Quicklime Range

Singleton Birch

Prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

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APPENDIX: EXPOSURE SCENARIOS

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

Methodology used for environmental exposure assessment

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

1) Industrial uses (local scale)

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

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

2) Professional uses (local scale)

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

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

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Methodology used for occupational exposure assessment

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

For workers, the repeated dose DNEL for inhalation as well as the acute DNEL for inhalation are based on the respective recommendations of the scientific committee on occupational exposure limits (SCOEL) being 1 mg/m³ and 4 mg/m³, respectively.

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

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

Methodology used for consumer exposure assessment

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

For consumers, the repeated dose DNEL for inhalation as well as the acute DNEL for inhalation are based on the respective recommendations of the Scientific Committee on Occupational Exposure Limits (SCOEL), being 1 mg/m³ and 4 mg/m³, 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 μ g/hr or 0.25 μ 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 μ g/hr. To convert these values in mg/m³ a default value of 1.25 m³/hr for the breathing volume under light working conditions will be assumed (van Hemmen, 1992) giving 12 μ g/m³ for small tasks and 120 μ g/m³ for larger tasks.

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

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

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

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

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

			lde use	ntifi es		Resultin g life cycle stage	Identified Use	e de la companya de la		Process	Article	Environmental
ES number	Exposure scenario title	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	x	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
9.3	Manufacture and industrial uses of medium dusty solids/powders of lime substances	x	x	x		x	3	3; 1, 2a, 2b, 4, 5, 6a, 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, 8, 10, 11, 13	1, 2, 3, 4, 5, 6a, 6b, 6c, 6d, 7, 12a, 12b, 10a, 10b, 11a, 11b

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		re o title			Process	Article	Environmental					
ES number	Exposure scenario title	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)
9.4	Manufacture and industrial uses of high dusty solids/powders of lime substances	x	x	x		x		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	6c, 6d, 7, 12a, 12b,
9.5	Manufacture and industrial uses of massive objects containing lime substances	x	x	x		x	5	3; 1, 2a, 2b, 4, 5, 6a, 6b, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 23, 24	1, 2, 3, 7, 8, 9a, 9b, 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	6c, 6d, 7, 12a, 12b,
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

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				Identified uses		Resultin g life cycle stage	ied Use					F actorian and a l
ES number	Exposure scenario title	Manufacture	Formulation	End use	Consumer	Service life (for articles)	Linked to Identified Use	Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article categor y (AC)	Environmental release category (ERC)
9.7	Professional uses of low dusty solids/powders of lime substances		x	x		x	7	22; 1, 5, 6a, 6b, 7, 10, 11, 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		x	8	22; 1, 5, 6a, 6b, 7, 10, 11, 12, 13, 16, 17, 18, 19, 20, 23, 24	1, 2, 3, 7, 8, 9a, 9b, 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
9.9	Professional uses of high dusty solids/powders of lime substances		x	x		х	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

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

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			Identified uses		Resultin g life cycle stage			Chamical Product	Process	Article	Environmental	
ES number	Exposure scenario title	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)
9.14	Consumer use of garden lime/fertilizer				x		Х	21	20, 12			8e
9.15	Consumer use of lime substances as water treatment chemicals in aquaria				x		х	21	20, 37			8
9.16	Consumer use of cosmetics containing lime substances				x		x	21	39			8

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

Exposure Scenario	o Format (1) addressing uses carried ou	ut by workers						
1. Title								
Free short title	Manufacture and industrial uses of a	aqueous solutions 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 cov	ered are described in Section 2 below.						
Assessment Method	The assessment of inhalation exposure is ba	ased on the exposure estimation tool MEASE.						
2. Operational con	ditions and risk management measures	3						
PROC/ERC	REACH definition	Involved tasks						
PROC 1	Use in closed process, no likelihood of exposure							
PROC 2	Use in closed, continuous process with occasional controlled exposure							
PROC 3	Use in closed batch process (synthesis or formulation)							
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises							
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)							
PROC 7	Industrial spraying							
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities							
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities							
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	Further information is provided in the ECHA Guidance on information requirements and chemical safety assessment, Chapter R.12: Use						
PROC 10	Roller application or brushing	descriptor system (ECHA-2010-G-05-EN).						
PROC 12	Use of blowing agents in manufacture of foam							
PROC 13	Treatment of articles by dipping and pouring							
PROC 14	Production of preparations or articles by tabletting, compression, extrusion, pelletisation							
PROC 15	Use as laboratory reagent							
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected							
PROC 17	Lubrication at high energy conditions and in partly open process							
PROC 18	Greasing at high energy conditions							
PROC 19	Hand-mixing with intimate contact and only PPE available							
ERC 1-7, 12	Manufacture, formulation and all types of industrial uses							

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ERC 10, 11			Wide-dispersive outdoor and indoor use of long- life articles and materials								
2.1 Control of worl											
Product characteristic											
According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. This is reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substances at ambient temperature the fugacity is based on the dustiness of that substance. Whereas in hot metal operations, fugacity is temperature based, taking into account the process temperature and the melting point of the substance. As a third group, high abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. The spraying of aqueous solutions (PROC7 and 11) is assumed to be involved with a medium emission.											
PROC	Used in preparation?	Jsed in preparation? Content in preparation Physical form Emission potential									
PROC 7	not res	stricted	aqueous solution	medium							
All other applicable PROCs	not res	stricted	aqueous solution	very low							
Amounts used											
combination of the scale	he actual tonnage handled per shift is not considered to influence the exposure as such for this scenario. Instead, the ombination of the scale of operation (industrial vs. Professional) and level of containment/automation (as reflected in the ROC) is the main determinant of the process intrinsic emission potential.										
Frequency and duratio	n of use/exposure	f use/exposure									
PROC	Duration of exposure										
PROC 7	≤ 240 minutes										
All other applicable PROCs	All other applicable PROCs 480 minutes (not restricted)										
Human factors not influ	Human factors not influenced by risk management										
The shift breathing volun	ne during all process steps	reflected in the PROCs is	assumed to be 10 m ³ /shift	t (8 hours).							
	I conditions affecting wo										
	s are not used in hot-me ot considered relevant for c										
Technical conditions a	nd measures at process	level (source) to prevent	release								
Risk management meas required in the processes	sures at the process level s.	(e.g. containment or seg	regation of the emission s	ource) are generally not							
Technical conditions a	nd measures to control c	lispersion from source to	owards 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	local exhaust ventilation	78 %								
PROC 19	above under "Frequency and duration of exposure". A reduction of exposure duration can be above under not applicable na 										
All other applicable PROCs	achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with relevant exposure.	not required	na								

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Organisational measures to prevent /limit releases, dispersion and exposure

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

Conditions and measur	res related to personal p	rotection, hygiene and h	ealth 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 oxide is classified as irritating to	Eye protection equipment (e.g. goggles or visors) must be worn, unless potential contact with the eye can be excluded by the nature							
All other applicable PROCs	not required	skin, the use of excl protective gloves is and mandatory for all (i.e process steps. A									
Any RPE as defined above shall only be worn if the following principles are implemented in parallel: The duration of work (compare with "duration of exposure" above) should reflect the additional physiological stress for the worker due to the breathing resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the wearing of RPE. For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the face properly and securely. The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and their correct use in the workplace. Therefore, they should define and document a suitable policy for a respiratory protective device programme including training of the workers. An overview of the APFs of different RPE (according to BS EN 529:2005) can be found in the glossary of MEASE.											
	ronmental exposure										
Amounts used											
The daily and annual a exposure.	mount per site (for point	sources) is not consider	ed to be the main deterr	ninant for environmental							
Frequency and duration	n of use										
Intermittent (< 12 time pe	er year) or continuous use/	release									
Environment factors no	ot influenced by risk mar	agement									
Flow rate of receiving su	rface water: 18000 m³/day										
Other given operationa	I conditions affecting en	vironmental exposure									
Effluent discharge rate: 2	2000 m³/day										
Technical onsite condit	tions and measures to re	duce or limit discharges	, air emissions and relea	ises to soil							
surface water, in case su introduction into open wa waters are minimised (e. This is also reflected in th	ich discharges are expecte aters is required. In genera g. through neutralisation).	ed to cause significant pH I discharges should be can In general most aquatic or OECD tests with aquatic o	ging lime solutions into mu changes. Regular control c rried out such that pH char ganisms can tolerate pH v organisms. The justification	of the pH value during nges in receiving surface alues in the range of 6-9.							
Conditions and measur	res related to waste										
Solid industrial waste of	lime should be reused or d	ischarged to the industrial	wastewater and further ne	eutralized if needed.							

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3. Exposure estimation and reference to its source

Occupational exposure

The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium oxide of 1 mg/m³ (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.

auditional safety margins		n being a sub-fraction of th	le initialable fraction accord	ang to EN 461.							
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	3, MEASE <pre>< 1 mg/m³ (0.001 - as technically feasible. A DNEL for dermal effects</pre>										
Environmental exposur	e										
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 emissions emissions or exposure to assessment for the aqua related to the OH- dischar	stance in the different life- nt only deal with the effect icity of Ca2+ is expected t ng municipal sewage treatu production and industrial er solubility and very low v ons or exposure to air are to the terrestrial environmer tic environment will therefore	cycle stages (production a con organisms/ecosystems o be negligible compared ment plants (STPs) or indu use as any effects that mi vapour pressure indicate th not expected due to the lo not expected due to the lo that are not expected either f pre only deal with the poss	ronment, when applicable ind use) mainly apply to (we s due to possible pH chang to the (potential) pH effect. ustrial waste water treatme ght occur would be expected at lime substance will be for w vapour pressure of lime for this exposure scenario. ible pH changes in STP effect approached by assessing	aste) water. The aquatic ges related to OH- Only the local scale is nt plants (WWTPs) ed to take place on a ound predominantly in substance. Significant The exposure fluent and surface water							
Environmental emissions	The production of lime substance can potentially result in an aquatic emission and locally increase the lime substance concentration and affect the pH in the aquatic environment. When the pH is not neutralised, the discharge of effluent from lime substance 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 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 on negligible. When lime is no capacity of the water. The general the buffer capacity of the suffer capacity of th	emitted to surface water, s rejected to surface water, t e higher the buffer capacit ty preventing shifts in acid	orption to particulate matte the pH may increase, depe y of the water, the lower th ity or alkalinity in natural w arbonate ion (HCO3-) and t	nding on the buffer e effect on pH will be. In aters is regulated by the							
Exposure concentration in sediments			S, because it is not consid equatic compartment, sorpt								
Exposure concentrations in soil and groundwater	be relevant.		exposure scenario, becaus	-							
Exposure concentration in atmospheric compartment	The air compartment is not included in this CSA because it is considered not relevant for lime substance: when emitted to air as an aerosol in water, lime substance 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 lime substance largely end up in soil and water.										
Exposure concentration relevant for the food chain (secondary poisoning)	Bioaccumulation in orgar poisoning is therefore no		ne substance: a risk asses	sment for secondary							

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

Occupational exposure

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

(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 site as "high dusty".

DNEL_{inhalation}: 1 mg/m³ (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/m³. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).

Environmental exposure

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

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

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

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

Where:

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

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

pH effluent refers to the pH of the effluent

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

Please note that initially, default values can be used:

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

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

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

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

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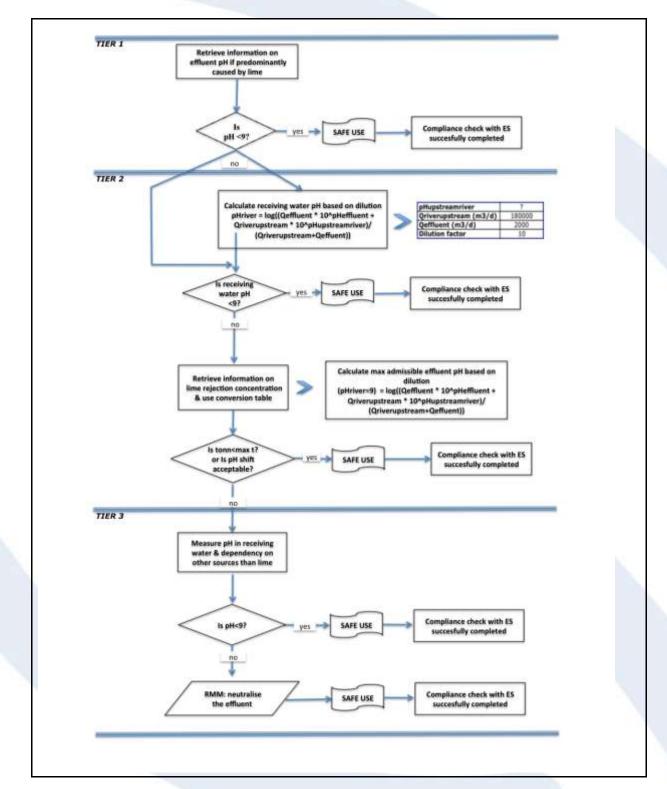
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ES number 9.2: Manufacture and industrial uses of low dusty solids/powders of lime substances

	Format (1) addressing uses carried ou									
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 cov	Processes, tasks and/or activities covered are described in Section 2 below.								
Assessment Method	The assessment of inhalation exposure is ba	ased on the exposure estimation tool MEASE.								
2. Operational con	ditions and risk management measures	8								
PROC/ERC	REACH definition	Involved tasks								
PROC 1	Use in closed process, no likelihood of exposure									
PROC 2	Use in closed, continuous process with occasional controlled exposure									
PROC 3	Use in closed batch process (synthesis or formulation)									
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises									
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)									
PROC 6	Calendering operations									
PROC 7	Industrial spraying									
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities									
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities	Further information is provided in the ECHA Guidance on information requirements and								
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	chemical safety assessment, Chapter R.12: Use descriptor system (ECHA-2010-G-05-EN).								
PROC 10	Roller application or brushing									
PROC 13	Treatment of articles by dipping and pouring									
PROC 14	Production of preparations or articles by tabletting, compression, extrusion, pelletisation									
PROC 15	Use as laboratory reagent									
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected									
PROC 17	Lubrication at high energy conditions and in partly open process									
PROC 18	Greasing at high energy conditions									
PROC 19	Hand-mixing with intimate contact and only PPE available									
PROC 21	Low energy manipulation of substances bound in									

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

Frequency and duration of use/exposure

PROC	Duration of exposure
PROC 22	≤ 240 minutes
All other applicable PROCs	480 minutes (not restricted)

