
All other applicable PROCs	not required	na	Since calcium dihydroxide is classified as irritating to skin, the use of protective gloves is mandatory for all process steps.	goggles or visors) must 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

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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) Quantity of dust per m3 (in mg) Wind speed: 120 - 3.5 m/s 100 - 6 m/s 80 3.5 m/s 60 40 20 11 15 7 20 3 Distance from the spreader(in m) (Figure taken from: Laudet, A. et al., 1999) Amounts used Ca(OH)2 2,244 kg/ha Frequency and duration of use 1 day/year (one application per year). Multiple applications during the year are allowed, provided the total yearly amount of 2,244 kg/ha is not exceeded (CaOH2) 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 affecting environmental exposure Outdoor use of products Soil mixing depth: 20 cm Technical conditions and measures 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.

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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 environmental exposure – only relevant for soil treatment in civil engineering
Product characteristics
Drift: 1% (very worst-case estimate based on data from dust measurements in air as a function of the distance from application) Quantity of dust per m3 (in mg) <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>120</sup> <sup>121</sup> <sup>15</sup> <sup>200</sup> <sup>121</sup> <sup>15</sup> <sup>200</sup> <sup>121</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup> <sup>15</sup>
Amounts used
Ca(OH)2 238,208 kg/ha
Frequency and duration of use
1 day/year and only once in a lifetime. Multiple applications during the year are allowed, provided the total yearly amount of 238,208 kg/ha is not exceeded (CaOH2)
Environment factors not influenced by risk management
Field surface area: 1 ha
Other given operational conditions affecting environmental exposure
Outdoor use of products
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.

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3. Exposure estimation and reference to its source							
Occupational exposure	9						
The exposure estimation is the quotient of the refii demonstrate a safe use. respirable dust) and the includes an additional sa 481.	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 dihydroxide 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	MEASE < 1 mg/m³ (0.01 - 0.75) Since calcium dihydroxide 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 exposu	re for agricultural soil protection						
The PEC calculation for on the calculation of pre- surface water and sedim more appropriate for agr modelling. FOCUS is a r German EXPOSIT 1.0 m the soil, calcium dihydro:	soil and surface water was based on dicted environmental concentration v nent (Kloskowksi et al., 1999). The FC icultural-like application as in this cas nodel typically developed for biocidal nodel, where parameters such as drif xide can indeed migrate then towards	the FOCUS soil gr alues (PEC) of plar OCUS/EXPOSIT mo se where paramete applications and w ts can be improved s surface waters, vi	oup (FOCUS, 1996) an at protection products for odelling tool is preferred r as the drift needs to b vas further elaborated o according to collected a drift.	d on the "draft guidance or soil, ground water, d to the EUSES as it is e included in the n the basis of the data: once applied on			
Environmental emissions	See amounts used						
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for agricultural soil pro	tection					
Exposure	Substance	PEC (ug/L)	PNEC (ug/L)	RCR			
concentration in aquatic pelagic compartment	Ca(OH)2	7.48	490	0.015			
Exposure concentration in sediments	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			
and groundwater	Ca(OH)2	660	1080	0.61			
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium dihydroxide 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 (Ca2+ and OH-) in the environment.						

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Environmental exposu	re for soil treatment in civil engine	ering				
The soil treatment in civil engineering 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 s of predicted environment sediment (Kloskowksi et agricultural-like application model typically develope where parameters such	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.					
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 scenari	io				
Exposure concentration in sediments	Not relevant for road border scenari	io				
Exposure	Substance	PEC (mg/L)	PNEC (mg/L)	RCR		
and groundwater	Ca(OH)2	701	1080	0.65		
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium dihydroxide 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 (Ca2+ and OH-) in the environment.					
Environmental exposu	re for other uses					
For all other uses, no qua The operational protection or s Lime is an ing	<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 soil treatment in civil engineering</li> <li>Lime is an ingredient and chemically bound into a matrix. Releases are negligible and insufficient to cause a pH-shift</li> </ul>					

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

(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".

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

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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 out I	by workers	
1. Title			
Free short title	Professional uses of medium dusty so	lids/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, 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 covere	d are described in Section 2 below.	
Assessment Method	The assessment of inhalation exposure is based o environmental assessment is b	on the exposure estimation tool MEASE. The ased on FOCUS-Exposit.	
2. Operational con	ditions 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	Guidance on information is provided in the ECHA Guidance on information requirements and chemical safety assessment, Chapter R.12: Use descriptor system (ECHA-2010-G-05-EN).	
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)		
PROC 10	Roller application or brushing		
PROC 11	Non industrial spraying		
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		

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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	
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	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)	
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						
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	generic local exhaust ventilation	72 %	-		
PROC 17, 18	emission source is indicated above under "Frequency and duration of exposure". A reduction	integrated local exhaust ventilation	87 %	-		
PROC 19	of exposure duration can be achieved, for example, by the	not applicable	na	-		
All other applicable PROCs	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 releases, dispe	ersion and exposu	ire			
Avoid inhalation or inges These measures involve eating and smoking at th Shower and change clot compressed air.	tion. General occupational hygiene r good personal and housekeeping p workplace, the wearing of standard hes at end of work shift. Do not wear	neasures are requi ractices (i.e. regula d working clothes a contaminated cloth	red to ensure a safe ha r cleaning with suitable nd shoes unless otherw ning at home. Do not bl	ndling of the substance. cleaning devices), no vise stated below. ow dust off with		
Conditions and measu	res related to personal protection,	hygiene and heal	th 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		
PROC 4, 5, 8a, 8b, 9, 10, 13, 17, 18, 25, 26	FFP2 mask	APF=10	Since calcium	equipment (e.g. goggles or visors) must be worn, unless		
PROC 11	FFP1 mask	APF=10	dihydroxide is	potential contact with the eye can be		
PROC 15	not required	na	to 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		

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.

clothing and safety shoes are required to be worn as appropriate.

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An overview of the APFs of differ	ent RPE (according to BS EN 529:2005) can be found in the glossary of MEASE.
2.2 Control of environme	ntal exposure – only relevant for agricultural soil protection
Product characteristics	
Drift: 1% (very worst-case estimation	te 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
	60 - 3.5 m/s
	40 .
	20
	1 3 7 11 15 20
	Distance from the
	spreader(in m)
	(Figure taken from: Laudet, A. et al., 1999)
Amounts used	
Ca(OH)2	2,244 kg/ha
Frequency and duration of use	
1 day/year (one application per 2.244 kg/ha is not exceeded (Cat	year). Multiple applications during the year are allowed, provided the total yearly amount of OH2)
, , , , , , , , , , , , , , , , , , , ,	
Environment factors not influe	nced by risk management
Volume of surface water: 300 L/n	n <sup>2</sup>
Field surface area: 1 ha	
Other given operational condit	ions affecting environmental exposure
Outdoor use of products Soil mixing depth: 20 cm	
Technical conditions and meas	sures at process level (source) to prevent release
There are no direct releases to a	djacent surface waters.
Technical conditions and meas	sures to reduce or limit discharges, air emissions and releases to soil
Drift should be minimised.	