Human factors not influenced by risk management

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

Other given operational conditions affecting workers exposure

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

Technical conditions 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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		Localised controls	Efficiency of LC	
PROC	Level of separation	(LC)	(according to MEASE)	Further information
PROC 7, 17, 18	Any potentially required separation of workers from the emission	general ventilation	17 %	-
PROC 19	source is indicated above under	not applicable	na	
PROC 22, 23, 24, 25, 26, 27a	"Frequency and duration of exposure".	local exhaust ventilation	78 %	-
All other applicable PROCs	A reduction of exposure duration can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with relevant exposure.	not required	na	
Organisational measur	res to prevent /limit releas	ses, dispersion and expo	sure	
Shower and change clo compressed air.	the workplace, the wearin othes at end of work shift res related to personal pr	a. Do not wear contamina	ated clothing at home. Do	
PROC	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further personal protective equipmer (PPE)
				Eye protection
PROC 22, 24, 27a	FFP1 mask	APF=4		equipment (e.g. goggles or visors) mu
PROC 22, 24, 27a All other applicable PROCs	FFP1 mask	APF=4	Since calcium oxide 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 natur and type of applicatio (i.e. closed process). Additionally, face protection, protective clothing and safety shoes are required to
All other applicable PROCs Any RPE as defined abore (compare with "duration resistance and mass of it considered that the work For reasons as given ab the use of RPE), (ii) have hair). The recommended contours of the face prop The employer and self-e devices and the manage policy for a respiratory p	not required ove shall only be worn if the of exposure" above) should the RPE itself, due to the in cer's capability of using tool ove, the worker should the e suitable facial characteris d devices above which rely perly and securely. employed persons have leg- ement of their correct use in rotective device programm	na following principles are in d reflect the additional phy creased thermal stress by s and of communicating a refore be (i) healthy (espec tics reducing leakages bet on a tight face seal will no al responsibilities for the m the workplace. Therefore e including training of the v	classified as irritating to skin, the use of protective gloves is mandatory for all process steps. nplemented in parallel: The siological stress for the wo enclosing the head. In ad re reduced during the wea cially in view of medical pro- tween face and mask (in v t provide the required prot- naintenance and issue of re , they should define and do workers.	goggles or visors) mu be worn, unless potential contact with the eye can be excluded by the natur and type of applicatio (i.e. closed process) Additionally, face protection, protective clothing and safety shoes are required to be worn as appropriate e duration of work rker due to the breathin dition, it shall be ring of RPE. oblems that may affect iew of scars and facial ection unless they fit th espiratory protective pocument a suitable
All other applicable PROCs Any RPE as defined abc (compare with "duration resistance and mass of to considered that the work For reasons as given ab the use of RPE), (ii) hav hair). The recommended contours of the face prop The employer and self-ed devices and the manage policy for a respiratory p An overview of the APEs	not required pove shall only be worn if the of exposure" above) should the RPE itself, due to the in cer's capability of using tool ove, the worker should the e suitable facial characteris d devices above which rely perly and securely. employed persons have leg- ement of their correct use in	na following principles are in d reflect the additional physic reased thermal stress by s and of communicating a refore be (i) healthy (espec- tics reducing leakages bef on a tight face seal will no al responsibilities for the m the workplace. Therefore e including training of the v ig to BS EN 529:2005) car	classified as irritating to skin, the use of protective gloves is mandatory for all process steps. nplemented in parallel: The siological stress for the wo enclosing the head. In ad re reduced during the wea cially in view of medical pro- tween face and mask (in v t provide the required prot- naintenance and issue of re , they should define and do workers.	goggles or visors) mu be worn, unless potential contact with the eye can be excluded by the natur and type of applicatio (i.e. closed process) Additionally, face protection, protective clothing and safety shoes are required to be worn as appropriate e duration of work rker due to the breathin dition, it shall be ring of RPE. oblems that may affect iew of scars and facial ection unless they fit th espiratory protective pocument a suitable
All other applicable PROCs Any RPE as defined abc (compare with "duration resistance and mass of to considered that the work For reasons as given ab the use of RPE), (ii) hav hair). The recommended contours of the face prop The employer and self-ed devices and the manage policy for a respiratory p An overview of the APEs	not required pove shall only be worn if the of exposure" above) should the RPE itself, due to the in cer's capability of using tool ove, the worker should the e suitable facial characteris d devices above which rely perly and securely. employed persons have leg- ment of their correct use in rotective device programm- s of different RPE (accordin	na following principles are in d reflect the additional physic reased thermal stress by s and of communicating a refore be (i) healthy (espec- tics reducing leakages bef on a tight face seal will no al responsibilities for the m the workplace. Therefore e including training of the v ig to BS EN 529:2005) car	classified as irritating to skin, the use of protective gloves is mandatory for all process steps. nplemented in parallel: The siological stress for the wo enclosing the head. In ad re reduced during the wea cially in view of medical pro- tween face and mask (in v t provide the required prot- naintenance and issue of re , they should define and do workers.	goggles or visors) mu be worn, unless potential contact wit the eye can be excluded by the natu and type of applicatio (i.e. closed process) Additionally, face protection, protectiv, clothing and safety shoes are required t be worn as appropria e duration of work rker due to the breathi dition, it shall be ring of RPE. oblems that may affect iew of scars and facial ection unless they fit th espiratory protective pocument a suitable

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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.

3. Exposure estimation and reference to its source

Occupational exposure

The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium oxide of 1 mg/m³ (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.

PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)
PROC 1, 2, 3, 4, 5, 6, 7, 8a, 8b, 9, 10, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 25, 26, 27a,	MEASE	<1 mg/m³ (0.01 – 0.83)	as technically feasible. A	classified as irritating to as to be minimised as far DNEL for dermal effects hus, dermal exposure is
27b			not assessed in this	· ·

Environmental emissions

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

Environmental emissions	The production of calcium oxide can potentially result in an aquatic emission and locally increase the calcium oxide concentration and affect the pH in the aquatic environment. When the pH is not neutralised, the discharge of effluent from calcium oxide production sites may impact the pH in the receiving water. The pH of effluents is normally measured very frequently and can be neutralised easily as often required by national laws.
Exposure	Waste water from calcium oxide production is an inorganic wastewater stream and therefore there is
concentration in	no biological treatment. Therefore, wastewater streams from calcium oxide production sites will
waste water treatment	
plant (WWTP)	control of acid wastewater streams that are treated in biological WWTPs.

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Exposure concentration in aquatic pelagic compartment	When calcium oxide is emitted to surface water, sorption to particulate matter and sediment will be negligible. When lime is rejected to surface water, the pH may increase, depending on the buffer capacity of the water. The higher the buffer capacity of the water, the lower the effect on pH will be. In general the buffer capacity preventing shifts in acidity or alkalinity in natural waters is regulated by the equilibrium between carbon dioxide (CO2), the bicarbonate ion (HCO3-) and the carbonate ion (CO32-).
Exposure concentration in sediments	The sediment compartment is not included in this ES, because it is not considered relevant for calcium oxide: when calcium oxide is emitted to the aquatic compartment, sorption to sediment particles is negligible.
Exposure concentrations in soil and groundwater	The terrestrial compartment is not included in this exposure scenario, because it is not considered to be relevant.
Exposure concentration in atmospheric compartment	The air compartment is not included in this CSA because it is considered not relevant for calcium oxide: when emitted to air as an aerosol in water, calcium oxide is neutralised as a result of its reaction with CO2 (or other acids), into HCO3- and Ca2+. Subsequently, the salts (e.g. calcium(bi)carbonate) are washed out from the air and thus the atmospheric emissions of neutralised calcium oxide largely end up in soil and water.
Exposure concentration relevant for the food chain (secondary poisoning)	Bioaccumulation in organisms is not relevant for calcium oxide: a risk assessment for secondary poisoning is therefore not required.

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

Occupational exposure

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 dustinesy.

DNEL_{inhalation}: 1 mg/m³ (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/m³. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).

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Environmental exposure

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

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

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

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

Where:

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

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

pH effluent refers to the pH of the effluent

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

Please note that initially, default values can be used:

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

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

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

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

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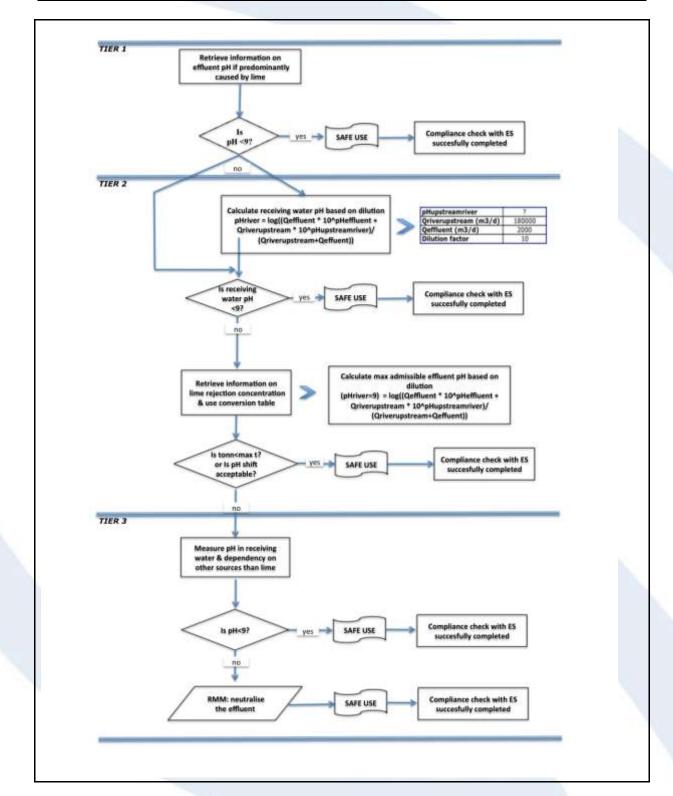


Quicklime Range

Prepared in accordance with Annex II of the REACH Regulation EC 1907/2006, Regulation (EC) 1272/2008 and Regulation (EC) 453/2010

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

Exposure Scenario	Format (1) addressing uses carried ou	It by workers	
1. Title			
Free short title	Manufacture and industrial uses of mediur	m dusty solids/powders of lime substances	
Systematic title based on use descriptor	SU3, SU1, SU2a, SU2b, SU4, SU5, SU6a, SU6b, SU7, SU8, SU9, SU10, SU11, SU12, SU13, SU14, SU15, SU16, SU17, SU18, SU19, SU20, SU23, SU24 PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18, PC19, PC20, PC21, PC23, PC24, PC25, PC26, PC27, PC28, PC29, PC30, PC31, PC32, PC33, PC34, PC35, PC36, PC37, PC38, PC39, PC40 AC1, AC2, AC3, AC4, AC5, AC6, AC7, AC8, AC10, AC11, AC13 (appropriate PROCs and ERCs are given in Section 2 below)		
Processes, tasks and/or activities covered	Processes, tasks and/or activities covered are described in Section 2 below.		
Assessment Method	The assessment of inhalation exposure is ba	sed on the exposure estimation tool MEASE.	
2. Operational con	ditions and risk management measures	6	
PROC/ERC	REACH definition	Involved tasks	
PROC 1	Use in closed process, no likelihood of exposure		
PROC 2	Use in closed, continuous process with occasional controlled exposure		
PROC 3	Use in closed batch process (synthesis or formulation)		
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises		
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)		
PROC 7	Industrial spraying		
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities		
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities	Further information is provided in the ECHA	
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	Guidance on information requirements and chemical safety assessment, Chapter R.12: Use descriptor system (ECHA-2010-G-05-EN).	
PROC 10	Roller application or brushing		
PROC 13	Treatment of articles by dipping and pouring		
PROC 14	Production of preparations or articles by tabletting, compression, extrusion, pelletisation		
PROC 15	Use as laboratory reagent		
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected		
PROC 17	Lubrication at high energy conditions and in partly open process		
PROC 18	Greasing at high energy conditions		
PROC 19	Hand-mixing with intimate contact and only PPE available		
PROC 22	Potentially closed processing operations with minerals/metals at elevated temperature Industrial setting		

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

2.1 Control of workers exposure

Product characteristic

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

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

Human factors not influenced by risk management

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

Other given operational conditions affecting workers exposure

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

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

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

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PROC	Level of separation	Localised controls (LC)	Efficiency of LC (according to MEASE)	Further information
PROC 1, 2, 15, 27b	Any potentially required	not required	na	
PROC 3, 13, 14	separation of workers from the emission	general ventilation	17 %	-
PROC 19	source is indicated	not applicable	na	_
	above under "Frequency and duration of exposure". A reduction of exposure		Ild	
All other applicable PROCs	duration can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with relevant exposure.	local exhaust ventilation	78 %	
Organisational measur	es to prevent /limit releas	ses, dispersion and expo	osure	
Shower and change clo compressed air.	the workplace, the wearin othes at end of work shift res related to personal pr	t. Do not wear contamina	ated clothing at home. Do	
PROC	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further personal protective equipmer (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) mus
All other applicable PROCs	not required	na	Since calcium oxide is classified as irritating to skin, the use of protective gloves is mandatory for all process steps.	be worn, unless potential contact with the eye can be excluded by the naturn 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	ve shall only be worn if the	tollouring principles are in	nniamantad in narallal. The	duration of work
(compare with "duration resistance and mass of t considered that the work For reasons as given ab the use of RPE), (ii) have hair). The recommended contours of the face prop The employer and self-en devices and the manage policy for a respiratory pr	of exposure" above) should the RPE itself, due to the in- ter's capability of using tool ove, the worker should the e suitable facial characteris d devices above which rely perly and securely. mployed persons have leg- ment of their correct use in rotective device programment	d reflect the additional phy hcreased thermal stress by Is and of communicating a refore be (i) healthy (espe- stics reducing leakages be on a tight face seal will no al responsibilities for the m in the workplace. Therefore e including training of the w	siological stress for the wo renclosing the head. In ad- re reduced during the wea cially in view of medical pro- tween face and mask (in vi- t provide the required proto- naintenance and issue of re- t, they should define and do- workers.	rker due to the breathin dition, it shall be ring of RPE. bblems that may affect ew of scars and facial ection unless they fit the espiratory protective ocument a suitable
(compare with "duration resistance and mass of t considered that the work For reasons as given abo the use of RPE), (ii) have hair). The recommended contours of the face prop The employer and self-end devices and the manage policy for a respiratory pr An overview of the APFs	of exposure" above) should the RPE itself, due to the in- ter's capability of using tool ove, the worker should the e suitable facial characteris d devices above which rely berly and securely. mployed persons have leg- ement of their correct use in	d reflect the additional phy hcreased thermal stress by Is and of communicating a refore be (i) healthy (espe- stics reducing leakages be on a tight face seal will no al responsibilities for the m in the workplace. Therefore e including training of the ing to BS EN 529:2005) car	siological stress for the wo renclosing the head. In ad- re reduced during the wea cially in view of medical pro- tween face and mask (in vi- t provide the required proto- naintenance and issue of re- t, they should define and do- workers.	rker due to the breathin dition, it shall be ring of RPE. bblems that may affect ew of scars and facial ection unless they fit the espiratory protective ocument a suitable
(compare with "duration resistance and mass of t considered that the work For reasons as given abo the use of RPE), (ii) have hair). The recommended contours of the face prop The employer and self- devices and the manage policy for a respiratory pr An overview of the APFs	of exposure" above) should the RPE itself, due to the in- ter's capability of using tool ove, the worker should the e suitable facial characteris d devices above which rely berly and securely. mployed persons have leg- ment of their correct use in- rotective device programme s of different RPE (according	d reflect the additional phy hcreased thermal stress by Is and of communicating a refore be (i) healthy (espe- stics reducing leakages be on a tight face seal will no al responsibilities for the m in the workplace. Therefore e including training of the ing to BS EN 529:2005) car	siological stress for the wo renclosing the head. In ad- re reduced during the wea cially in view of medical pro- tween face and mask (in vi- t provide the required proto- naintenance and issue of re- t, they should define and do- workers.	rker due to the breathi dition, it shall be ring of RPE. bblems that may affect ew of scars and facial ection unless they fit th espiratory protective ocument a suitable

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Quicklime Range



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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.

3. Exposure estimation and reference to its source

Occupational exposure

The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium oxide of 1 mg/m³ (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.

PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)
PROC 1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 13, 14, 15, 16, 17, 18, 19, 22, 23, 24, 25, 26, 27a, 27b	MEASE	< 1 mg/m³ (0.01 – 0.88)	skin, dermal exposure ha as technically feasible. A	classified as irritating to as to be minimised as far DNEL for dermal effects hus, dermal exposure is exposure scenario.

Environmental emissions

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

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

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When calcium oxide is emitted to surface water, sorption to particulate matter and sediment will be negligible. When lime is rejected to surface water, the pH may increase, depending on the buffer capacity of the water. The higher the buffer capacity of the water, the lower the effect on pH will be. In general the buffer capacity preventing shifts in acidity or alkalinity in natural waters is regulated by the equilibrium between carbon dioxide (CO2), the bicarbonate ion (HCO3-) and the carbonate ion (CO32–).
The sediment compartment is not included in this ES, because it is not considered relevant for calcium oxide: when calcium oxide is emitted to the aquatic compartment, sorption of to sediment particles is negligible.
The terrestrial compartment is not included in this exposure scenario, because it is not considered to be relevant.
The air compartment is not included in this CSA because it is considered not relevant for calcium oxide: when emitted to air as an aerosol in water, calcium oxide is neutralised as a result of its reaction with CO2 (or other acids), into HCO3- and Ca2+. Subsequently, the salts (e.g. calcium(bi)carbonate) are washed out from the air and thus the atmospheric emissions of neutralised calcium oxide largely end up in soil and water.
Bioaccumulation in organisms is not relevant for calcium oxide: a risk assessment for secondary poisoning is therefore not required.

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

Occupational exposure

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 dustinesy.

DNEL_{inhalation}: 1 mg/m³ (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/m³. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).

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Environmental exposure

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

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

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

$$pHriver = Log \boxed{\frac{Qeffluent * 10^{pHeffluent} + Qriverupstream * 10^{pHupstream}}{Qriverupstream + Qeffluent}}$$
Eq 1)

Where:

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

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

pH effluent refers to the pH of the effluent

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

Please note that initially, default values can be used:

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

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

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

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

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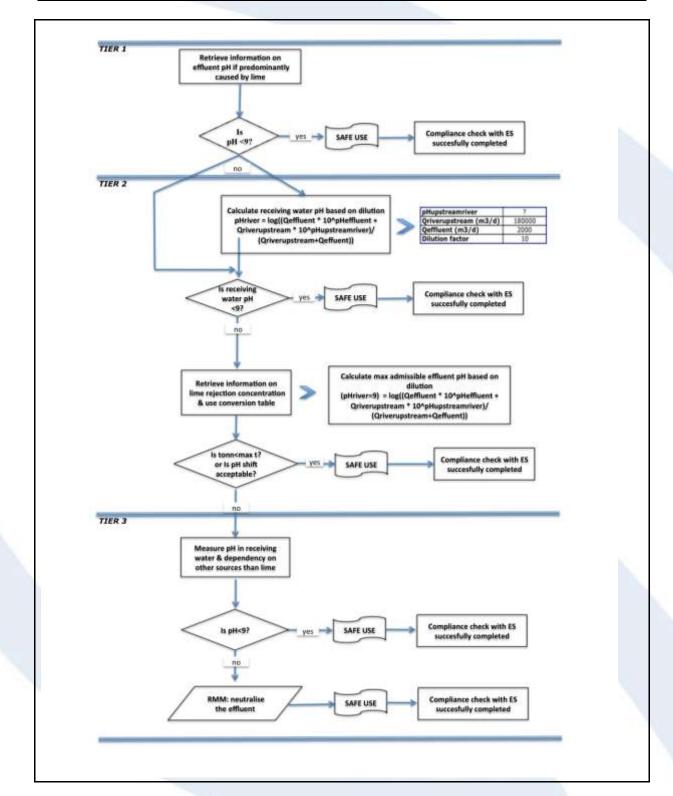


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ES number 9.4: Manufacture and industrial uses of high dusty solids/powders of lime substances

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



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PROC 23	Open processing and t	ransfer operations with levated temperature		
PROC 24	High (mechanical) energ	y work-up of substances		
PROC 25	Other hot work ope			
PROC 26	•	ic substances at ambient		
PROC 27a	· · · · · ·	wders (hot processes)		
PROC 27b	Production of metal po	wders (wet processes)		
ERC 1-7, 12	Manufacture, formula industri	ation and all types of al uses		
ERC 10, 11	Wide-dispersive outdoor life articles a			
2.1 Control of work	ers exposure			
Product characteristic				
reflected by an assignme ambient temperature the temperature based, takin	approach, the substance- ent of a so-called fugacity of fugacity is based on the d g into account the process on the level of abrasion in	lass in the MEASE tool. F ustiness of that substance temperature and the mel nstead of the substance in	or operations conducted w . Whereas in hot metal op ting point of the substance	<i>i</i> th solid substances at erations, fugacity is
PROC	Used in preparation?	Content in preparation	Physical form	Emission potential
PROC 22, 23, 25, 27a	not res	stricted	solid/powder, molten	high
All other applicable PROCs	not res	stricted	solid/powder	high
Amounts used				
combination of the scale	led per shift is not conside of operation (industrial vs. minant of the process intrir	Professional) and level of		
Frequency and duration	n of use/exposure			
PROC		Duration o	f exposure	
PROC 7, 8a, 17, 18, 19, 22	≤ 240 minutes			
All other applicable PROCs	480 minutes (not restricted)			
Human factors not influ	enced by risk managem	ent		
The shift breathing volum	ne during all process steps	reflected in the PROCs is	assumed to be 10 m ³ /shif	t (8 hours).
Other given operationa	I conditions affecting wo	rkers exposure		
assessment of the conductive exposure assessment in temperatures are expected.	te process temperature an inted processes. In process MEASE is however based ed to vary within the indust ess temperatures are autor	s steps with considerably l on the ratio of process ter ry the highest ratio was ta	high temperatures (i.e. PR mperature and melting poi ken as a worst case assur	OC 22, 23, 25), the nt. As the associated nption for the exposure
Technical conditions a	nd measures at process	level (source) to prevent	release	
Risk management measurequired in the processes	ures at the process level (e s.	e.g. containment or segreg	ation of the emission sour	ce) are generally not

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	nd measures to control c	lispersion from source to	owards the worker	
PROC	Level of separation	Localised controls (LC)	Efficiency of LC (according to MEASE)	Further information
PROC 1	Any potentially required	not required	na	-
PROC 2, 3	separation of workers	general ventilation	17 %	-
PROC 7	from the emission source is indicated	integrated local exhaust ventilation	84 %	
PROC 19	above under "Frequency and	not applicable	na	-
All other applicable PROCs	duration of exposure". A reduction of exposure duration can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with relevant exposure.	local exhaust ventilation	78 %	
Avoid inhalation or inges These measures involve eating and smoking at th Shower and change cloth compressed air.	good personal and house e workplace, the wearing of	hygiene measures are rec keeping practices (i.e. reg of standard working clothes o not wear contaminated c	quired to ensure a safe har ular cleaning with suitable s and shoes unless otherw lothing at home. Do not blo	cleaning devices), no ise stated below.
Conditions and measu				
PROC	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further personal protective equipment (PPE)
PROC 1, 2, 3, 23, 25, 27b	not required	na		Eye protection equipment (e.g.
PROC 4, 5, 7, 8a, 8b, 9, 17, 18,	FFP2 mask	APF=10		goggles or visors) mus be worn, unless
PROC 10, 13, 14, 15, 16, 22, 24, 26, 27a	FFP1 mask	APF=4	Since calcium oxide is classified as irritating to	potential contact with the eye can be
PROC 19	FFP3 mask	APF=20	skin, the use of protective gloves is mandatory for all process steps.	excluded by the nature and type of application (i.e. closed process). Additionally, face protection, protective clothing and safety shoes are required to be worn as appropriate
resistance and mass of t considered that the work For reasons as given abo the use of RPE), (ii) have hair). The recommended contours of the face prop The employer and self-e	he RPE itself, due to the ir er's capability of using tool ove, the worker should the e suitable facial characteris I devices above which rely perly and securely. mployed persons have leg	acreased thermal stress by a and of communicating a refore be (i) healthy (espe- stics reducing leakages be on a tight face seal will no al responsibilities for the m	siological stress for the wo v enclosing the head. In ad- ire reduced during the wea- cially in view of medical pro- tween face and mask (in v tween face and mask (in v to provide the required proto- naintenance and issue of re- ta, they should define and durations	dition, it shall be ring of RPE. oblems that may affect iew of scars and facial ection unless they fit the espiratory protective

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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.

3. Exposure estimation and reference to its source

Occupational exposure

The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium oxide of 1 mg/m³ (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.

PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)
PROC 1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 13, 14, 15, 16, 17, 18, 19, 22, 23, 24, 25, 26, 27a, 27b	MEASE	<1 mg/m³ (0.01 – 0.96)	Since calcium oxide is classified as irritating to skin, dermal exposure has to be minimised as fa as technically feasible. A DNEL for dermal effec has not been derived. Thus, dermal exposure i not assessed in this exposure scenario.	

Environmental emissions

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

Environmental emissions calcium oxide concentration and affect the pH in the aquatic environment. When the pH is not neutralised, the discharge of effluent from calcium oxide production sites may impact the pH in the receiving water. The pH of effluents is normally measured very frequently and can be neutralised easily as often required by national laws. Exposure concentration in waste water treatment Waste water from calcium oxide production is an inorganic wastewater stream and therefore there is no biological treatment. Therefore, wastewater streams from calcium oxide production sites will normally not be treated in biological waste water treatment plants (WWTPs), but can be used for pH	plant (WWTP)	control of acid wastewater streams that are treated in biological WWTPs.
Environmental emissionsneutralised, the discharge of effluent from calcium oxide production sites may impact the pH in the receiving water. The pH of effluents is normally measured very frequently and can be neutralised easily as often required by national laws.ExposureWaste water from calcium oxide production is an inorganic wastewater stream and therefore there is		
emissions neutralised, the discharge of effluent from calcium oxide production sites may impact the pH in the receiving water. The pH of effluents is normally measured very frequently and can be neutralised	Exposure	
The production of calcium oxide can potentially result in an aquatic emission and locally increase the		calcium oxide concentration and affect the pH in the aquatic environment. When the pH is not neutralised, the discharge of effluent from calcium oxide production sites may impact the pH in the receiving water. The pH of effluents is normally measured very frequently and can be neutralised

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Exposure concentration in aquatic pelagic compartment	When calcium oxide is emitted to surface water, sorption to particulate matter and sediment will be negligible. When lime is rejected to surface water, the pH may increase, depending on the buffer capacity of the water. The higher the buffer capacity of the water, the lower the effect on pH will be. In general the buffer capacity preventing shifts in acidity or alkalinity in natural waters is regulated by the equilibrium between carbon dioxide (CO2), the bicarbonate ion (HCO3-) and the carbonate ion (CO32-).
Exposure concentration in sediments	The sediment compartment is not included in this ES, because it is not considered relevant for calcium oxide: when calcium oxide is emitted to the aquatic compartment, sorption of to sediment particles is negligible.
Exposure concentrations in soil and groundwater	The terrestrial compartment is not included in this exposure scenario, because it is not considered to be relevant.
Exposure concentration in atmospheric compartment	The air compartment is not included in this CSA because it is considered not relevant for calcium oxide: when emitted to air as an aerosol in water, calcium oxide is neutralised as a result of its reaction with CO2 (or other acids), into HCO3- and Ca2+. Subsequently, the salts (e.g. calcium(bi)carbonate) are washed out from the air and thus the atmospheric emissions of neutralised calcium oxide largely end up in soil and water.
Exposure concentration relevant for the food chain (secondary poisoning)	Bioaccumulation in organisms is not relevant for calcium oxide: a risk assessment for secondary poisoning is therefore not required.

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

Occupational exposure

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 dustinesy.

DNEL_{inhalation}: 1 mg/m³ (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/m³. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).

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Environmental exposure

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

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

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

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

Where:

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

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

pH effluent refers to the pH of the effluent

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

Please note that initially, default values can be used:

- Q river upstream flows: use the 10th of existing measurements distribution or use default value of 18000 $\rm m^{3}/day$
- 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 modified where information is available). Maximum load of lime that can be annually rejected without negatively affecting the pH of the receiving water is calculated assuming chemical equilibrium. OH- expressed as moles/litre are multiplied by average flow of the effluent and then divided by the molar mass of the calcium oxide.