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COLCIES ROHSTOFF FUR IDEEN		prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) No 1272/2008 and Regulation (EU) 2015/830		
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3. Exposure estimation and reference to its source							
Occupational exposure	9						
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 dihydroxide 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	Method used for inhalation exposure assessmentInhalation exposure estimate (RCR)Method used for dermal exposure assessmentDermal exposure estimate (RCR)					
PROC 2, 3, 4, 5, 8a, 8b, 9, 10, 11, 13, 15, 16, 17, 18, 19, 25, 26	Since calcium dihydroxide 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.Since calcium dihydroxide is classified as irritating to skin, dermal exposure has to be 						
Environmental exposu	re for agricultural soil protection						
The PEC calculation for on the calculation of pre- surface water and sedim more appropriate for agr modelling. FOCUS is a r German EXPOSIT 1.0 m the soil, calcium dihydro.	soil and surface water was based on dicted environmental concentration v nent (Kloskowksi et al., 1999). The FC icultural-like application as in this cas nodel typically developed for biocidal nodel, where parameters such as drif xide can indeed migrate then towards	the FOCUS soil gr alues (PEC) of plar OCUS/EXPOSIT mo se where paramete l applications and w ts can be improved s surface waters, vi	oup (FOCUS, 1996) ar ant protection products for odelling tool is preferred r as the drift needs to b vas further elaborated of according to collected a drift.	d on the "draft guidance or soil, ground water, d to the EUSES as it is e included in the n the basis of the data: once applied on			
Environmental emissions	See amounts used						
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for agricultural soil pro	tection					
Exposure	Substance	PEC (ug/L)	PNEC (ug/L)	RCR			
concentration in aquatic pelagic compartment	Ca(OH)2	7.48	490	0.015			
Exposure concentration in sediments	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			
and groundwater	Ca(OH)2	660	1080	0.61			
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium dihydroxide 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 (secondary         poisoning)						

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Environmental exposu	re for soil treatment in civil engine	ering			
The soil treatment in civil engineering 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.					
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 scenari	io			
Exposure concentration in sediments	Not relevant for road border scenari	io			
Exposure	Substance	PEC (mg/L)	PNEC (mg/L)	RCR	
and groundwater	Ca(OH)2	701	1080	0.65	
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium d	lihydroxide is not vo	latile. The vapour pres	sures is below 10 <sup>-5</sup> Pa.	
Exposure concentration relevant for the food chain (secondary poisoning)	<ul> <li>food</li> <li>ry</li> <li>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 (Ca2+ and OH-) in the environment.</li> </ul>				
Environmental exposu	re 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 soil treatment in civil engineering</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> </ul>					

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

(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".

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

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

# lime substances

Exposure Scenario Format (1) addressing uses carried out by workers				
1. Title				
Free short title	Professional uses of high 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, 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 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.			

COLCICIS ROHSTOFF FÜR IDEEN		PRODUCT SAFETY DATA SHEET for Ca(OH) <sub>2</sub> /CaCO <sub>3</sub> - Mixture prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) No 1272/2008 and Regulation (EU) 2015/830		
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2. Operational conditions and risk management measures					
PROC/ERC	REACH definition	n	Involv	ved tasks	
PROC 2	Use in closed, continuous process controlled exposu	s with occasional re			
PROC 3	Use in closed batch process formulation)	(synthesis or			
PROC 4	Use in batch and other process (so opportunity for exposure	synthesis) where arises			
PROC 5	Mixing or blending in batch process of preparations and articles (mu significant contact	ses for formulation Iltistage and/or :)			
PROC 8a	Transfer of substance or p (charging/discharging) from/to containers at non-dedicate	reparation vessels/large d facilities			
PROC 8b	Transfer of substance or prepara discharging) from/to vessels/larg dedicated facilitie	ation (charging/ ge containers at s			
PROC 9	Transfer of substance or prepar containers (dedicated filling line, in	ation into small cluding weighing)			
PROC 10	Roller application or bro	ushing	Further information i Guidance on inform	s provided in the ECHA ation requirements and	
PROC 11	Non industrial spray	ing	chemical safety assessment, Chapter R.12		
PROC 13	Treatment of articles by dippin	g and pouring	- Use descriptor system (ECHA-2010-G-05-EN		
PROC 15	Use as laboratory rea	gent	-		
PROC 16	Using material as fuel sources, lin unburned product to be e	nited exposure to expected	-		
PROC 17	Lubrication at high energy conditi open process	ons and in partly			
PROC 18	Greasing at high energy c	onditions	1		
PROC 19	Hand-mixing with intimate contac available	ct and only PPE			
PROC 25	Other hot work operations w	vith metals			
PROC 26	Handling of solid inorganic substa temperature	ances at ambient			
ERC2, ERC8a, ERC8b, ERC8c, ERC8d, ERC8e, ERC8f	Wide dispersive indoor and outdo substances or processing aids in	or use of reactive open systems	-		
2.1 Control of wor	kers exposure				
Product characteristic					
According to the MEASE reflected by an assignme ambient temperature the temperature based, takin abrasive tasks are based	approach, the substance-intrinsic e ent of a so-called fugacity class in the fugacity is based on the dustiness on ng into account the process temperated on the level of abrasion instead of t	mission potential is e MEASE tool. For o of that substance. W sure and the melting he substance intrin	one of the main exposi operations conducted w /hereas in hot metal op g point of the substance sic emission potential.	ure determinants. This is <i>i</i> th solid substances at erations, fugacity is . As a third group, high	
PROC	Use in preparation	Content in preparation	Physical form	Emission potential	
All applicable PROCs	not restricted		solid/powder	high	

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# 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 4, 5, 8a, 8b, 9, 10, 16, 17, 18, 19, 26 ≤ 240 minutes PROC 11 ≤ 60 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 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 4, 5, 8a, 8b, 9, 11, 16, 26	Any potentially required separation of workers 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.	generic local exhaust ventilation	72 %	-
PROC 17, 18		integrated local exhaust ventilation	87 %	-
PROC 19		not applicable	na	only in well ventilated rooms or outdoors (efficiency 50 %)
All other applicable PROCs		not required	na	-

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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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	
PROC 11, 17, 18, 19	FFP3 mask	APF=20		goggles or visors) must be worn, unless potential contact with the eve can be	
PROC 25	FFP2 mask	APF=10	Since calcium dihydroxide is		
All other applicable PROCs	FFP2 mask	APF=10	classified as irritating to 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 abo	ove shall only be worn if the following	principles are impl	emented in parallel: The	e duration of work	

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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3. Exposure estimation	ation and reference to its so	ource				
Occupational exposure	3					
The exposure estimation is the quotient of the refin demonstrate a safe use. respirable dust) and the includes an additional sa 481.	tool MEASE was used for the assest ned exposure estimate and the respe- For inhalation exposure, the RCR is respective inhalation exposure estimate afety margin since the respirable fract	sment of inhalation ective DNEL (derive based on the DNE late derived using N tion being a sub-fra	exposure. The risk cha ad no-effect level) and h L for calcium dihydroxid /IEASE (as inhalable du iction of the inhalable fr	aracterisation ratio (RCR) has to be below 1 to de of 1 mg/m <sup>3</sup> (as lst). Thus, the RCR action according to EN		
PROC	Method used for inhalation exposure assessment	Method used for inhalation exposure assessmentInhalation exposure estimate (RCR)Method used for dermal exposure assessmentDermal exposure estimate (RCR)				
PROC 2, 3, 4, 5, 8a, 8b, 9, 10, 11, 13, 15, 16, 17, 18, 19, 25, 26	PROC 2, 3, 4, 5, 8a, Jb, 9, 10, 11, 13, 15, I6, 17, 18, 19, 25, 26MEASE<1 mg/m³ (0.5 - 0.825)Since calcium dihydroxide is classified as irritating to skin, dermal exposure has to b minimised as far as technically feasible. J DNEL for dermal effects has not been deriv Thus, dermal exposure is not assessed in t exposure scenario.					
Environmental exposu	re for agricultural soil protection					
The PEC calculation for a on the calculation of precession of the calculation of precession of the surface water and sedim more appropriate for agr modelling. FOCUS is a modelling. FOCUS is a German EXPOSIT 1.0 m the soil, calcium dihydro:	soil and surface water was based on dicted environmental concentration v nent (Kloskowksi et al., 1999). The FC icultural-like application as in this cas nodel typically developed for biocidal nodel, where parameters such as drif xide can indeed migrate then toward	the FOCUS soil gr alues (PEC) of plar OCUS/EXPOSIT mo se where parameter I applications and w ts can be improved s surface waters, vi	oup (FOCUS, 1996) an nt protection products for odelling tool is preferred r as the drift needs to b vas further elaborated o according to collected a drift.	Id on the "draft guidance or soil, ground water, d to the EUSES as it is e included in the in the basis of the data: once applied on		
Environmental emissions	See amounts used	See amounts used				
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for agricultural soil pro	tection				
Exposure	Substance	PEC (ug/L)	PNEC (ug/L)	RCR		
concentration in aquatic pelagic compartment	Ca(OH)2	7.48	490	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		
and groundwater	Ca(OH)2	660	1080	0.61		
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium dihydroxide 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 (Ca2+ and OH-) in the environment.					

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Environmental exposu	re for soil treatment in civil engine	ering				
The soil treatment in civi (Ispra, September 5, 20 technosphere can be de with its structure, opera technosphere, which in groundwater watertable. prevention of pollution a risk assessment for the technosphere, to which t	The soil treatment in civil engineering 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 of predicted environmen sediment (Kloskowksi et agricultural-like applicati model typically develope where parameters such	soil was based on the FOCUS soil g tal concentration values (PEC) of p al., 1999). The FOCUS/EXPOSIT m on as in this case where paramete ed for biocidal applications and was f as drifts can be improved according t	proup (FOCUS, 199 lant protection pro- odelling tool is pref r as the drift needs urther elaborated o to collected data.	6) and on the "draft gui ducts for soil, ground v erred to the EUSES as s to be included in the n the basis of the Germ	idance on the calculation vater, surface water and it is more appropriate for modelling. FOCUS is a nan EXPOSIT 1.0 model,		
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 border scenari	io				
Exposure	Substance	PEC (mg/L)	PNEC (mg/L)	RCR		
and groundwater	Ca(OH)2	701	1080	0.65		
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium dihydroxide 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 (Ca2+ and OH-) in the environment.					
Environmental exposu	re for other uses					
For all other uses, no qu The operations protection or s Lime is an ing	antitative environmental exposure as al conditions and risk management r oil treatment in civil engineering redient and chemically bound into a	sessment is carried neasures are less matrix. Releases a	l because stringent than those ou re negligible and insuffi	tlined for agricultural soil		

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

(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".

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

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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 2 below)			
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 measured data and on the exposure estimation tool MEASE. The environmental assessment is based on FOCUS-Exposit.			

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2. Operational cond	itions and risk ma	nagement meas	sures		
Task/ERC	REACH de	finition	Involved tasks		
Milling	PROC	C 5			
Loading of spreader	PROC 8b, F	PROC 26	Preparation and use of	f calcium dihydroxide for soil	
Application to soil (spreading)	PROC	: 11	tre	atment.	
ERC2, ERC8a, ERC8b, ERC8c, ERC8d, ERC8e, ERC8f	Wide dispersive indoor reactive substances of open sys	and outdoor use of r processing aids in stems	Calcium dihydroxide is a wide dispersive uses: a shrimps farming, soil to pro	applied in numerous cases of agricultural, forestry, fish and reatment and environmental otection.	
2.1 Control of worke	ers exposure				
Product characteristic					
According to the MEASE a reflected by an assignmen ambient temperature the fu temperature based, taking abrasive tasks are based of	approach, the substance t of a so-called fugacity or ugacity is based on the or into account the process on the level of abrasion in	-intrinsic emission po class in the MEASE t lustiness of that subs s temperature and th nstead of the substan	tential is one of the main e ool. For operations conduc stance. Whereas in hot me e melting point of the subs nce intrinsic emission poter	exposure determinants. This is ted with solid substances at tal operations, fugacity is tance. As a third group, high ntial.	
Task	Use in preparation	Content in preparation	Physical form	Emission potential	
Milling	not restr	icted	solid/powder	high	
Loading of spreader	not restr	ricted	solid/powder	high	
Application to soil (spreading)	not restricted solid/powder high				
Amounts used					
The actual tonnage handle combination of the scale o PROC) is the main determ	d per shift is not conside f operation (industrial vs. inant of the process intri	ered to influence the . professional) and le nsic emission potent	exposure as such for this s vel of containment/automa ial.	cenario. Instead, the tion (as reflected in the	
Frequency and duration	of use/exposure				
Task		Dura	ation of exposure		
Milling			240 minutes		
Loading of spreader			240 minutes		
Application to soil (spreading)	480 minutes (not restricted)				
Human factors not influe	nced by risk managem	ient			
The shift breathing volume	during all process steps	s reflected in the PRC	DCs is assumed to be 10 m	n³/shift (8 hours).	
Other given operational	conditions affecting wo	orkers exposure			
Operational conditions (e.g assessment of the conduct	j. process temperature a ted processes.	and process pressure	) are not considered releva	ant for occupational exposure	
Technical conditions and	d measures at process	level (source) to pr	event release		
Risk management measur required in the processes.	es at the process level (	e.g. containment or s	egregation of the emission	source) are generally not	

CONSTOFF FÜR IDEEN		PRODUCT SAFETY DATA SHEET for Ca(OH) <sub>2</sub> /CaCO <sub>3</sub> - Mixture prepared in accordance with Annex II of the REACH Regulatio 1907/2006, Regulation (EC) No 1272/2008 and Regulation (EU) 2015/830	on EC
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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	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.

### Conditions and measures related to personal protection, hygiene and health 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	Since calcium	Eye protection equipment (e.g. goggles or visors) must be worn, unless potential
Loading of spreader	FFP3 mask	APF=20	dihydroxide is classified as irritating to skin, the use of protective gloves is mandatory for all	contact with the eye can be excluded by the nature and type of application (i.e. closed process). Additionally, face protection protective
Application to soil (spreading)	not required	na	process steps.	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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3. Exposure estimat	tion and reference	to its source			
Occupational exposure					
Measured data and modell characterisation ratio (RCF and has to be below 1 to d dihydroxide of 1 mg/m <sup>3</sup> (as	led exposure estimates ( R) is the quotient of the re lemonstrate a safe use. F s respirable dust).	MEASE) were used efined exposure estir For inhalation exposu	for the assessment of inha nate and the respective D ire, the RCR is based on t	alation exposure. The risk NEL (derived no-effect level) he DNEL for calcium	
Task	Method used for inhalation exposure assessment	Method used for halation exposure assessmentInhalation exposure estimate (RCR)Method used for dermal exposure assessmentDermal exposure (RCR)			
Milling	MEASE	0.488 mg/m <sup>3</sup> (0.48)	Since calcium dihydrox	ide is classified as irritating to	
Loading of spreader	MEASE (PROC 8b)	0.488 mg/m <sup>3</sup> (0.48)	skin, dermal exposure I technically feasible. A D been derived. Thus, der	has to be minimised as far as NEL for dermal effects has not mal exposure is not assessed	
Application to soil (spreading)	measured data	0.880 mg/m <sup>3</sup> (0.88)	in this exp	oosure scenario.	
Environmental exposure	for agricultural soil pro	otection			
The PEC calculation for so on the calculation of predic surface water and sedimer more appropriate for agric modelling. FOCUS is a mo German EXPOSIT 1.0 mo the soil, calcium dihydroxic	and surface water was ted environmental concent (Kloskowksi et al., 199 ultural-like application as odel typically developed f del, where parameters side can indeed migrate th	based on the FOCU entration values (PEC 9). The FOCUS/EXP in this case where p for biocidal applicatio uch as drifts can be in en towards surface v	S soil group (FOCUS, 198 C) of plant protection produ OSIT modelling tool is pre- arameter as the drift need ns and was further elabora mproved according to colle vaters, via drift.	b) and on the "draft guidance ucts for soil, ground water, eferred to the EUSES as it is s to be included in the ated on the basis of the ected data: once applied on	
Environmental emissions	See amounts used	See amounts used			
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for agricult	tural soil protection			
Exposure	Substance	PEC (ug/L)	PNEC (ug/L)	RCR	
concentration in aquatic pelagic compartment	Ca(OH)2	7.48	490	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	
and groundwater	Ca(OH)2	660	1080	0.61	
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium dihydroxide 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 relevar environment. The uses (Ca2+ and OH-) in the	nt because calcium c covered do not signi environment.	an be considered to be on ficantly influence the distri	nnipresent and essential in the bution of the constituents	