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

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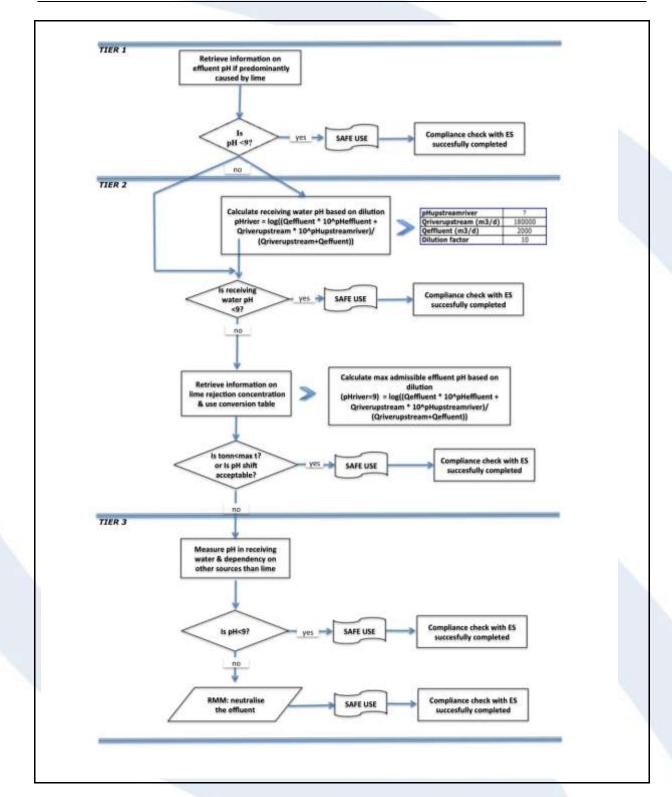


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ES number 9.5: Manufacture and industrial uses of massive objects containing lime substances

Exposure Scenario	Format (1) address	ing uses carried or	it by workers		
1. Title	, i office (1) address				
Free short title	Manufacture and industrial uses of massive objects containing lime substances				
Systematic title based on use descriptor	SU3, SU1, SU2a, SU2b, SU4, SU5, SU6a, SU6b, SU7, SU8, SU9, SU10, SU11, SU12, SU13, SU14, SU15, SU16, SU17, SU18, SU19, SU20, SU23, SU24 PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18, PC19, PC20, PC21, PC23, PC24, PC25, PC26, PC27, PC28, PC29, PC30, PC31, PC32, PC33, PC34, PC35, PC36, PC37, PC38, PC39, PC40 AC1, AC2, AC3, AC4, AC5, AC6, AC7, AC8, AC10, AC11, AC13 (appropriate PROCs and ERCs are given in Section 2 below)				
Processes, tasks and/or activities covered	Processes,	tasks and/or activities cov	ered are described in Sec	tion 2 below.	
Assessment Method	The assessment of	inhalation exposure is ba	sed on the exposure estir	mation tool MEASE.	
2. Operational con	ditions and risk mar	nagement measures	6		
PROC/ERC	REACH o	lefinition	Involve	ed tasks	
PROC 6	Calendering	operations			
PROC 14	Production of prepar tabletting, compression				
PROC 21	materials an	d/or articles			
PROC 22	Potentially closed proc minerals/metals at e Industria	levated temperature		provided in the ECHA	
PROC 23	Open processing and t minerals/metals at e	levated temperature	Guidance on information requirements and chemical safety assessment, Chapter R.12: U		
PROC 24	High (mechanical) energ bound in materia	y work-up of substances ls and/or articles			
PROC 25	Other hot work ope	rations with metals	of		
ERC 1-7, 12	industri				
ERC 10, 11	Wide-dispersive outdoor life articles a	and indoor use of long- nd materials			
2.1 Control of worl	kers exposure				
Product characteristic					
reflected by an assignme ambient temperature the temperature based, takin	approach, the substance- ent of a so-called fugacity of fugacity is based on the d ig into account the process on the level of abrasion in	lass in the MEASE tool. F ustiness of that substance temperature and the mel	or operations conducted v . Whereas in hot metal op ting point of the substance	with solid substances at perations, fugacity is	
PROC	Used in preparation?	Content in preparation	Physical form	Emission potential	
PROC 22, 23,25	not res	tricted	massive objects, molten	high	
PROC 24	not res	tricted	massive objects	high	
All other applicable PROCs	not restricted massive objects very low			very low	

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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.

Duration of exposure

≤ 240 minutes

480 minutes (not restricted)

Frequency and duration of use/exposure

PROC

PROC 22

All other applicable PROCs

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 6, 14, 21	Any potentially required separation of workers	not required	na	-
	from the emission source is indicated above under "Frequency and duration of exposure". A reduction of exposure duration can be			
PROC 22, 23, 24, 25	achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with relevant	local exhaust ventilation	78 %	
	exposure.			

Organisational measures to prevent /limit releases, dispersion and exposure

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

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oonulions and medsul		Conditions and measures related to personal protection, hygiene and health evaluation				
PROC	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further personal protective equipment (PPE)		
PROC 22	FFP1 mask	APF=4	Since calcium oxide is classified as irritating to	Eye protection equipment (e.g. goggles or visors) must be worn, unless potential contact with the eye can be		
All other applicable PROCs	not required	na	skin, the use of protective gloves is mandatory for all process steps.	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.						
Amounts used	ronmental exposure	;				
	mount per site (for point	sources) is not consider	ed to be the main detern	ninant for environmental		
Frequency and duration	n of use					
Intermittent (< 12 time pe	er year) or continuous use/	release				
Environment factors no	ot influenced by risk man	agement				
Flow rate of receiving sur	face water: 18000 m³/day					
Other given operational	I conditions affecting en	vironmental exposure				
Effluent discharge rate: 2	000 m³/day					
Technical onsite condit	ions and measures to re	duce or limit discharges	, air emissions and relea	ses 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 measur	es related to waste					

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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 oxide of 1 mg/m³ (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.

PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)	
PROC 6, 14, 21, 22, 23, 24, 25	MEASE	< 1 mg/m³ (0.01 – 0.44)	 Since calcium oxide is classified as irritating to skin, dermal exposure has to be minimised as fa as technically feasible. A DNEL for dermal effect has not been derived. Thus, dermal exposure is not assessed in this exposure scenario. 		
Environmental emissio	ns				
as emissions of calcium of effect and risk assessme discharges, being the tox being addressed, includii when applicable, both for local scale. The high wat water. Significant emission emissions or exposure to assessment for the aqua related to the OH- dischar	oxide in the different life-cy int only deal with the effect acity of Ca2+ is expected to any municipal sewage treater r production and industrial er solubility and very low v ons or exposure to air are to the terrestrial environmer tic environment will therefor arges at the local scale. The build not increase above 9.	elevant for the aquatic envir ycle stages (production and t on organisms/ecosystems to be negligible compared ment plants (STPs) or indu use as any effects that mig yapour pressure indicate the not expected due to the loo not expected due to the loo t are not expected either f pre only deal with the poss the exposure assessment is	d use) mainly apply to (was s due to possible pH chang to the (potential) pH effect istrial waste water treatme ght occur would be expect at calcium oxide will be for w vapour pressure of calcii or this exposure scenario. ible pH changes in STP ef approached by assessing	ste) water. The aquatic ges related to OH- . Only the local scale is nt plants (WWTPs) ed to take place on a und predominantly in um oxide. Significant The exposure fluent and surface water the resulting pH impact:	
Environmental emissions	The production of calcium oxide can potentially result in an aquatic emission and locally increase the calcium oxide concentration and affect the pH in the aquatic environment. When the pH is not neutralised, the discharge of effluent from calcium oxide production sites may impact the pH in the receiving water. The pH of effluents is normally measured very frequently and can be neutralised easily as often required by national laws.				
Exposure concentration in waste water treatment plant (WWTP)	no biological treatment. T normally not be treated in	n oxide production is an in Therefore, wastewater stre n biological waste water tre er streams that are treated	ams from calcium oxide pr eatment plants (WWTPs), I	oduction sites will	
Exposure concentration in aquatic pelagic compartment	When calcium oxide is emitted to surface water, sorption to particulate matter and sediment will be negligible. When lime is rejected to surface water, the pH may increase, depending on the buffer capacity of the water. The higher the buffer capacity of the water, the lower the effect on pH will be. In general the buffer capacity preventing shifts in acidity or alkalinity in natural waters is regulated by the equilibrium between carbon dioxide (CO2), the bicarbonate ion (HCO3-) and the carbonate ion (CO32-).				
Exposure concentration in sediments		ent is not included in this E ium oxide is emitted to the			
Exposure concentrations in soil and groundwater	The terrestrial compartmeter be relevant.	ent is not included in this e	exposure scenario, becaus	e it is not considered to	
Exposure concentration in atmospheric compartment	oxide: when emitted to air reaction with CO2 (or oth	not included in this CSA be ir as an aerosol in water, c ner acids), into HCO3- and e washed out from the air a d up in soil and water.	alcium oxide is neutralised Ca2+. Subsequently, the	l as a result of its salts (e.g.	
Exposure concentration relevant for the food chain (secondary poisoning)	Bioaccumulation in orgar poisoning is therefore no	nisms is not relevant for ca t required.	lcium oxide: a risk assessr	ment for secondary	

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

Occupational exposure

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

(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 site as "high dusty".

DNEL_{inhalation}: 1 mg/m³ (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/m³. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).

Environmental exposure

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

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

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

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

Where:

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

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

pH effluent refers to the pH of the effluent

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

Please note that initially, default values can be used:

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

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

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

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

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(Eq 1)







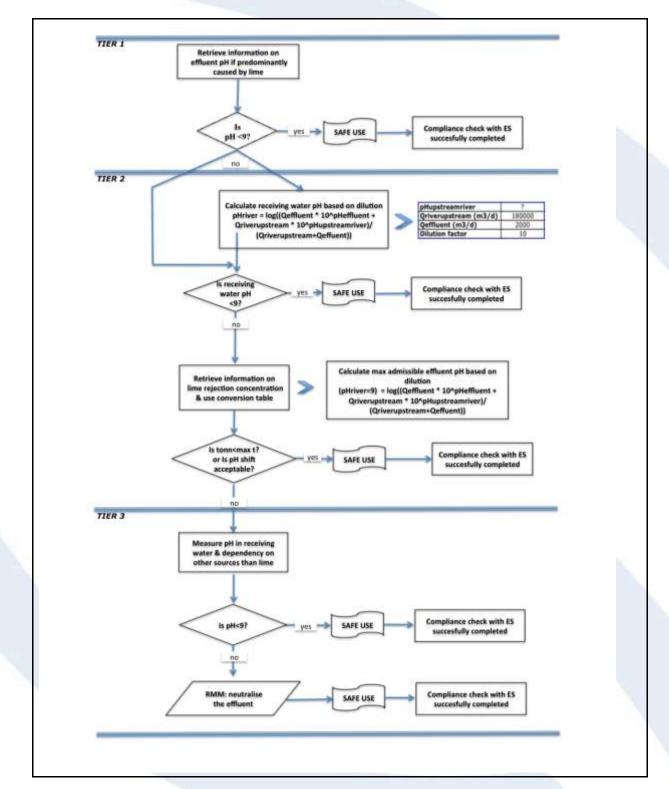
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ES number 9.6: Professional uses of aqueous solutions of lime substances

Exposure Scenario	ο Format (1) addressing uses carried οι	ut by workers			
1. Title					
Free short title	Professional uses of aqueous solutions of lime substances				
	SU22, SU1, SU5, SU6a, SU6b, SU7, SU10, SU11, SU12, SU13, SU16, SU17, SU18, SU19, SU20,				
Systematic title based on use descriptor	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 cove	ered are described in Section 2 below.			
Assessment Method		ed on the exposure estimation tool MEASE. The sased on FOCUS-Exposit.			
2. Operational con	ditions and risk management measures	5			
PROC/ERC	REACH definition	Involved tasks			
PROC 2	Use in closed, continuous process with occasional controlled exposure				
PROC 3	Use in closed batch process (synthesis or formulation)				
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises				
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)				
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities				
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities				
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	Further information is provided in the ECHA Guidance on information requirements and chemical safety assessment, Chapter R.12: Use			
PROC 10	Roller application or brushing	descriptor system (ECHA-2010-G-05-EN).			
PROC 11	Non industrial spraying				
PROC 12	Use of blowing agents in manufacture of foam				
PROC 13	Treatment of articles by dipping and pouring				
PROC 15	Use as laboratory reagent				
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected				
PROC 17	Lubrication at high energy conditions and in partly open process				
PROC 18	Greasing at high energy conditions				
PROC 19	Hand-mixing with intimate contact and only PPE available				
ERC2, ERC8a, ERC8b, ERC8c, ERC8d, ERC8e, ERC8f	Wide dispersive indoor and outdoor use of reactive substances or processing aids in open systems	Calcium oxide is applied in numerous cases of wide dispersive uses: agricultural, forestry, fish and shrimps farming, soil treatment and environmental protection.			

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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 Content in PROC Use in preparation Physical form Emission potential preparation 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 480 minutes (not restricted) PROCs 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 Technical conditions and measures to control dispersion from source towards the worker Localised controls Efficiency of LC PROC Level of separation **Further information** (according to MEASE) (LC) Separation of workers PROC 19 not applicable na from the emission source is generally not All other applicable required in the not required na PROCs conducted processes. 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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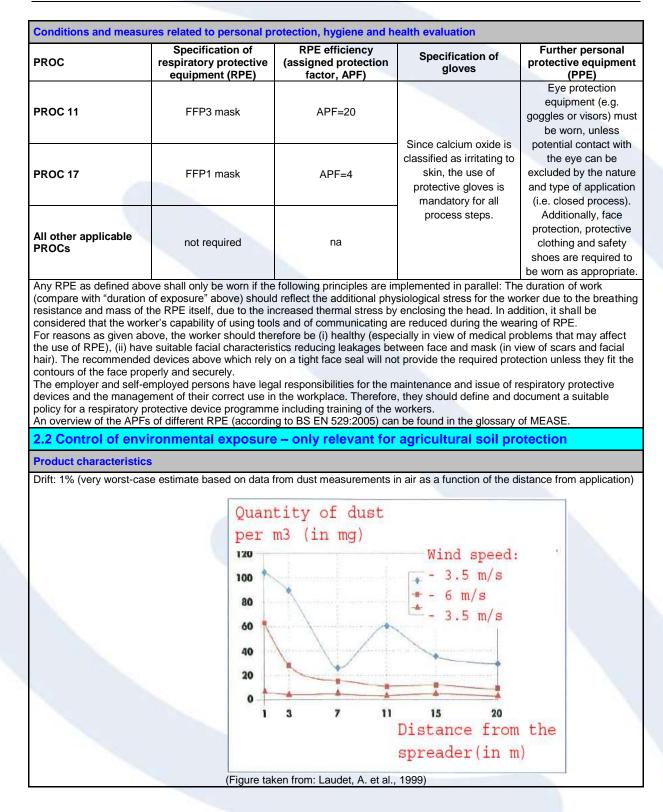
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Amounts used	
CaO	1,700 kg/ha
Frequency and duration of use	
1 day/year (one application per year); 1,700 kg/ha CaO is not exceeded	Multiple applications during the year are allowed, provided the total yearly amount of
Environment factors not influenced b	y risk management
Volume of surface water: 300 L/m ² Field surface area: 1 ha	
Other given operational conditions af	fecting environmental exposure
Outdoor use of products Soil mixing depth: 20 cm	
Technical conditions and measures a	at process level (source) to prevent release
There are no direct releases to adjacent	surface waters.
Technical conditions and measures t	o reduce or limit discharges, air emissions and releases to soil
Drift should be minimised.	
Organizational measures to prevent/I	imit release from site
In line with the requirements for good age the application rate should be adjusted a	pricultural practice, agricultural soil should be analysed prior to application of lime and according to the results of the analysis.
2.2 Control of environmental e	exposure – only relevant for urban soil treatment
Product characteristics	
	Quantity of dust per m3 (in mg) ¹²⁰ ¹²¹ ¹²¹ ¹²⁵ ¹²⁰ ¹²¹ ¹²⁵ ¹²
	(Figure taken from: Laudet, A. et al., 1999)
Amounts used	
СаО	180,000 kg/ha
Frequency and duration of use	
1 day/year and only once in a lifetime; 180,000 kg/ha (CaO) is not exceeded	Multiple applications during the year are allowed, provided the total yearly amount of
Environment factors not influenced b	y risk management
Field surface area: 1 ha	

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Other given operational conditions affecting environmental exposure

Outdoor use of products Soil mixing depth: 20 cm

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

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

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

Drift should be minimised.

3. Exposure estimation and reference to its source

Occupational exposure

The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium oxide of 1 mg/m³ (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.

PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)
PROC 2, 3, 4, 5, 8a, 8b, 9, 10, 11, 12, 13, 15, 16, 17, 18, 19	MEASE	< 1 mg/m³ (<0.001 – 0.6)	skin, dermal exposure ha as technically feasible. A	classified as irritating to as to be minimised as far DNEL for dermal effects hus, dermal exposure is exposure scenario

Environmental exposure for agricultural soil protection

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

	an indebed migrate them ten	ando bundoo watero, via a				
Environmental emissions	See amounts used					
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for agricultural soil protection					
Exposure	Substance	PEC (ug/L)	PNEC (ug/L)	RCR		
concentration in aquatic pelagic compartment	CaO	5.66	370	0.015		
Exposure concentration in sediments	As described above, no exposure of surface water nor sediment to lime is expected. Further, in natural waters the hydroxide ions react with HCO3– to form water and CO32 CO32- forms CaCO3 by reacting with Ca2+. The calcium carbonate precipitates and deposits on the sediment. Calcium carbonate is of low solubility and a constituent of natural soils.					
Exposure	Substance	PEC (mg/L)	PNEC (mg/L)	RCR		
concentrations in soil and groundwater	CaO	500	816	0.61		
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium oxide is not volatile. The vapour pressures is below 10 ⁻⁵ Pa.					
Exposure concentration relevant for the food chain (secondary poisoning)		uses covered do not signifi	an be considered to be om cantly influence the distribu			

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Environmental exposure for urban soil treatment

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

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

where parameters such a	as units can be improved a	iccording to conected date	l.		
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 concentrations in soil	Substance	PEC (mg/L)	PNEC (mg/L)	RCR	
and groundwater	CaO	529	816	0.65	
Exposure concentration in atmospheric compartment	This point is not relevant.	Calcium oxide is not vola	tile. The vapour pressures is	below 10 ^{−5} Pa.	
Exposure concentration relevant for the food chain (secondary poisoning)		overed do not significantly	considered to be omnipresen r influence the distribution of		
Environmental exposu	re for other uses				
For all other uses no qui	antitative environmental ex	posure assessment is car	ried because		

For all other uses, no quantitative environmental exposure assessment is carried because

• The operational conditions and risk management measures are less stringent than those outlined for agricultural soil protection or urban soil treatment

• 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

• 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".

1 mg/m³ (as respirable dust) DNEL_{inhalation}:

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/m³. 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 longterm 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	Format (1) addressing uses carried ou	It by workers			
1. Title					
Free short title	Professional uses of low dusty solids/powders of lime substances				
Systematic title based on use descriptor	SU22, SU1, SU5, SU6a, SU6b, SU7, SU10, SU11, SU12, SU13, SU16, SU17, SU18, SU19, SU20, SU23, 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		ered are described in Section 2 below.			
Assessment Method		ed on the exposure estimation tool MEASE. The is based on FOCUS-Exposit.			
2. Operational con	ditions and risk management measures	3			
PROC/ERC	REACH definition	Involved tasks			
PROC 2	Use in closed, continuous process with occasional controlled exposure				
PROC 3	Use in closed batch process (synthesis or formulation)				
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises				
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)				
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities				
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities				
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	Further information is provided in the ECHA			
PROC 10	Roller application or brushing	Guidance on information requirements and chemical safety assessment, Chapter R.12: Us			
PROC 11	Non industrial spraying	descriptor system (ECHA-2010-G-05-EN).			
PROC 13	Treatment of articles by dipping and pouring				
PROC 15	Use as laboratory reagent				
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected				
PROC 17	Lubrication at high energy conditions and in partly open process				
PROC 18	Greasing at high energy conditions				
PROC 19	Hand-mixing with intimate contact and only PPE available				
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				

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ERC2, ERC8a, ERC8b, ERC8c, ERC8d, ERC8e, ERC8f	reactive substances or	processing aids in open		
2.1 Control of wor	syst	ems		
Product characteristic				
According to the MEASE reflected by an assignme ambient temperature the temperature based, takir	ent of a so-called fugacity of fugacity is based on the d	lass in the MEASE tool. F ustiness of that substance temperature and the me	al is one of the main exposit For operations conducted w e. Whereas in hot metal ope Iting point of the substance. Itrinsic emission potential.	ith solid substances at erations, fugacity is
PROC	Use in preparation	Content in preparation	Physical form	Emission potential
PROC 25	not res	stricted	solid/powder, molten	high
All other applicable PROCs	not res	tricted	solid/powder	low
Amounts used				
combination of the scale		professional) and level of	sure as such for this scenar f containment/automation (a	
Frequency and duratio	n of use/exposure			
PROC		Duration of	of exposure	
PROC 17		≤ 240	minutes	
All other applicable PROCs		480 minutes	(not restricted)	
Human factors not infl	uenced by risk managem	ent		
The shift breathing volum	ne during all process steps	reflected in the PROCs is	s assumed to be 10 m³/shift	t (8 hours).
Other given operationa	al conditions affecting wo	rkers exposure		
assessment of the condu exposure assessment in temperatures are expect	ucted processes. In process MEASE is however based ted to vary within the indust	s steps with considerably on the ratio of process te ry the highest ratio was ta	ot considered relevant for o high temperatures (i.e. PR emperature and melting poir aken as a worst case assun exposure scenario for PROC	OC 22, 23, 25), the nt. As the associated nption for the exposure
Technical conditions a	nd measures at process	level (source) to preven	t release	
Risk management meas required in the processe		e.g. containment or segree	gation of the emission source	ce) are generally not
	nd measures to control d	lispersion from source t	owards the worker	
PROC	Level of separation	Localised controls (LC)	Efficiency of LC (according to MEASE)	Further information
PROC 19	Any potentially required separation of workers from the emission source is indicated above under "Frequency and duration of exposure".	not applicable	na	
All other applicable PROCs	A reduction of exposure duration can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the	not required	na	-
	worker from workplaces involved with relevant exposure.			

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Organisational measures to prevent /limit releases, dispersion and exposure

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

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	17, 18, 25 FFP2 mask APF=10		equipment (e.g. goggles or visors) must	
All other applicable PROCs	not required	na	Since calcium oxide is classified as irritating to skin, the use of protective gloves is mandatory for all process steps.	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

(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 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) 120 Wind speed: - 3.5 m/s 100 6 m/s80 3.5 m/s 60 40 20 11 15 7 20 Distance from the spreader(in m) (Figure taken from: Laudet, A. et al., 1999) Amounts used CaO 1,700 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 1,700 kg/ha is not exceeded (CaO) Environment factors not influenced by risk management Volume of surface water: 300 L/m² 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. 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.

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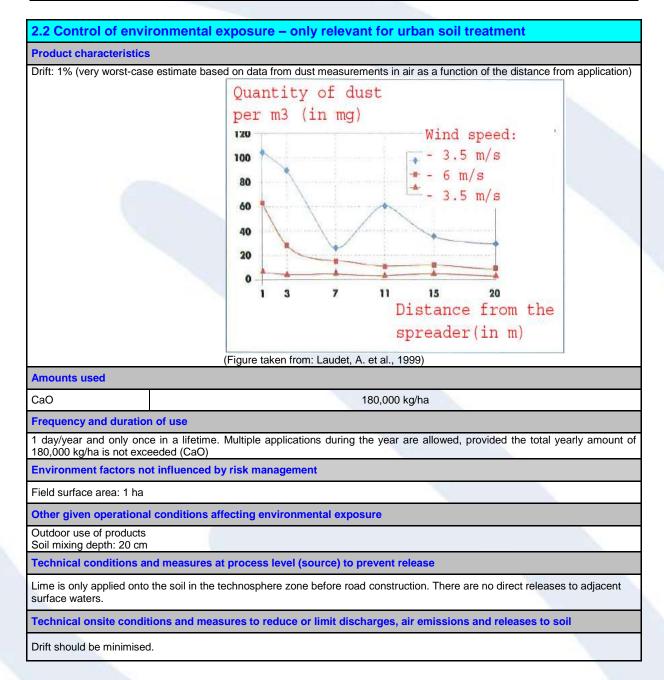
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3. Exposure estimation and reference to its source **Occupational exposure** The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate 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 oxide of 1 mg/m³ (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. Method used for Method used for Inhalation exposure Dermal exposure PROC inhalation exposure dermal exposure estimate (RCR) estimate (RCR) assessment assessment Since calcium oxide is classified as irritating to PROC 2, 3, 4, 5, 8a, skin, dermal exposure has to be minimised as far 8b, 9, 10, 11, 13, 15, MEASE < 1 mg/m³ (0.01 - 0.75) as technically feasible. A DNEL for dermal effects 16, 17, 18, 19, 21, 25, has not been derived. Thus, dermal exposure is 26 not assessed in this exposure scenario. Environmental exposure for agricultural soil protection The PEC calculation for soil and surface water was based on the FOCUS soil group (FOCUS, 1996) and on the "draft guidance on the calculation of predicted environmental concentration values (PEC) of plant protection products for soil, ground water, surface water and sediment (Kloskowksi et al., 1999). The FOCUS/EXPOSIT modelling tool is preferred to the EUSES as it is more appropriate for agricultural-like application as in this case where parameter as the drift needs to be included in the modelling. FOCUS is a model typically developed for biocidal applications and was further elaborated on the basis of the German EXPOSIT 1.0 model, where parameters such as drifts can be improved according to collected data: once applied on the soil, calcium oxide can indeed migrate then towards surface waters, via drift. Environmental See amounts used emissions Exposure concentration in Not relevant for agricultural soil protection waste water treatment plant (WWTP) Exposure PNEC (ug/L) Substance PEC (ug/L) RCR concentration in aquatic pelagic CaO 5.66 370 0.015 compartment As described above, no exposure of surface water nor sediment to lime is expected. Further, in Exposure natural waters the hydroxide ions react with HCO3- to form water and CO32-. CO32- forms CaCO3 by concentration in reacting with Ca2+. The calcium carbonate precipitates and deposits on the sediment. Calcium sediments carbonate is of low solubility and a constituent of natural soils. RCR Exposure Substance PEC (mg/L) PNEC (mg/L) concentrations in soil CaO 500 816 0.61 and groundwater Exposure concentration in This point is not relevant. Calcium oxide is not volatile. The vapour pressures is below 10⁻⁵ Pa. atmospheric compartment Exposure concentration This point is not relevant because calcium can be considered to be omnipresent and essential in the relevant for the food environment. The uses covered do not significantly influence the distribution of the constituents (Ca²¹ chain (secondary and OH⁻) in the environment. poisoning)

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Environmental exposure for urban soil treatment

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

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

milliono paramotoro odorri	us anno oan be improved e	loooranig to concolca dall			
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 concentrations in soil	Substance	PEC (mg/L)	PNEC (mg/L)	RCR	
and groundwater	CaO	529	816	0.65	
Exposure concentration in atmospheric compartment	This point is not relevant.	Calcium oxide is not vola	tile. The vapour pressures is	below 10 ⁻⁵ Pa.	
Exposure concentration relevant for the food chain (secondary poisoning)	This point is not relevant environment. The uses c and OH ⁻) in the environm	overed do not significantly	considered to be omnipresen / influence the distribution of	t and essential in the the constituents (Ca ²⁺	
Environmental exposu	re for other uses				
For all other uses, no qui	antitative environmental ex	posure assessment is car	rried because		

For all other uses, no quantitative environmental exposure assessment is carried because

• The operational conditions and risk management measures are less stringent than those outlined for agricultural soil protection or urban soil treatment

• 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

• 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 site as "high dusty".

DNEL_{inhalation}: 1 mg/m³ (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/m³. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).

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

	Format (1) addressing uses carried ou			
1. Title				
Free short title	Professional uses of medium dusty	v solids/powders of lime substances		
	SU22, SU1, SU5, SU6a, SU6b, SU7, SU10, SU11, SU12, SU13, SU16, SU17, SU18, SU19, SU20, SU23, SU24			
Systematic title based		, 5024 , PC12, PC13, PC14, PC15, PC16, PC17, PC18,		
Systematic title based on use descriptor		PC27, PC28, PC29, PC30, PC31, PC32, PC33, PC37, PC32, PC39, PC49		
		, PC37, PC39, PC40 5, AC7, AC8, AC10, AC11, AC13		
	(appropriate PROCs and ERC	s are given in Section 2 below)		
Processes, tasks		ared are described in Castion 2 holes:		
and/or activities covered	Processes, tasks and/or activities cove	ered are described in Section 2 below.		
Assessment Method	The assessment of inhalation exposure is base	ed on the exposure estimation tool MEASE. The		
Assessment Method		s based on FOCUS-Exposit.		
2. Operational con	ditions and risk management measures	5		
PROC/ERC	REACH definition	Involved tasks		
PROC 2	Use in closed, continuous process with occasional controlled exposure			
	Use in closed batch process (synthesis or			
PROC 3	formulation)			
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises			
	Mixing or blending in batch processes for			
PROC 5	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			
	Transfer of substance or preparation (charging/			
PROC 8b	discharging) from/to vessels/large containers at			
	dedicated facilities Transfer of substance or preparation into small			
PROC 9	containers (dedicated filling line, including			
	weighing)	Further information is provided in the ECHA		
PROC 10	Roller application or brushing	Guidance on information requirements and		
PROC 11	Non industrial spraying	chemical safety assessment, Chapter R.12: Us descriptor system (ECHA-2010-G-05-EN).		
PROC 13	Treatment of articles by dipping and pouring			
PROC 15	Use as laboratory reagent			
PROC 16	Using material as fuel sources, limited exposure	1		
	to unburned product to be expected Lubrication at high energy conditions and in partly	- · · · · · · · · · · · · · · · · · · ·		
PROC 17	open process			
PROC 18	Greasing at high energy conditions			
PROC 19	Hand-mixing with intimate contact and only PPE	1		
	available			
PROC 25	Other hot work operations with metals			
PROC 26	Handling of solid inorganic substances at ambient temperature			
ERC2, ERC8a, ERC8b,	Wide dispersive indoor and outdoor use of			
ERC8c, ERC8d,	reactive substances or processing aids in open			
ERC8e, ERC8f	systems			

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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. Content in PROC Physical form **Emission potential** Use in preparation preparation solid/powder, PROC 25 not restricted high molten All other applicable not restricted solid/powder medium PROCs 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, ≤ 240 minutes 19 All other applicable 480 minutes (not restricted) PROCs 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 Localised controls Efficiency of LC PROC Level of separation Further information (according to MEASE) (LC) Any potentially required generic local exhaust **PROC 11, 16** 72 % separation of workers ventilation from the emission integrated local exhaust source is indicated **PROC 17, 18** 87 % ventilation above under "Frequency and **PROC 19** not applicable na duration of exposure". A reduction of exposure duration can be achieved, for example, by the installation of ventilated (positive All other applicable not required na pressure) control rooms PROCs or by removing the worker from workplaces involved with relevant exposure.