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Environmental exposure	for soil treatment in ci	vil engineering			
The soil treatment in civil engineering 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 sc of predicted environmental sediment (Kloskowksi et al agricultural-like application model typically developed where parameters such as	il was based on the FOC concentration values (P l., 1999). The FOCUS/EX as in this case where pa for biocidal applications a drifts can be improved a	CUS soil group (FOCI EC) of plant protectic (POSIT modelling too arameter as the drift r and was further elabor according to collectec	US, 1996) and on the "dra on products for soil, ground ol is preferred to the EUSE needs to be included in the orated on the basis of the I data.	ft guidance on the calculation d water, surface water and ES as it is more appropriate for e modelling. FOCUS is a German EXPOSIT 1.0 model,	
Environmental emissions	See amounts used				
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for road bo	Not relevant for road border scenario			
Exposure concentration in aquatic pelagic compartment	Not relevant for road bo	Not relevant for road border scenario			
Exposure concentration in sediments	Not relevant for road bo	order scenario			
Exposure	Substance	PEC (mg/L)	PNEC (mg/L)	RCR	
and groundwater	Ca(OH)2	701	1080	0.65	
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium dihydroxide is not volatile. The vapour pressures is below 10 <sup>-5</sup> Pa.				
Exposure concentration relevant for the food chain (secondary poisoning)	xposure oncentration relevant or the food chain secondary poisoning) This point is not relevant because calcium can be considered to be omnipresent and essential in the or the food chain secondary poisoning)				
Environmental exposure	for other uses				
For all other uses, no quar <ul> <li>The operational protection or soi</li> <li>Lime is an ingre</li> </ul>	ititative environmental ex conditions and risk man I treatment in civil engine dient and chemically bou	posure assessment i agement measures a ering und into a matrix. Re	is carried because are less stringent than tho leases are negligible and	se outlined for agricultural soil insufficient to cause a pH-shift	

- Lime is an ingredient and chemically bound into a matrix. Releases are negligible and insufficient to cause a pH-snift 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

(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".

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

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

# lime substances

Exposure Scenario Format (1) addressing uses carried 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, SU11, SU12, SU13, SU16, SU17, SU18, SU19, SU20, SU23, SU24 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 described in Section 2 below.		
Assessment Method	The assessment of inhalation exposure is based on the exposure estimation tool MEASE.		

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2. Operational conditions and risk management measures				
PROC/ERC	C/ERC REACH definition Involved tas			
PROC 0	Other process (PROC 21 (low emission potential) as proxy for exposure estimation)	Use of containers containing calcium dihydroxide/preparations as CO <sub>2</sub> absorbents (e.g. breathing apparatus)		
PROC 21	Low energy manipulation of substances bound in materials and/or articles	Handling of substances bound in materials and/or articles		
PROC 24         High (mechanical) energy work-up of substances bound in materials and/or articles         Grinding, mechanical cut				
PROC 25	Other hot work operations with metals	Welding, soldering		
ERC10, ERC11, ERC 12Wide dispersive indoor and outdoor use of long-life articles and materials with low releaseCalcium dihydroxide bound into or onto articles and materials such as: wooden and plastic construction a building materials (e.g. gutters, drains), flooring, furniture, toys, leather products, paper and cardboar products (magazines, books, news paper and packaging paper), electronic equipment (casing)				
2.1 Control of workers exposure				
Product charac	teristic			
According to the	MEASE approach, the substance-intrinsic emission po	otential 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 0	not restricted		massive objects (pellets), low potential for dust formation due to abrasion during previous filling and handling activities of pellets, not during use of breathing apparatus	low (worst case assumption as no inhalation exposure is assumed during the use of the breathing apparatus due to the very low abrasive potential)
PROC 21	not restricted		massive objects	very low
PROC 24, 25	not restricted		massive objects	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 0	480 minutes (not restricted as far as occupational exposure to calcium dihydroxide is concerned, the actual wearing duration may be restricted due the user instructions of the actual breathing apparatus)			
PROC 21	480 minutes (not restricted)			
PROC 24, 25	≤ 240 minutes			
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).

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Other given operational conditions affecting workers exposure						
Operational con assessment of the exposure assess temperatures are estimation. Thus	ditions like process temperature and p he conducted processes. In process s sment in MEASE is however based or e expected to vary within the industry s all process temperatures are automa	process pressure teps with conside the ratio of proc the highest ratio ttically covered in	are not considered releval erably high temperatures (i ess temperature and melti was taken as a worst case this exposure scenario for	nt for occupational exposure e. PROC 22, 23, 25), the ng point. As the associated assumption for the exposure PROC 22, 23 and PROC 25.		
Technical cond	litions and measures at process lev	vel (source) to p	revent release			
Risk manageme required in the p	ent measures at the process level (e.g. processes.	. containment or s	segregation of the emissio	n source) are generally not		
Technical cond	litions and measures to control disp	persion from so	urce towards the worker			
PROC	Level of separation	Localised controls (LC)	Efficiency of LC (according to MEASE)	Further information		
PROC 0, 21, 24, 25	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 exposure duration can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved       not required       na					
Organisational	measures to prevent /limit releases	s, dispersion and	d exposure			
Avoid inhalation These measures eating and smok Shower and cha compressed air.	or ingestion. General occupational hy s involve good personal and housekee king at the workplace, the wearing of s inge clothes at end of work shift. Do no	giene measures eping practices (i. tandard working ot wear contamin	are required to ensure a si e. regular cleaning with su clothes and shoes unless ated clothing at home. Do	afe handling of the substance. itable cleaning devices), no otherwise stated below. not blow dust off with		
Conditions and	I measures related to personal prote	ection, 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 0, 21	not required	na	Since calcium	Eye protection equipment (e.g. goggles or visors) must be worn, unless potential		
PROC 24, 25	FFP1 mask	APF=4	dihydroxide is classified as irritating to skin, the use of protective gloves is mandatory for all process steps. dihydroxide is classified as irritating to skin, the use of protective gloves is mandatory for all protection, protective and safety shoes are to be worn, diffess pot			
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 devices and the	nd self-employed persons have legal r management of their correct use in th	esponsibilities fo workplace. The	r the maintenance and issu prefore, they should define	ue of respiratory protective and document a suitable		

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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

Product characteristics

Lime is chemically bound into/onto a matrix with very low release potential

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 dihydroxide 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 0	MEASE (PROC 21)	0.5 mg/m³ (0.5)			
PROC 21	MEASE	0.05 mg/m³ (0.05)	Since calcium dihydroxide is classified as irritatir skin, dermal exposure has to be minimised as fa technically feasible. A DNEL for dermal effects ha been derived. Thus, dermal exposure is not asses this exposure scenario.		
PROC 24	MEASE	0.825 mg/m³ (0.825)			
PROC 25	MEASE	0.6 mg/m³ (0.6)			

### 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.

# 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 (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 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)