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Organisational measures to prevent /limit releases, dispersion and exposure

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

PROC	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further personal protective equipment (PPE)
PROC 2, 3, 16, 19	FFP1 mask	APF=4		Eye protection equipment (e.g.
PROC 4, 5, 8a, 8b, 9, 10, 13, 17, 18, 25, 26	FFP2 mask	APF=10	Since calcium oxide is	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. e duration of work
PROC 11	FFP1 mask	APF=10		
PROC 15	not required	na	classified as irritating to skin, the use of protective gloves is mandatory for all process steps.	

resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the wearing of RPE. For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the face properly and securely.

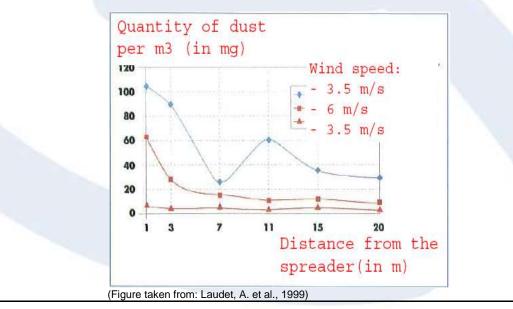
The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and the management of their correct use in the workplace. Therefore, they should define and document a suitable policy for a respiratory protective device programme including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

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

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

Product characteristics

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



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Amounts used	
CaO	1,700 kg/ha
Frequency and duration of use	1,100 Agrica
	Itiple applications during the year are allowed, provided the total yearly amount of 1,700
Environment factors not influenced by	y risk management
Volume of surface water: 300 L/m ² Field surface area: 1 ha	
Other given operational conditions af	ecting environmental exposure
Outdoor use of products Soil mixing depth: 20 cm	
Technical conditions and measures at	t process level (source) to prevent release
There are no direct releases to adjacent	surface waters.
Technical conditions and measures to	o reduce or limit discharges, air emissions and releases to soil
Drift should be minimised.	
Organizational measures to prevent/li	mit release from site
In line with the requirements for good ag the application rate should be adjusted a	ricultural practice, agricultural soil should be analysed prior to application of lime and ccording to the results of the analysis.
2.2 Control of environmental e	xposure – only relevant for urban soil treatment
Product characteristics	
	Quantity of dust per m3 (in mg) Wind speed: - 3.5 m/s - 6 m/s - 3.5 m/s - 3.5 m/s Distance from the spreader(in m)
	(Figure taken from: Laudet, A. et al., 1999)
Amounts used	
CaO	180,000 kg/ha
Frequency and duration of use 1 day/year and only once in a lifetime. 180,000 kg/ha is not exceeded (CaO)	Multiple applications during the year are allowed, provided the total yearly amount of
Environment factors not influenced by	y risk management
Field surface area: 1 ha	

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Other given operational conditions affecting environmental exposure

Outdoor use of products Soil mixing depth: 20 cm

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

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

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

Drift should be minimised.

3. Exposure estimation and reference to its source

Occupational exposure

The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium oxide of 1 mg/m³ (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.

PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)
PROC 2, 3, 4, 5, 8a, 8b, 9, 10, 11, 13, 15, 16, 17, 18, 19, 25, 26	MEASE	< 1 mg/m³ (0.25 – 0.825)	skin, dermal exposure ha as technically feasible. A	classified as irritating to as to be minimised as far DNEL for dermal effects hus, dermal exposure is exposure scenario

Environmental exposure for agricultural soil protection

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

the son, calcium oxide ca	in indeed migrate then tow	ando sunace waters, via u			
Environmental emissions	See amounts used				
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for agricultural soil protection				
Exposure	Substance	PEC (ug/L)	PNEC (ug/L)	RCR	
concentration in aquatic pelagic compartment	CaO	5.66	370	0.015	
Exposure concentration in sediments	As described above, no exposure of surface water nor sediment to lime is expected. Further, in natural waters the hydroxide ions react with HCO3- to form water and CO32 CO32- forms CaCO3 by reacting with Ca2+. The calcium carbonate precipitates and deposits on the sediment. Calcium carbonate is of low solubility and a constituent of natural soils.				
Exposure	Substance	PEC (mg/L)	PNEC (mg/L)	RCR	
concentrations in soil and groundwater	CaO	500	816	0.61	
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium oxide is not volatile. The vapour pressures is below 10 ⁻⁵ Pa.				
Exposure concentration relevant for the food chain (secondary poisoning)		because calcium can be c overed do not significantly ent.			

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Environmental exposure for urban soil treatment

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

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

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 concentrations in soil	Substance	PEC (mg/L)	PNEC (mg/L)	RCR	
and groundwater	CaO	529	816	0.65	
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium oxide is not volatile. The vapour pressures is below 10 ⁻⁵ Pa.				
Exposure concentration relevant for the food chain (secondary poisoning)	This point is not relevant because calcium can be considered to be omnipresent and essential in the environment. The uses covered do not significantly influence the distribution of the constituents (Ca ²⁺ and OH ⁻) in the environment.				
Environmental exposu	re for other uses				
For all other uses, no qu	antitative environmental ex	posure assessment is car	rried because		

For all other uses, no quantitative environmental exposure assessment is carried because

The operational conditions and risk management measures are less stringent than those outlined for agricultural soil
protection or urban soil treatment

• 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

• 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 site as "high dusty".

DNEL_{inhalation}: 1 mg/m³ (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/m³. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).

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

Exposure Scenario	Format (1) addressing uses carried ou	ut by workers			
1. Title					
Free short title	Professional uses of high dusty s	olids/powders of lime substances			
	SU22, SU1, SU5, SU6a, SU6b, SU7, SU10, SU11, SU12, SU13, SU16, SU17, SU18, SU19, SU20, SU23, SU24				
Systematic title based on use descriptor	PC1, PC2, PC3, PC7, PC8, PC9a, PC9b, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC1 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 cov	ered are described in Section 2 below.			
Assessment Method		ed on the exposure estimation tool MEASE. The is based on FOCUS-Exposit.			
2. Operational cond	ditions and risk management measures	S			
PROC/ERC	REACH definition	Involved tasks			
PROC 2	Use in closed, continuous process with occasional controlled exposure				
PROC 3	Use in closed batch process (synthesis or formulation)				
PROC 4	Use in batch and other process (synthesis) where opportunity for exposure arises				
PROC 5	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)				
PROC 8a	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities				
PROC 8b	Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at dedicated facilities				
PROC 9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	Further information is provided in the FOUA			
PROC 10	Roller application or brushing	Further information is provided in the ECHA Guidance on information requirements and			
PROC 11	Non industrial spraying	chemical safety assessment, Chapter R.12: Uso descriptor system (ECHA-2010-G-05-EN).			
PROC 13	Treatment of articles by dipping and pouring				
PROC 15	Use as laboratory reagent				
PROC 16	Using material as fuel sources, limited exposure to unburned product to be expected				
PROC 17	Lubrication at high energy conditions and in partly open process				
PROC 18	Greasing at high energy conditions				
PROC 19	Hand-mixing with intimate contact and only PPE available				
PROC 25	Other hot work operations with metals				
PROC 26	Handling of solid inorganic substances at ambient temperature				
ERC2, ERC8a, ERC8b, ERC8c, ERC8d, ERC8e, ERC8f	Wide dispersive indoor and outdoor use of reactive substances or processing aids in open systems				

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2.1 Control of work	ers exposure					
Product characteristic						
reflected by an assignme ambient temperature the temperature based, taking	nt of a so-called fugacity of fugacity is based on the d	lass in the MEASE tool. F ustiness of that substance temperature and the mell stead of the substance in	I is one of the main expose or operations conducted w Whereas in hot metal ope ting point of the substance trinsic emission potential.	ith solid substances at erations, fugacity is		
PROC	Use in preparation	Content in preparation	Physical form	Emission potential		
All applicable PROCs	not res	stricted	solid/powder	high		
Amounts used						
combination of the scale		professional) and level of	ure as such for this scenar containment/automation (a			
Frequency and duration	n of use/exposure					
PROC	1	Duration o	f exposure			
PROC 4, 5, 8a, 8b, 9, 10, 16, 17, 18, 19, 26		≤ 240 r	ninutes			
PROC 11		<mark>≤</mark> 60 m	ninutes			
All other applicable PROCs		480 minutes ((not restricted)			
Human factors not influ	enced by risk managem	ent				
The shift breathing volum	e during all process steps	reflected in the PROCs is	assumed to be 10 m ³ /shift	t (8 hours).		
Other given operational	conditions affecting wo	rkers exposure				
assessment of the conductive exposure assessment in latemperatures are expected	cted processes. In proces MEASE is however based ed to vary within the indust	s steps with considerably I on the ratio of process ter try the highest ratio was ta	ot considered relevant for o high temperatures (i.e. PR mperature and melting poin ken as a worst case assur xposure scenario for PRO	OC 22, 23, 25), the nt. As the associated nption for the exposure		
Technical conditions an	nd measures at process	level (source) to prevent	release			
Risk management measurequired in the processes		e.g. containment or segreg	ation of the emission sour	ce) are generally not		
Technical conditions an	nd measures to control d	lispersion from source to	owards the worker			
PROC	Level of separation	Localised controls (LC)	Efficiency of LC (according to MEASE)	Further information		
PROC 4, 5, 8a, 8b, 9, 11, 16, 26	Any potentially required separation of workers from the emission	generic local exhaust ventilation	72 %			
PROC 17, 18	source is indicated above under	integrated local exhaust ventilation	87 %			
PROC 19	"Frequency and duration of exposure". A reduction of exposure (efficiency 50 %)-					
All other applicable PROCs	duration can be achieved, for example, by the installation of ventilated (positive pressure) control rooms or by removing the worker from workplaces involved with relevant exposure.	not required	na	-		

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Organisational measures to prevent /limit releases, dispersion and exposure

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

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

Any RPE as defined above shall only be worn if the following principles are implemented in parallel: The duration of work (compare with "duration of exposure" above) should reflect the additional physiological stress for the worker due to the breathing resistance and mass of the RPE itself, due to the increased thermal stress by enclosing the head. In addition, it shall be considered that the worker's capability of using tools and of communicating are reduced during the wearing of RPE. For reasons as given above, the worker should therefore be (i) healthy (especially in view of medical problems that may affect the use of RPE), (ii) have suitable facial characteristics reducing leakages between face and mask (in view of scars and facial hair). The recommended devices above which rely on a tight face seal will not provide the required protection unless they fit the contours of the face properly and securely.

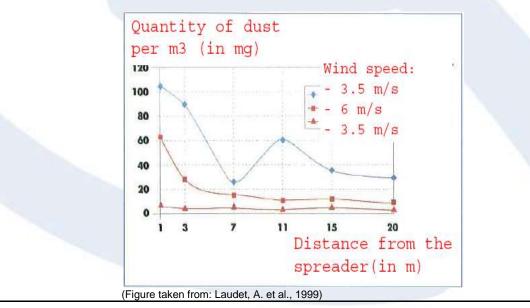
The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective devices and the management of their correct use in the workplace. Therefore, they should define and document a suitable policy for a respiratory protective device programme including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

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

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

Product characteristics

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



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Amounts used	
CaO	1,700 kg/ha
Frequency and duration o	fuse
1 day/year (one application 1,700 kg/ha is not exceeded	per year). Multiple applications during the year are allowed, provided the total yearly amount of d (CaO)
	nfluenced by risk management
Volume of surface water: 30 Field surface area: 1 ha	0 L/m2
	onditions affecting environmental exposure
Outdoor use of products Soil mixing depth: 20 cm	measures at process level (source) to prevent release
There are no direct releases	
Technical conditions and	measures to reduce or limit discharges, air emissions and releases to soil
Drift should be minimised.	
	to prevent/limit release from site
In line with the requirements	s for good agricultural practice, agricultural soil should be analysed prior to application of lime and be adjusted according to the results of the analysis.
2.2 Control of environ	nmental exposure – only relevant for urban soil treatment
Product characteristics	
	Quantity of dust per m3 (in mg) Wind speed: - 3.5 m/s - 6 m/s - 3.5 m/s - 3.5 m/s - 3.5 m/s Distance from the spreader(in m)
	(Figure taken from: Laudet, A. et al., 1999)
Amounts used	
CaO	180,000 kg/ha
Frequency and duration o 1 day/year and only once in 180,000 kg/ha is not exceed	n a lifetime. Multiple applications during the year are allowed, provided the total yearly amount of
Environment factors not in	nfluenced by risk management
Field surface area: 1 ha	

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Other given operational conditions affecting environmental exposure

Outdoor use of products Soil mixing depth: 20 cm

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

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

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

Drift should be minimised.

3. Exposure estimation and reference to its source

Occupational exposure

The exposure estimation tool MEASE was used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level) and has to be below 1 to demonstrate a safe use. For inhalation exposure, the RCR is based on the DNEL for calcium oxide of 1 mg/m³ (as respirable dust) and the respective inhalation exposure estimate derived using MEASE (as inhalable dust). Thus, the RCR includes an additional safety margin since the respirable fraction being a sub-fraction of the inhalable fraction according to EN 481.

PROC	Method used for inhalation exposure assessment	Inhalation exposure estimate (RCR)	Method used for dermal exposure assessment	Dermal exposure estimate (RCR)
PROC 2, 3, 4, 5, 8a, 8b, 9, 10, 11, 13, 15, 16, 17, 18, 19, 25, 26	MEASE	<1 mg/m³ (0.5 – 0.825)	skin, dermal exposure ha as technically feasible. A	DNEL for dermal effects hus, dermal exposure is

Environmental exposure for agricultural soil protection

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

	an indeced migrate them tow	ando sunace waters, via u			
Environmental emissions	See amounts used				
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for agricultural soil protection				
Exposure	Substance	PEC (ug/L)	PNEC (ug/L)	RCR	
concentration in aquatic pelagic compartment	CaO	5.66	370	0.015	
Exposure concentration in sediments	As described above, no exposure of surface water nor sediment to lime is expected. Further, in natural waters the hydroxide ions react with HCO3- to form water and CO32 CO32- forms CaCO3 by reacting with Ca2+. The calcium carbonate precipitates and deposits on the sediment. Calcium carbonate is of low solubility and a constituent of natural soils.				
Exposure	Substance	PEC (mg/L)	PNEC (mg/L)	RCR	
concentrations in soil and groundwater	CaO	500	816	0.61	
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium oxide is not volatile. The vapour pressures is below 10 ⁻⁵ Pa.				
Exposure concentration relevant for the food chain (secondary poisoning)		because calcium can be c overed do not significantly ent.			