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

Exposure Scenario Format (2) addressing uses carried out by consumers					
1. Title					
Free short title			Consumer use of building and construction material		
Systematic title based	on us	e descriptor	SU21, PC9a, PC9b, EF	RC8c, ERC8d, ERC8e, ERC	8f
Processes, tasks activ	vities o	covered	Handling (mixing and fi Application of liquid, pa	illing) of powder formulations asty lime preparations.	3
Assessment Method*			Human health: A qualitative assessment has been performed for oral and dermal exposure as well as exposure to the eye. Inhalation exposure to dust has been assessed by the Dutch model (van Hemmen, 1992). Environment: A qualitative justification assessment is provided.		
2. Operational con	ditio	ns and risk ma	nagement measure	es	
RMM		No product integra	ated risk management m	easures are in place.	
PC/ERC		Description of ac categories (ERC	ctivity referring to articl )	e categories (AC) and env	ironmental release
PC 9a, 9b		Mixing and loading of powder containing lime substances. Application of lime plaster, putty or slurry to the walls or ceiling. Post-application exposure.			
ERC 8c, 8d, 8e, 8f		Wide dispersive indoor use resulting in inclusion into or onto a matrix Wide dispersive outdoor use of processing aids in open systems Wide dispersive outdoor use of reactive substances in open systems Wide dispersive outdoor use resulting in inclusion into or onto a matrix			
2.1 Control of con	sume	ers exposure			
Product characteristic					
Description of the preparation	Con subs prep	centration of the stance in the aration	Physical state of the preparation	Dustiness (if relevant)	Packaging design
Lime substance	100	%	Solid, powder	High, medium and low,	Bulk in bags of up to
Plaster, Mortar 20-40		0%	Solid, powder	lime substance (indicative value from DIY <sup>1</sup> fact sheet see section 9.0.3)	35 Kg.
Plaster, Mortar 20-40%		Pasty	-	-	
Putty, filler 30-55%		Pasty, highly viscous, thick liquid	-	In tubes or buckets	
Pre-mixed lime wash ~30% paint		Solid, powder	High - low (indicative value from DIY <sup>1</sup> fact sheet see section 9.0.3)	Bulk in bags of up to 35 kg.	
Socies Rohstoff für iden		PRODUCT SAFETY DATA SHEET for Ca(OH) <sub>2</sub> /CaCO <sub>3</sub> - Mixture prepared in accordance with Annex II of the REACH Regulatio 1907/2006, Regulation (EC) No 1272/2008 and Regulation (EU) 2015/830	on EC		
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Lime wash paint/milk of lime preparation	~ 30 %		Milk of lime preparation		-			-	
Amounts used									
Description of the Amount used per event preparation									
Filler, putty		250 g - Difficult holes to	1 kg pov to detern be filled	wder (2:1 powde mine, because t I.	er water) he amou	nt is heavil	y dependent	t on th	ne depth and size of the
Plaster/lime wash paint		~ 25 kg	dependi	ng on the size c	of the room	m, wall to b	be treated.		
Floor/wall equalizer		~ 25 kg	dependi	ng on the size c	of the roo	m, wall to b	pe equalized	Ι.	
Frequency and duratio	n of use/	exposu	re						
Description of task			Duratio	on of exposure	per evei	nt	frequency	of ev	vents
Mixing and loading of lim powder.	ie contair	ning	1.33 mi Chapte powder	in (DIY <sup>1</sup> -fact she r 2.4.2 Mixing a s)	et, RIVM nd loadin	l, g of	2/year (DI)	Y <sup>1</sup> fac	t sheet)
Application of lime plasters slurry to the walls or ceili	er, putty c ng	or	Severa	l minutes - hour	S		2/year (DI)	Y <sup>1</sup> fac	t sheet)
Human factors not influ	uenced b	y risk m	anagem	ent					
Description of the task	Popula	tion exp	osed	Breathing rat	e	Exposed	l body part		Corresponding skin area [cm²]
Handling of powder	Adult			1.25 m³/hr		Half of be	alf of both hands		430 (DIY <sup>1</sup> fact sheet)
Application of liquid, pasty lime preparations.	Adult			NR	NR Hands a		nd forearms		1900 (DIY <sup>1</sup> fact sheet)
Other given operationa	I conditi	ons affe	cting co	onsumers expo	sure				
Description of the task		Indoo	or/outdoor Room v			volume		Air	exchange rate
Handling of powder		indoo	or 1 m³ (p area ar		ersonal space, small 0.6 ound the user)		0.6	3 hr <sup>-1</sup> (unspecified room)	
Application of liquid, past preparations.	ty lime	indoo	r NR		NR		NR	ł	
Conditions and measu	res relate	ed to inf	ormatior	n and behaviou	ral advid	ce to cons	umers		
In order to avoid health damage DIYers should comply with the same strict protective measures which apply to professional workplaces:									
Change wet cl	othing, sł	noes and	l gloves i	mmediately.					
<ul> <li>Protect uncovered areas of skin (arms, legs, face): there are various effective skin protection products which should be used in accordance with a skin protection plan (skin protection, cleansing and care). Cleanse the skin thoroughly after the work and apply a care product</li> </ul>									
Conditions and measures related to personal protection and hygiene									
In order to avoid health damage DIYers should comply with the same strict protective measures which apply to professional workplaces:									
<ul> <li>When preparing or mixing building materials, during demolition or caulking and, above all, during overhead work, wear protective goggles as well as face masks during dusty work.</li> <li>Choose work gloves carefully. Leather gloves become wet and can facilitate burns. When working in a wet environment, cotton gloves with plastic covering (nitrile) are better. Wear gauntlet gloves during overhead work because they can considerably reduce the amount of humidity which permeates the working clothes.</li> </ul>									
2.2 Control of envi	2.2 Control of environmental exposure								

Product characteristics

Socies Rohstoff für ideen		PRODUCT SAFETY DATA SHEET for Ca(OH) <sub>2</sub> /CaCO <sub>3</sub> - Mixture prepared in accordance with Annex II of the REACH Regulatio 1907/2006, Regulation (EC) No 1272/2008 and Regulation (EU) 2015/830	on EC
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Not relevant for exposure assessment						
Amounts used*						
Not relevant for expo	sure assessment					
Frequency and dura	tion of use					
Not relevant for expo	sure assessment					
Environment factors	s not influenced by risk managemen	t				
Default river flow and	dilution					
Other given operation	onal conditions affecting environme	ntal exposure				
Indoor Direct discharge to th	e wastewater is avoided.					
Conditions and mea	sures related to municipal sewage t	reatment plant				
Default size of munic	ipal sewage system/treatment plant an	d sludge treatment technique				
Conditions and mea	sures related to external treatment	of waste for disposal				
Not relevant for expos	sure assessment					
Conditions and mea	sures related to external recovery o	of waste				
Not relevant for expos	sure assessment					
3. Exposure est	imation and reference to its s	ource				
The risk characterisa effect level) and is giv substances of 4 mg/n includes an additiona Since limes are class exposure to the eye.	tion ratio (RCR) is the quotient of the re- ven in parentheses below. For inhalatic n <sup>3</sup> (as respirable dust) and the respecti I safety margin since the respirable fra- ified as irritating to skin and eyes a qua	Prined exposure estimate and the respective DNEL (derived no- on exposure, the RCR is based on the acute DNEL for lime ve inhalation exposure estimate (as inhalable dust). Thus, the RCR ction is a sub-fraction of the inhalable fraction according to EN 481. alitative assessment has been performed for dermal exposure and				
Human exposure						
Handling of powder						
Route of 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/cm² (-) large task: 1 μg/cm² (-)	Qualitative assessment 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.				

		PRODUCT SAFETY DATA SHEET for Ca(OH) <sub>2</sub> /CaCO <sub>3</sub> - Mixture				
	OLCIS OHSTOFF FÜR IDEEN	prepared in accordance with Annex II of the REACH Regulation 1907/2006, Regulation (EC) No 1272/2008 and Regulation (EU) 2015/830	on EC			
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	1	
Inhalation	Small task: 12 µg/m³ (0.003)	Quantitative assessment
	Large task: 120 µg/m³ (0.03)	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 of liquic	I, pasty lime preparations.	
Route of exposure	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-application ex	oosure	
No relevant exposure dioxide from the atmo	will be assumed as the aqueous lin psphere.	ne preparation will quickly convert to calcium carbonate with carbon
Environmental expo	osure	

Referring to the OC/RMMs related to the environment to avoid discharging lime solutions directly into municipal wastewater, the pH of the influent of a municipal wastewater treatment plant is circum-neutral and therefore, there is no exposure to the biological activity. The influent of a municipal wastewater 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.

		PRODUCT SAFETY DATA SHEET for Ca(OH) <sub>2</sub> /CaCO <sub>3</sub> - Mixture				
	COLCIS OHSTOFF FÜR IDEEN	prepared in accordance with Annex II of the REACH Regulation 1907/2006, Regulation (EC) No 1272/2008 and Regulation (EU) 2015/830	on EC			
Version:	1,0 Engl.					
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## ES number 9.13: Consumer use of CO2 absorbent in breathing

### apparatuses

Exposure Scenario Format (2) addressing uses carried out by consumers								
1. Title								
Free short title			Consumer use of CO <sub>2</sub>	Consumer use of CO <sub>2</sub> absorbent in breathing apparatuses				
Systematic title based	on use	e descriptor	SU21, PC2 , ERC8b					
Processes, tasks activ	vities c	overed	Filling of the formulation Use of closed circuit b Cleaning of equipment	on into the cartridge reathing apparatuses t				
Assessment Method*			Human health A qualitative assessment has been performed for oral and dermal exposure. The inhalation exposure has been assessed by the Dutch model (van Hemmen, 1992). Environment A qualitative justification assessment is provided.					
2. Operational con	ditio	ns and risk ma	nagement measu	res				
RMM		The soda lime is a is added which wi calcium dihydroxid	available in granular forr Il further reduce the dus de will be quickly reactir	n. Furthermore, a defined am tiness of the absorbent. Durin ng with CO <sub>2</sub> to form the carbo	ount of water (14-18%) ng the breathing cycle nate.			
PC/ERC Description of ac categories (ERC		tivity referring to article categories (AC) and environmental release						
PC 2 Us CC (cz Th Ha		Use of closed circuit breathing apparatus for e.g. recreational diving containing soda lime as CO <sub>2</sub> absorbent. The breathed air will flow through the absorbent and CO <sub>2</sub> will quickly react (catalysed by water and sodium hydroxide) with the calcium dihydroxide to form the carbonate. The CO <sub>2</sub> -free air can be re-breathed again, after addition of oxygen. Handling of the absorbent: The absorbent will be discarded after each use and refilled before each dive.						
ERC 8b		Wide dispersive ir	ndoor use resulting in inclusion into or onto a matrix					
2.1 Control of cons	sume	rs exposure						
Product characteristic								
Description of the preparation	Con subs prep	centration of the stance in the aration	Physical state of the preparation	Dustiness (if relevant)	Packaging design			
CO <sub>2</sub> absorbent	78 - 84% Depending on the application the main component has different additives. A specific amount of water is always added (14-18%).		Solid, granular	Very low dustiness (reduction by 10 % compared to powder) Dust formation cannot be ruled out during the filling of the scrubber cartridge.	4.5, 18 kg canister			
"Used" CO2 absorbent	~ 20	%	Solid, granular	Very low dustiness (reduction by 10 % compared to powder)	1-3 kg in breathing apparatus			
Amounts used								

S COLCIS ROHSTOFF FÜR IDEEN		PRODUCT SAFETY DATA SHEET for Ca(OH) <sub>2</sub> /CaCO <sub>3</sub> - Mixture prepared in accordance with Annex II of the REACH Regulatio 1907/2006, Regulation (EC) No 1272/2008 and Regulation (EU) 2015/830	on EC
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CO <sub>2</sub> -Absorbent used in b	CO <sub>2</sub> -Absorbent used in breathing apparatus 1-3 kg depending on the kind of breathing apparatus								
Frequency and duratio	n of us <mark>e</mark> /e	xposu	re						
Description of the task D			Duration of exposure per event			frequency	frequency of events		
Filling of the formulation into the cartridge			Ca. 1.3	33 min per filling	, in sum ∝	< 15 min	Before eac	ch div	re (up to 4 times)
Use of closed circuit brea apparatus	athing		1-2 h				Up to 4 div	ves a	day
Cleaning and emptying of	of equipme	nt	< 15 m	in			After each	dive	(up to 4 times)
Human factors not influ	uenced by	risk m	anagem	nent					
Description of the task	Populat	ion exp	osed	Breathing rat	e	Exposed	d body part		Corresponding skin area [cm²]
Filling of the formulation into the cartridge	adult			1.25 m³/hr (lig working activit	ht ry)	hands	hands		840 (REACH guidance R.15, men)
Use of closed circuit breathing apparatus						-			-
Cleaning and emptying of equipment			hand		hands	ands		840 (REACH guidance R.15, men)	
Other given operationa	l conditio	ns affe	cting co	onsumers expo	sure			-	
Description of the task		Indoo	or/outdoor		Room volume		Air exchange rate		
Filling of the formulation cartridge	into the	NR			NR		NR		
Use of closed circuit brea apparatus	athing	-			-		-		
Cleaning and emptying c equipment	of	NR			NR			NR	
Conditions and measu	res related	d to inf	ormatio	n and behaviou	ral advid	ce to cons	umers		
Do not get in eyes, on skin, or on clothing. Do not breathe dust Keep container tightly closed as to avoid the soda lime to dry out. Keep out of reach of children. Wash thoroughly after handling. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Do not mix with acids. Carefully read the instructions of the breathing apparatus to assure a proper use of the breathing apparatus.									
Conditions and measu	res related	d to pe	r <mark>sonal</mark> p	rotection and h	ygiene				
Wear suitable gloves, goggles and protective clothes during handling. 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 exposure	e assessm	ent							
Frequency and duration of use									

Socies Rohstoff für iden		PRODUCT SAFETY DATA SHEET for Ca(OH) <sub>2</sub> /CaCO <sub>3</sub> - Mixture prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) No 1272/2008 and Regulation (EU) 2015/830				
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No	ot relevant	for exposure assessment	

Environment factors not influenced by risk management

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 to its source

The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived noeffect 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. Since lime substances are classified as irritating to skin, and eyes a qualitative assessment has been performed for dermal exposure and exposure to the eye.

Due to the very specialised kind of consumers (divers filling their own  $CO_2$  scrubber) it can be assumed that instructions will be taken into account to reduce exposure

Human exposure

#### Filling of the formulation into the cartridge

Route of exposure	Exposure estimate	Method used, comments			
Oral	-	Qualitative assessment			
		Oral exposure does not occur as part of the intended product use.			
Dermal	-	Qualitative assessment			
		If risk reduction measures are taken into account no human exposure is expected. However, dermal contact to dust from			
		loading of granular soda lime or direct contact to the granules			
		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.			
Eye	Dust	Qualitative assessment			
		If risk reduction measures are taken into account no human exposure is expected. Dust from loading of the granular soda lime is expected to be minimal, therefore eye exposure will be minimal even without protective goggles. Nevertheless, prompt rinsing with water and seeking medical advice after accidental exposure is advisable.			
Inhalation	Small task: 1.2 µg/m³ (3 × 10 <sup>-4</sup> )	Quantitative assessment			
	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.			
Use of closed circui	t breathing apparatus				
Route of exposure	Exposure estimate	Method used, comments			

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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 empty	ing of equipment	
Route of exposure	Exposure estimate	Method used, comments
Oral		Qualitativa accessment
Ulai	-	Quainative assessment
	-	Oral exposure does not occur as part of the intended product use.
Dermal	- Dust and splashes	Oral exposure does not occur as part of the intended product use. 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.
Dermal	Dust and splashes	Qualitative assessment         Oral exposure does not occur as part of the intended product use.         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.         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
Dermal Eye	Dust and splashes Dust and splashes Small task: 0.3 µg/m <sup>3</sup> (7.5 × 10 <sup>-5</sup> )	Qualitative assessment         Oral exposure does not occur as part of the intended product use.         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.         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.
Dermal Eye Inhalation	Dust and splashes Dust and splashes Dust and splashes Small task: 0.3 µg/m³ (7.5 × 10 <sup>-5</sup> ) Large task: 3 µg/m³ (7.5 × 10 <sup>-4</sup> )	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.         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 moistened soda limes may occur in very rare         occasions. Prompt rinsing with water and seeking medical advice         after accidental exposure is advisable.         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.