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Environmental exposure for urban soil treatment

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

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

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 concentrations in soil	Substance	PEC (mg/L)	PNEC (mg/L)	RCR		
and groundwater	CaO	529	816	0.65		
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium oxide is not volatile. The vapour pressures is below 10 ⁻⁵ Pa.					
Exposure concentration relevant for the food chain (secondary poisoning)	This point is not relevant because calcium can be considered to be omnipresent and essential in the environment. The uses covered do not significantly influence the distribution of the constituents (Ca ²⁺ and OH) in the environment.					
Environmental exposu	re for other uses					
For all other uses no qui	antitative environmental ex	posure assessment is car	rried because			

all other uses, no quantitative environmental exposure assessment is carried because

The operational conditions and risk management measures are less stringent than those outlined for agricultural soil protection or urban soil treatment

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

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 site as "high dusty".

DNEL_{inhalation}: 1 mg/m³ (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/m³. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).

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

Exposure Scenario Format (1) addressing uses carried out by workers					
1. Title	. 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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	REACH definition		Involved tasks	
Milling	PROC 5		Preparation and use of calcium oxides for soil treatment.	
Loading of spreader	PROC 8b, PROC 26			
Application to soil (spreading)	PROC 11			
ERC2, ERC8a, ERC8b, ERC8c, ERC8d, ERC8e, ERC8f	Wide dispersive indoor and outdoor use of reactive substances or processing aids in open systems		Calcium oxide is applied in numerous cases of wide dispersive uses: agricultural, forestry, fish and shrimps farming, soil treatment and environmental protection.	
2.1 Control of worl	kers exposure			
Product characteristic				
emperature based, takir	fugacity is based on the di ing into account the process on the level of abrasion in Use in preparation	temperature and the mel stead of the substance in Content in	ting point of the substance	
Milling	not res	preparation stricted	solid/powder	high
Loading of spreader	not res	stricted	solid/powder	high
Application to soil (spreading)	not res	stricted	solid/powder	high
Amounts used			•	
The actual tonnage hanc combination of the scale	lled per shift is not conside of operation (industrial vs. minant of the process intrir	professional) and level of		
The actual tonnage hanc combination of the scale PROC) is the main deter	of operation (industrial vs. minant of the process intrir	professional) and level of		
The actual tonnage hand combination of the scale PROC) is the main deter Frequency and duration	of operation (industrial vs. minant of the process intrir	professional) and level of sic emission potential.		
The actual tonnage hand combination of the scale PROC) is the main deter Frequency and duration Task	of operation (industrial vs. minant of the process intrir	professional) and level of hsic emission potential. Duration of	containment/automation (
The actual tonnage hand combination of the scale PROC) is the main deter Frequency and duratio Task Milling Loading of spreader	of operation (industrial vs. minant of the process intrir	professional) and level of nsic emission potential. Duration o 240 m	containment/automation (
The actual tonnage hand combination of the scale PROC) is the main deter Frequency and duration Task Milling Loading of spreader Application to soil	of operation (industrial vs. minant of the process intrir	professional) and level of hsic emission potential. Duration o 240 m 240 m	containment/automation (f exposure inutes	
The actual tonnage hanc combination of the scale PROC) is the main deter Frequency and duratio Task Milling Loading of spreader Application to soil (spreading)	of operation (industrial vs. minant of the process intrir	professional) and level of hsic emission potential. Duration of 240 m 240 m 480 minutes of	containment/automation (of exposure ninutes	
The actual tonnage hand combination of the scale PROC) is the main deter Frequency and duration Task Milling Loading of spreader Application to soil (spreading) Human factors not influ	of operation (industrial vs. minant of the process intrir n of use/exposure	professional) and level of hsic emission potential. Duration of 240 m 240 m 480 minutes (ent	containment/automation (of exposure inutes inutes (not restricted)	as reflected in the
The actual tonnage hand combination of the scale PROC) is the main deter Frequency and duration Task Milling Loading of spreader Application to soil (spreading) Human factors not influ	of operation (industrial vs. minant of the process intrir n of use/exposure	professional) and level of hsic emission potential. Duration of 240 m 240 m 480 minutes (ent reflected in the PROCs is	containment/automation (of exposure inutes inutes (not restricted)	as reflected in the
The actual tonnage hand combination of the scale PROC) is the main deter Frequency and duration Task Milling Loading of spreader Application to soil (spreading) Human factors not influ The shift breathing volun Other given operationa	of operation (industrial vs. minant of the process intrir n of use/exposure uenced by risk managem ne during all process steps I conditions affecting wo e.g. process temperature and	professional) and level of hsic emission potential. Duration of 240 m 240 m 480 minutes (ent reflected in the PROCs is rkers exposure	containment/automation (of exposure ninutes ninutes (not restricted) s assumed to be 10 m³/shif	as reflected in the

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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Task	Level of separation	Localised controls (LC)	Efficiency of LC	Further information		
Milling	Separation of workers is generally not	not required	na	-		
Loading of spreader	required in the conducted processes.	not required	na	-		
Application to soil (spreading)	During application the worker is sitting in the cabin of the spreader	Cabin with filtered air supply	99%	- 0		
Organisational measur	es to prevent /limit releas	ses, dispersion and expo	osure			
Shower and change cloth compressed air.	e workplace, the wearing on the state of work shift. Do nes at end of work shift. Do nes at end of work shift. Do nes related to personal provided to personal	o not wear contaminated c	lothing at home. Do not bl			
Task	Specification of respiratory protective equipment (RPE)	RPE efficiency (assigned protection factor, APF)	Specification of gloves	Further personal protective equipmen (PPE)		
Milling	FFP3 mask	APF=20	0	Eye protection equipment (e.g. goggles or visors) mus be worn, unless		
Loading of spreader	FFP3 mask	APF=20	Since calcium oxide is classified as irritating to skin, the use of protective gloves is mandatory for all Since calcium oxide is the eye can be excluded by the r and type of applie (i.e. closed proc			
Application to soil (spreading)	not required	na	process steps.	Additionally, face protection, protective clothing and safety shoes are required to be worn as appropriate		
(compare with "duration resistance and mass of t considered that the work For reasons as given abo the use of RPE), (ii) have	ve shall only be worn if the of exposure" above) should he RPE itself, due to the in er's capability of using tool ove, the worker should the e suitable facial characteris devices above which rely verty and securely	d reflect the additional phy icreased thermal stress by s and of communicating a refore be (i) healthy (espe- tics reducing leakages be	siological stress for the wo v enclosing the head. In ad re reduced during the wea cially in view of medical pr tween face and mask (in v	orker due to the breathin dition, it shall be ring of RPE. oblems that may affect iew of scars and facial		

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 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) 120 Wind speed: - 3.5 m/s 100 6 m/s80 3.5 m/s 60 40 20 11 15 7 20 Distance from the spreader(in m) (Figure taken from: Laudet, A. et al., 1999) Amounts used CaO 1,700 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 1,700 kg/ha (CaO) is not exceeded Environment factors not influenced by risk management Volume of surface water: 300 L/m² 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. 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.

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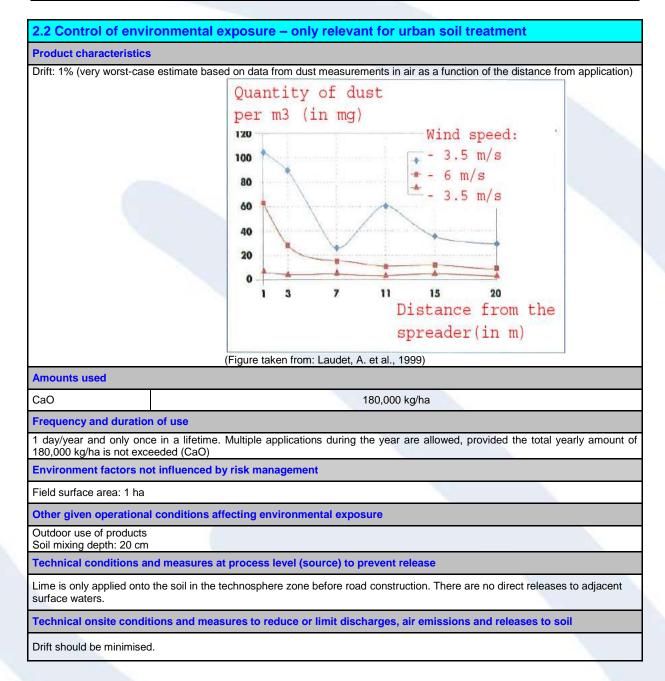
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3. Exposure estimation and reference to its source **Occupational exposure** Measured data and modelled exposure estimates (MEASE) were used for the assessment of inhalation exposure. The risk characterisation ratio (RCR) is the quotient of the refined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

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Environmental exposure for urban soil treatment

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

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

milliono paramotoro odorri	us anno oan be improved e	loooranig to concolca dall					
Environmental emissions	See amounts used	See amounts used					
Exposure concentration in waste water treatment plant (WWTP)	Not relevant for road bord	Not relevant for road border scenario					
Exposure concentration in aquatic pelagic compartment	Not relevant for road bord	Not relevant for road border scenario					
Exposure concentration in sediments	Not relevant for road border scenario						
Exposure concentrations in soil	Substance	PEC (mg/L)	PNEC (mg/L)	RCR			
and groundwater	CaO	529	816	0.65			
Exposure concentration in atmospheric compartment	This point is not relevant. Calcium oxide is not volatile. The vapour pressures is below 10 ⁻⁵ Pa.						
Exposure concentration relevant for the food chain (secondary poisoning)	This point is not relevant because calcium can be considered to be omnipresent and essential in the environment. The uses covered do not significantly influence the distribution of the constituents (Ca^{2+} and OH ⁻) in the environment.						
Environmental exposu	re for other uses						
For all other uses, no qui	antitative environmental ex	posure assessment is car	rried because				

For all other uses, no quantitative environmental exposure assessment is carried because

• The operational conditions and risk management measures are less stringent than those outlined for agricultural soil protection or urban soil treatment

• 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

• 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 site as "high dusty".

DNEL_{inhalation}: 1 mg/m³ (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/m³. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).