The pH impact due to use of lime in breathing apparatuses is expected to be negligible. The influent of a municipal wastewater 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	ressing	g uses carried out b	y consum	ers		
1. Title								
Free short title				Consumer use of garden lime/fertilizer				
Systematic title based	on us	e descripto	or	SU21, PC20, PC12, E	RC8e			
Processes, tasks activ	vities o	overed		Manual application of Post-application expose	garden lime sure	e, fe	rtilizer	
Assessment Method*			Human health A qualitative assessment has been performed for oral and dermal exposure as well as for the exposure to the eye. The dust exposure has been assessed by the Dutch model (van Hemmen, 1992). Environment A qualitative justification assessment is provided.				oral and dermal exposure posure has been ?).	
2. Operational con	ditio	ns and r	isk ma	anagement measu	res			
RMM		No produ	ct integr	ated risk management r	measures a	re in	place.	
PC/ERC		Descript categorie	ion of a es (ERC	ctivity referring to artic	cle categor	ies	(AC) and env	vironmental release
PC 20		Surface s Post-appl	preading	g of the garden lime by s exposure to playing child	shovel/hand dren.	d (wo	orst case) and	d soil incorporation.
PC 12		Surface s Post-appl	preading	g of the garden lime by s exposure to playing child	shovel/ han dren.	d (w	orst case) an	d soil incorporation.
ERC 8e		Wide disp	persive o	outdoor use of reactive substances in open systems				
2.1 Control of con	sume	ers expo	sure					
Product characteristic								
Description of the preparation	Cone subs prep	centration stance in th aration	of the ne	Physical state of the preparation	Dustine	ustiness (if relevant) Packa		Packaging design
Garden lime	100 9	%		Solid, powder	High dus	igh dusty		Bulk in bags or containers of 5, 10 and 25 kg
Fertilizer	Up to	0 20 %		Solid, granular	Low dus	Low dusty		Bulk in bags or containers of 5, 10 and 25 kg
Amounts used								
Description of the prep	oaratio	'n		Amount used per eve	ent		Source of information	
Garden lime				100g /m <sup>2</sup> (up to 200g/r	m²)		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/exposu	re			ī		
Description of the task	4		Durati	on of exposure per ev	ent	fre	equency of e	vents
Manual application			Minute Depen area	s-hours 1 tasks per year ding on the size of the treated			r	

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Post-application			2 h (toddlers playing on grass (EPA exposure factors handbook)		Relevant for up to 7 days after application				
Human factors not influenced by risk management									
Description of the task	Populati	on exp	osed	ed Breathing rate		Exposed body part			Corresponding skin area [cm²]
Manual application	Adult			1.25 m³/hr		Hands and forearms			1900 (DIY fact sheet)
Post-application	Child/Too	ddlers		NR		NR			NR
Other given operationa	al conditio	ns affe	cting c	onsumers exp	osure				
Description of the task	1	Indoc	or/outdo	or	Room	volume		Air	exchange rate
Manual application		outdo	or		1 m³ (p area ar	ersonal sp ound the ι	ace, small Iser)	NR	
Post-application		outdo	or		NR			NR	
Conditions and measu	res related	d to inf	ormatio	n and behavio	ural advi	ce to con	sumers		
Keep container closed a In case of contact with e Wash thoroughly after ha Do not mix with acids an Incorporation of the gard	nd out of re yes, rinse i andling. Id always a len lime or <b>res relate</b>	each of immedi add lime fertilize	children ately with es to wat er into the	n. h plenty of wate er and not wate e soil with subse protection and	r and see r to limes equent w	ek medical s. atering will	advice. facilitate the	e effe	ct.
Wear suitable gloves, go					nygierie				
2.2 Control of envi	ironmen	tal ex		e					
Product characteristics	;			-					
Drift: 1 % (very worst-cas	se estimate	e based	on data	from dust meas	surement	s in air as	a function o	f the o	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		recon the co	recommended not to exceed 1700 kg CaO/ha or the corresponding amount of 2244 kg Ca(OH) <sub>2</sub> /ha. This rate is three times the amount		
	CaO.MgC	)		1,478 kg/ha		Ca(O			
	Ca(OH)2.	.Mg(O⊢	l)2	2,030 kg/ha		by lea	iching. For the	his re	ason, the value of 1700 kg
	CaCO3.M	1gO		2,149 kg/ha		CaO/I Ca(O	Ca(OH) <sub>2</sub> /ha is used in this dossier as the basis		
	Ca(OH)2.	MgO		1,774 kg/ha		for the other	e risk assess lime variants	sment s can	t. The amount used for the be calculated based on
	Natural h	ydraulio	c lime	e 2,420 kg/ha their composition		and t	he molecular weight.		
Frequency and duration	n of use								
1 day/year (one applicati kg/ha is not exceeded (C	on per yea aOH2)	ar) Mult	iple appl	ications during	the year	are allowe	d, provided	the to	otal yearly amount of 2,244
Environment factors no	ot influenc	ed by i	risk mar	nagement					
Not relevant for exposure	e assessmo	ent							
Other given operationa	I conditio	ns affe	cting en	vironmental ex	posure				
Outdoor use of products Soil mixing depth: 20 cm									

Soil mixing depth: 20 cm

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Not relevant for exposure assessment

Conditions and measures related to external recovery of waste

Not relevant for exposure assessment

3. Exposure estimation and reference to its source

The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived noeffect level) and is given in parentheses below. For inhalation exposure, the RCR is based on the long-term DNEL for lime substances of 1 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. Since lime substances are classified as irritating to skin and eyes a qualitative assessment has been performed for dermal exposure and exposure to the eye.

#### Human exposure

#### Manual application

Route of exposure	Exposure estimate	Method used, comments
Oral	-	Qualitative assessment Oral exposure does not occur as part of the intended product use.
Dermal	Dust, powder	Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. However, dermal contact to dust from application of lime substances or by direct contact to the limes cannot be excluded if no protective gloves are worn during application. Due to the relatively long application time, skin irritation would be expected. This can easily be avoided by immediate rinsing with water. It would be assumed that consumers who had experience of skin irritation will protect themselves. Therefore, any occurring skin irritation, which will be reversible, can be assumed to be non-recurring.
Eye	Dust	Qualitative assessment If risk reduction measures are taken into account no human exposure is expected. Dust from surfacing with lime cannot be excluded if no protective goggles are used. Prompt rinsing with water and seeking medical advice after accidental exposure is advisable.
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).

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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
		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.
Post-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	Forma	at (2) addressing	uses carried out by	consumers			
1. Title							
Free short title			Consumer use of lime substances as water treatment chemicals				
Systematic title based	on use	e descriptor	SU21, PC20, PC37, EF	RC8b			
Processes, tasks activ	vities c	overed	Loading, filling or re-filli lime milk Application of lime milk	Loading, filling or re-filling of solid formulations into container/preparation of lime milk			
Assessment Method*			Human health:				
			A qualitative assessme as well as for exposure the Dutch model (van H	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).			
			A qualitative justification	n assessment is provided.			
2. Operational con	ditio	ns and risk ma	nagement measure	25			
RMM		No further product	t integrated risk manager	ment measures are in place			
PC/FRC		Description of a	ctivity referring to articl	e categories (AC) and envi	ironmental release		
10/210		categories (ERC)	)		in on internal release		
PC 20/37 Filling and re Transfer of li Dropwise ap		Filling and re-filling Transfer of lime so Dropwise applicat	ing (transfer of lime substances (solid)) of lime reactor for water treatment. substances (solid) into container for further application. ation of lime milk to water.				
ERC 8b		Wide dispersive ir	ndoor use of reactive sub	stances in open systems			
2.1 Control of cons	sume	ers exposure					
Product characteristic							
Description of the preparation	Cond subs prep	centration of the stance in the aration	Physical state of the preparation	Dustiness (if relevant)	Packaging design		
Water treatment chemical	Up to	o 100 %	Solid, fine powder	high dustiness (indicative value from DIY fact sheet see section 9.0.3)	Bulk in bags or buckets/containers.		
Water treatment chemical	reatment Up to 99 % al		Solid, granular of different size (D50 value 0.7 D50 value 1.75 D50 value 3.08)	low dustiness (reduction by 10% compared to powder)	Bulk-tank lorry or in "Big Bags" or in sacks		
Amounts used							
Description of the prep	oaratio	n	Amount used per even	nt			
Water treatment chemica aquaria	al in lim	ne reactor for	depending on the size of the water reactor to be filled (~ 100g /L)				
Water treatment chemica drinking water	al in lirr	ne reactor for	depending on the size of the water reactor to be filled (~up to 1.2 kg/L)				

CONSTOFF FÜR IDEEN		PRODUCT SAFETY DATA SHEET for Ca(OH) <sub>2</sub> /CaCO <sub>3</sub> - Mixture prepared in accordance with Annex II of the REACH Regulatio 1907/2006, Regulation (EC) No 1272/2008 and Regulation (EU) 2015/830	on EC
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Lime milk for further application				~ 20 g / 5L						
Frequency and duration of use/exposure										
Description of task Dura			Duration of exposure per event freq		frequency	requency of events				
Preparation of lime milk and refilling)	(loading, fi	lling	1.33 m (DIY-fa Mixing	1.33 min1(DIY-fact sheet, RIVM, Chapter 2.4.21Mixing and loading of powders)		1 task/mor 1task/weel	1 task/month 1task/week			
Dropwise application of I water	ime milk to	)	Severa	l minutes - hour	S		1 tasks/ m	onth		
Human factors not influ	uenced by	risk m	anagem	ent						
Description of the task	Populati	ion exp	osed	Breathing rat	e	Expos	ed body pa	rt	Corresponding skin area [cm²]	
Preparation of lime milk (loading, filling and refilling)	adult			1.25 m³/hr		Half of	of both hands		430 (RIVM report 320104007)	
Dropwise application of lime milk to water	adult			NR		Hands			860 (RIVM report 320104007)	
Other given operationa	I conditio	ns affe	cting co	onsumers expo	sure					
Description of the task		Indoc	or/outdo	or	Room vo	olume		Air	exchange rate	
Preparation of lime milk filling and refilling)	(loading,	Indoo	or/outdoor 1 m³ area		1 m³ (per area arou	n³ (personal space, small a around the user)		0.6 indo	0.6 hr <sup>-1</sup> (unspecified room indoor)	
Dropwise application of lime milk indoo to water		indoo	or NR			NR				
Conditions and measu	Conditions and measures related to information and behavioural advice to consumers									
Do not get in eyes, on sk Keep container closed at Use only with adequate In case of contact with ey Wash thoroughly after ha Do not mix with acids an	Do not get in eyes, on skin, or on clothing. Do not breathe dust Keep container closed and out of reach of children. Use only with adequate ventilation. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wash thoroughly after handling. Do not mix with acids and always add limes to water and not water to limes.									
Conditions and measu	res relateo	d to pe	r <mark>sonal p</mark>	rotection and h	ygiene					
Wear suitable gloves, go	ggles and	protect	ive clothe	es. Use a filterin	g half mas	k (mask i	type FFP2 a	cc. to	EN 149).	
2.2 Control of envi	ronmen	tal ex	posure	9						
Product characteristics	5									
Not relevant for exposure	e assessm	ent								
Amounts used*										
Not relevant for exposure	e assessm	ent								
Frequency and duratio	n of use									
Not relevant for exposure	e assessm	ent								
Environment factors not influenced by risk management										
Default river flow and dil	Default river flow and dilution									
Other given operationa	l conditio	ns affe	cting en	vironmental ex	posure					
Indoor		Indoor								

COLCICS ROHSTOFF FÜR IDEEN		PRODUCT SAFETY DATA SHEET for Ca(OH) <sub>2</sub> /CaCO <sub>3</sub> - Mixture prepared in accordance with Annex II of the REACH Regulatio 1907/2006, Regulation (EC) No 1272/2008 and Regulation (EU) 2015/830	on EC
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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 to its source

The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived noeffect 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.

Since lime substances are classified as irritating to skin and eyes a qualitative assessment has been performed for dermal exposure and exposure to the eye.

#### Human exposure

#### Preparation of lime milk (loading )

i reparation of fille	(localing)	
Route of exposure	Exposure estimate	Method used, comments
Oral	-	Qualitative assessment
		Oral exposure does not occur as part of the intended product use.
Dermal (powder)	small task: 0.1 µg/cm <sup>2</sup> (-)	Qualitative assessment
	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 limes 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-fact sheet (RIVM report 320104007). For granules the exposure estimate will be even lower.
Eye	Dust	Qualitative assessment
		If risk reduction measures are taken into account no human exposure is expected. Dust from loading of the limes cannot be excluded if no protective goggles are used. Prompt rinsing with water and seeking medical advice after accidental exposure is advisable.
Inhalation (powder)	Small task: 12 µg/m³ (0.003)	Quantitative assessment
	Large task: 120 µg/m³ (0.03)	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	Small task: 1.2 µg/m³ (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 applicatio	n of lime milk to water	
Route of exposure	Exposure estimate	Method used, comments
Oral	-	Qualitative assessment
		Oral exposure does not occur as part of the intended product use.

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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 expo	osure	
The pH impact due to	o use of lime in cosmetics is expected t	o be negligible. The influent of a municipal wastewater treatment

Ine pH impact due to use of lime in cosmetics is expected to be negligible. The influent of a municipal wastewater 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.

		PRODUCT SAFETY DATA SHEET for $Ca(OH)_2/CaCO_3$ - Mixture			
Colcis Rohstoff für ideen		prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) No 1272/2008 and Regulation (EU) 2015/830			
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	Revision date:				
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## ES number 9.16: Consumer use of cosmetics containing lime substances

Exposure Scenario Format (2) addressing 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 of	overed	-				
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 ma	nagement measures				
ERC 8a	Wide dispersive in	ndoor use of processing aids in open systems				
2.1 Control of consume	ers exposure					
Product characteristic						
Not relevant, as the risk to hun	nan health from this	use does not need to be considered.				
Amounts used						
Not relevant, as the risk to hun	nan health from this	use does not need to be considered.				
Frequency and duration of u	se/exposure					
Not relevant, as the risk to hun	nan health from this	use does not need to be considered.				
Human factors not influence	d by risk managem	nent				
Not relevant, as the risk to hun	nan health from this	use does not need to be considered.				
Other given operational cond	titions affecting co	onsumers exposure				
Not relevant, as the risk to hun	nan health from this	use does not need to be considered.				
Conditions and measures re	lated to information	n and behavioural advice to consumers				
Not relevant, as the risk to hun	nan health from this	use does not need to be considered.				
Conditions and measures re	lated to personal p	rotection and hygiene				
Not relevant, as the risk to hun	nan health from this	use does not need to be considered.				
2.2 Control of environm	nental exposure	e				
Product characteristics						
Not relevant for exposure asse	ssment					
Amounts used*						
Not relevant for exposure asse	ssment					
Frequency and duration of u	se					
Not relevant for exposure asse	ssment					

		PRODUCT SAFETY DATA SHEET for Ca(OH) <sub>2</sub> /CaCO <sub>3</sub> - Mixture			
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Environment factors not influenced by risk management
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 to its source
Human exposure
Human exposure to cosmetics will be addressed by other legislation and therefore need not be addressed under regulation (EC) 1907/2006 according to Article 14(5) (b) of this regulation.
Environmental exposure
The pH impact due to use of lime in cosmetics is expected to be negligible. The influent of a municipal wastewater 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.

### End of the safety data sheet