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

Systematic title based on use descriptor SU23, SU24 (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 2. Operational conditions and risk management measures Use of containers containing calcium over estimation) Use of containers containing calcium over estimation) PROC 0 (PROC 21 Other process exposure estimation) Use of containers containing calcium over estimation) Use of containers containing calcium over estimation) PROC 21 Low energy manipulation of substances bound in materials and/or articles Grinding, mechanical cutting PROC 25 Other hot work operations with metals Calcium oxide bound in the or ont articles materials such as: wooden and plasti constructional building materials (e.g. gu electronic equipment (casing) Product characteristic Vide dispersive indoor and outdoor use of long- life articles and materials with low release Calcium oxide bound into or not articles materials such as: wooden and plasti constructional building materials (e.g. gu electronic equipment (casing) Product characteristic Corret of workers exposure Product characteristic Corret (pellot, low group casins instead of the substance. Intrinsic emission potential for dust formation during paper and	Exposure Scenario	Format (1) address	ing uses carried οι	It by workers					
Systematic title based on use descriptor SU22, SU1, SU5, SU6a, SU6b, SU7, SU10, SU11, SU12, SU13, SU14, SU17, SU18, SU19, S SU23, SU24 Processes, tasks and/or activities covered 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 2. Operational conditions and risk management measures Use of containers containing calcium oxide/preparations as C0, absorbents (precycare estimation) PROC 0 (PROC 21 (low emission potential) as proxy for exposure estimation) Use of containers containing calcium oxide/preparationese bound in materials and/or articles PROC 24 High (mechanical) energy work-up of substances bound in materials and/or articles Grinding, mechanical cutting PROC 25 Other hot work operations with metals Welding, soldering Calcium oxide bound into or onto articles materials such as: wooden and plastic construction and building materials (e.g. gri rains), flooring, furthitter, toys, leather pro paper and cardboard products (magazri construction and building materials (e.g. gri rains), flooring, furthitter, toys, leather pro paper and cardboard products (magazri construction and building materials (e.g. gri rains), flooring, furthitter, toys, leather pro paper and cardboard products (magazri construction and building materials (e.g. gri prabi	1. Title			-					
Systematic title based on use descriptor 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 2. Operational conditions and risk management measures Involved tasks PROC/ERC REACH definition Involved tasks PROC 0 (PROC 21 (low emission potential) as proy for exposure estimation) Use of containers containing calcium valce/preparations as C0, absorbents (bound in materials and/or articles PROC 24 High (mechanical) energy work-up of substances bound in materials and/or articles Grinding, mechanical cutting PROC 25 Other hot work operations with metals Calcium oxide bound into or ont articles materials such as: wooden and plasti constructional, funditure, toys, leather pro paper and carboard products (magazir) iffe articles and materials with low release Calcium oxide bound into or not articles materials such as: wooden and plasti construction subuliding materials (e.g. gr paper and carboard products (magazir) bound in the evel of abrasion instead of the substance. Whereas in hot metal operations, fungacity i temperature based, taking into acount the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance infinise emission potential for dust f	Free short title	Professi	onal uses of articles/cont	ainers containing lime sub	stances				
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 2. Operational conditions and risk management measures Use of containers containing calcium oxide/preparations as CQ- absorbents() PROC 0 (PROC 21 (low emission potential) as proxy for exposure estimation) Use of containers containing calcium oxide/preparations as CQ- absorbents() PROC 21 Low energy manipulation of substances bound in materials and/or articles Handling of substances bound in materials articles PROC 24 High (mechanical) energy work-up of substances bound in materials and/or articles Grinding, mechanical cutting PROC 25 Other hot work operations with metals Welding, soldering Calcium oxide bound into or onto articles materials such as: wooden and plastis used as used as: wooden and plastis materials such as: wooden and plastis materials and/or articles PROC 10 for workers exposure Product characteristic According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. reflected by an assignment of a so-called tugacity class in the MEASE tool. For operations conducted with solid subst		AC1, A	AC1, AC2, AC3, AC4, AC5, AC6, AC7, AC8, AC10, AC11, AC13						
2. Operational conditions and risk management measures PROC/ERC REACH definition Involved tasks PROC/ERC REACH definition Involved tasks PROC 0 (PROC 21 (low emission potential) as proxy for exposure estimation) Use of containers containing calcium oxide/preparations as CO, absorbents (breathing apparatus) PROC 21 Low energy manipulation of substances bound in materials and/or articles Handling of substances bound in articles PROC 24 High (mechanical) energy work-up of substances bound in materials and/or articles Grinding, mechanical cutting PROC 25 Other hot work operations with metals Welding, soldering ERC10, ERC11, ERC 12 Wide dispersive indoor and outdoor use of long- life articles and materials with low release Calcium oxide bound into or onto articles materials such as: wooden and plastic construction and building materials (e.g. gr drains), flooring, furniture, toys, leather pro paper and cardboard products (magazin books, news paper and packaging pape electronic equipment (casing) 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. reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substance, arbitit temperature the fugacity is based on the dustiness of that substance. Noreat a thind group, abrasive tasks are based on the level of	and/or activities	Processes, tasks and/or activities covered are described in Section 2 below.							
PROC/ERC REACH definition Involved tasks PROC 0 Other process (PROC 1 (low emission potential) as proxy for exposure estimation) Use of containers containing calcium oxide/preparations as CO ₂ absorbents (breathing apparatus) PROC 21 Low energy manipulation of substances bound in materials and/or articles Handling of substances bound in materials articles PROC 24 High (mechanical) energy work-up of substances bound in materials and/or articles Grinding, mechanical cutting PROC 25 Other hot work operations with metals Welding, soldering Calcium oxide bound into or onto articles bound in materials and/or articles Grinding, mechanical cutting PROC 1 Wide dispersive indoor and outdoor use of long- life articles and materials with low release Calcium oxide bound into or onto articles materials such as: wooden and plasti construction and building materials (e.g. gu drains), flooring, furniture, toys, leather pro paper and cardboard products (magazir books, news paper and packaging pape electronic equipment (casing) 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. reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substance ambient temperature thating into account the process temperature and the melting point of the substance. As a third group, abrasive task are based on the level of abrasion ins	Assessment Method	The assessment of inhalation exposure is based on the exposure estimation tool MEASE.							
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PROC 0 (PROC 21 (low emission potential) as proxy for exposure estimation) oxide/preparations as CO ₂ absorbents (breathing apparatus) PROC 21 Low energy manipulation of substances bound in materials and/or articles Handling 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 cutting PROC 25 Other hot work operations with metals Welding, soldering ERC10, ERC11, ERC 12 Wide dispersive indoor and outdoor use of long- life articles and materials with low release Calcium oxide bound into or onto articles materials such as: wooden and plasti construction and building materials (e.g. g drains), flooring, furniture, toys, leather pro- paper and cardboard products (magazir books, news paper and packaging pape electronic equipment (casing) 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. reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substance ambient temperature based on the level of abrasion instead of the substance. Whereas in hot metal operations, fugacity is temperature based on the level of abrasion instead of the substance intrinsic emission potential. PROC 0 not restricted Physical form previous filling and handing activities of pellets, not during use of bre	PROC/ERC	REACH d	efinition	Involve	ed tasks				
PROC 21 materials and/or articles articles PROC 24 High (mechanical) energy work-up of substances bound in materials and/or articles Grinding, mechanical cutting PROC 25 Other hot work operations with metals Welding, soldering ERC10, ERC11, ERC 12 Wide dispersive indoor and outdoor use of long- life articles and materials with low release Calcium oxide bound into or onto articles materials such as: wooden and plasti construction and building materials (e.g. og drains), flooring, furniture, toys, leather pro- paper and cardboard products (magazir books, news paper and packaging pape electronic equipment (casing) 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. Treflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substance ambient temperature the fugacity is based on the dustiness of that substance. Whereas in hot metal operations, fugacity is durating into account the process temperature and the melting point of the substance. As a third group, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential for dust formation during previous filing and handling activities of breathing apparatus Iow (worst case assu as on inhalat exposure is ass during the use of breathing apparatus during the use of breathing apparatus PROC 0 not restricted massive objects of breathing apparatus Iow (worst case assu as on inhalati exposure is assi during the use of breathing apparatus <td>PROC 0</td> <td>(PROC 21 (low emission exposure e</td> <td>n potential) as proxy for stimation)</td> <td colspan="3"></td>	PROC 0	(PROC 21 (low emission exposure e	n potential) as proxy for stimation)						
PROC 24 High (mechanical) energy work-up of substances bound in materials and/or articles Grinding, mechanical cutting PROC 25 Other hot work operations with metals Welding, soldering ERC10, ERC11, ERC 12 Wide dispersive indoor and outdoor use of long- life articles and materials with low release Calcium oxide bound into or onto articles materials such as: wooden and plasti construction and building materials (e.g. gi drains), flooring, furniture, toys, leather pro- gaper and cardboard products (magazir books, news paper and packaging pape electronic equipment (casing) 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. T reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substance 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, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential for dust formation due to abrasion during previous filling and handling activities of pellets, not during use of breathing apparatus Iow (worst case assu as no inhalat exposure is ass during the use of pellets, not during use of breathing apparatus Iow (worst case assu as no inhalat exposure is ass during the use of pellets, not during use of breathing apparatus	PROC 21			Handling of substances bound in materials and articles					
ERC10, ERC11, ERC Wide dispersive indoor and outdoor use of long- life articles and materials with low release Calcium oxide bound into or oto articles materials such as: wooden and plasti construction and building materials (e.g. g. drains), flooring, furniture, toys, leather pro- paper and cardboard products (magazin books, news paper and packaging pape electronic equipment (casing) 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. T reflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substance 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, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. PROC Used in preparation? Content in preparation Physical form massive objects (pellets), low potential for dust formation due to abrasion during previous filling and handling activities of pellets, not during use of breatthing apparatus Iow (worst case assu as no inhalatt exposure is ass during the use of breatthing apparatus PROC 21 not restricted massive objects very low very low	PROC 24	High (mechanical) energy	igh (mechanical) energy work-up of substances						
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According to the MEASE approach, the substance-intrinsic emission potential is one of the main exposure determinants. Treflected by an assignment of a so-called fugacity class in the MEASE tool. For operations conducted with solid substance, 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, abrasive tasks are based on the level of abrasion instead of the substance intrinsic emission potential. PROC Used in preparation? Content in preparation Physical form Emission potential forw (worst case assu for dust formation due to abrasion during previous filling and handling activities of pellets, not during use of breathing apparatus Iow PROC 1 not restricted massive objects low PROC 21 not restricted massive objects very low	2.1 Control of work	ers exposure							
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PROC 0 not restricted (pellets), low potential for dust formation due to abrasion during previous filling and handling activities of pellets, not during use of breathing apparatus (worst case assume to abrasion during the use of breathing apparatus PROC 1 not restricted massive objects very low	RUC	Used in preparation?	preparation						
PROC 21 not restricted massive objects very low	PROC 0	not rest	iricted	(pellets), low potential for dust formation due to abrasion during previous filling and handling activities of pellets, not during use	(worst case assumption as no inhalation exposure is assumed during the use of the breathing apparatus due to the very low				
	PROC 21	not rest	ricted	0 11					
PROC 24, 25 not restricted massive objects high	PROC 24, 25	not rest	ricted		-				

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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 0	480 minutes (not restricted as far as occupational exposure to calcium oxide 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).

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 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 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 measur	res related to personal p	rotection, hygiene and h	ealth 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 Eye protect goggles or viso be worn, ur						
PROC 24, 25	FFP1 mask APF=4 Since calcium oxide is classified as irritating to skin, the use of protective gloves is mandatory for all process steps. potential contact with eye can be excluded by the national structure gloves is mandatory for all protective gloves is closed process steps. FFP1 mask APF=4 mandatory for all protective gloves is mandatory for all protection, protect clothing and safe shoes are required be worn as approprior						
(compare with "duration of	of exposure" above) should	d reflect the additional phy	nplemented in parallel: The siological stress for the wo enclosing the head. In ad	orker due to the breathing			
			re reduced during the wea				
For reasons as given abo	ove, the worker should the	refore be (i) healthy (espec	cially in view of medical pro	oblems that may affect			
			tween face and mask (in v t provide the required prot				
contours of the face prop	erly and securely.						
			naintenance and issue of r				
	ment of their correct use in otective device programme		, they should define and d	ocument a suitable			
			be found in the glossary	of MEASE.			
2.2 Control of envi	ronmental exposure	•					
Product characteristics	•						
Lime is chemically bound	l into/onto a matrix with ve	ry low release potential					
3. Exposure estimation	ation and reference	to its source					
Occupational exposure							
			tion exposure. The risk cha				
			rived no-effect level) and h NEL for calcium oxide of 1				
dust) and the respective	inhalation exposure estimation	ate derived using MEASE	(as inhalable dust). Thus, t	the RCR includes an			
additional safety margin		n being a sub-fraction of th	ne inhalable fraction accore	ding 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)	Since calcium oxide is	classified as irritating to			
PROC 21	MEASE	0.05 mg/m³ (0.05)	skin, dermal exposure ha	as to be minimised as far			
PROC 24	MEASE	0.825 mg/m³ (0.825)	as technically feasible. A DNEL for dermal effe				
PROC 25	MEASE	0.6 mg/m³ (0.6)	not assessed in this	exposure scenario.			
Environmental exposur							
			nded release of lime during se a pH-shift in soil, waste				
			, ,				

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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 site as "high dusty".

DNEL_{inhalation}: 1 mg/m³ (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/m³. By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2). When using MEASE for the derivation of exposure estimates, it is noted that the exposure duration should only be reduced to half-shift as a risk management measure (leading to an exposure reduction of 40 %).

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

Exposuro Soonario	Formet	(2) add	occina	uses corried out he	CONCUM		
	Pormat	(\mathbf{z}) addr	essing	uses carried out by	consum		
1. Title			0.1				
Free short title			Consu	mer use of building and	constructio	n material	
Systematic title based descriptor	on use		-	SU21, PC9a, PC9b, ERC8c, ERC8d, ERC8e, ERC8f			
Processes, tasks acti	vities co	vered	Applica	Handling (mixing and filling) of powder formulations Application of liquid, pasty lime preparations.			
Assessment Method*			A quali as exp Dutch	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	ndition	s and ri		nagement measur			
RMM				ated risk management m		e in place.	
PC/ERC	-		on of ac	ctivity referring to artic			ironmental release
PC 9a, 9b		Applicatio Post-appli	n of lime ication e	g of powder containing li e plaster, putty or slurry t exposure.	to the walls	or ceiling.	
ERC 8c, 8d, 8e, 8f Wide dis Wide dis			ersive o ersive o	ndoor use resulting in inc utdoor use of processing utdoor use of reactive si utdoor use resulting in ir	g aids in op ubstances i	en systems n open systems	
2.1 Control of con	sumer	s expos	sure				
Product characteristic							
Description of the preparation	Concentration of substance in the preparation			Physical state of the preparation	Dustine	ss (if relevant)	Packaging design
Lime substance	100 %			Solid, powder	High me	edium and low,	Bulk in bags of up to
Plaster, Mortar	20-409			Solid, powder	dependir lime sub (indicativ	ng on the kind of stance re value from sheet see	35 kg.
Plaster, Mortar	20-409	%		Pasty	-		-
Putty, filler	30-55%			Pasty, highly viscous, thick liquid	-		In tubes or buckets
Pre-mixed lime wash paint	~30%			Solid, powder		e value from sheet see	Bulk in bags of up to 35 kg.
Lime wash paint/milk of lime preparation	~ 30 %	0		Milk of lime preparation	-	/	
Amounts used Description of the preparation		Amoun	t used p	per event			
Filler, putty 250 g - Difficult		Difficult	 1 kg powder (2:1 powder water) It to determine, because the amount is heavily dependent on the depth and size of the to be filled. 				
				ing on the size of the roo			
Floor/wall equalizer				ing on the size of the roo	om, wall to	pe equalized.	
Frequency and duration	on of use	e/exposur					
Description of task			Durati	on of exposure per eve	ent	frequency of e	vents
Mixing and loading of lir powder.			Chapte	1.33 min (DIY ¹ -fact sheet, RIVM, Chapter 2.4.2 Mixing and loading of powders) 2/year (DIY ¹ fact sheet)		t sheet)	
Application of lime plast slurry to the walls or cei		or	Severa	Il minutes - hours		2/year (DIY ¹ fac	t sheet)

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Human factors not infl	uenced by	/ risk managem	nent			
Description of the			Breathing rat	0	Exposed body part	Corresponding skin
task	Fopulat	Population exposed		e	Exposed body part	area [cm ²]
Handling of powder	Adult		1.25 m³/hr	Half of both hands		430 (DIY ¹ fact sheet)
Application of liquid,						
pasty lime	Adult		NR		Hands and forearms	1900 (DIY ¹ fact sheet)
preparations.						
Other given operationa						
Description of the task		Indoor/outdo	or		volume	Air exchange rate
Handling of powder		indoor		area a	ersonal space, small ound the user)	0.6 hr ⁻¹ (unspecified room)
Application of liquid, pas	ty lime	indoor		NR		NR
preparations.						
Conditions and measu						
	damage DI	Yers should cor	nply with the sa	me strict	protective measures w	hich apply to professional
workplaces:						
 Change wet cl 	lothing, she	oes and gloves i	mmediately.			
 Protect uncover 	ered areas	of skin (arms, l	eas, face); there	are vari	ous effective skin prote	ction products which should
						Cleanse the skin thoroughly
		a care product.			, · · · · · J · · · · · ,	
Conditions and measu	res relate	d to personal p	rotection and h	nygiene		
					protective measures w	hich apply to professional
workplaces:	U				•	
 When preparir 	ng or mixin	g building mate	rials, during dem	nolition o	r caulking and, above a	all, during overhead work, wear
		ell as face masks			0 /	, G
					an facilitate burns. Whe	en working in a wet
environment, d	cotton glov	es with plastic c	overing (nitrile)	are bette	r. Wear gauntlet gloves	s during overhead work
because they	can consid	erably reduce tl	ne amount of hu	midity wl	nich permeates the wor	king clothes.
2.2 Control of envi	ironmen	tal exposur	e			
Product characteristics	s					
Not relevant for exposure	e assessm	ient		_		
Amounts used*						
Not relevant for exposur	e assessm	ient		2.0		
Frequency and duratio						
Not relevant for exposur		ient				
Environment factors n			nagement			
Default river flow and dil	ution					
Other given operationa	al conditio	ns affecting en	vironmental ex	posure		
Indoor				-		
Direct discharge to the w	vastewater	is avoided.				
Conditions and measu	res relate	d to municipal	sewage treatm	ent plan	t in the second s	
Default size of municipal	sewage s	ystem/treatmen	t plant and sludg	ge treatm	ent technique	
Conditions and measu						
Not relevant for exposure	e assessm	ient				
Conditions and measu	res relate	d to external re	ecovery of was	te		
Not relevant for exposure	e assessm	ient				
3. Exposure estim			to its sourc	е		
The risk characterisation	ratio (RC	R) is the quotier	t of the refined	exposure	estimate and the resp	ective DNEL (derived no-
effect level) and is given	in parenth	leses below. For	r inhalation expo	sure the	RCR is based on the	acute DNFL for lime
						halable dust). Thus, the RCR
						fraction according to EN 481.
						ed for dermal exposure and
exposure to the eye.		0				

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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/cm ²	Qualitative assessment
	(-)	If risk reduction measures are taken into account no human exposure is
	large task: 1 µg/cm ² (-)	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 dus
		formed while pouring powder has been taken from the DIY1-fact sheet (RIVM
		report 320104007).
Eye	Dust	Qualitative assessment
		If risk reduction measures are taken into account no human exposure is
		expected. Dust from loading of the lime substances cannot be excluded if no
		protective goggles are used. Prompt rinsing with water and seeking medical
		advice after accidental exposure is advisable.
Inhalation	Small task: 12 µg/m ³	Quantitative assessment
	(0.003)	Dust formation while pouring the powder is addressed by using the dutch
	Large task: 120 µg/m ³	model (van Hemmen, 1992, as described in section 9.0.3.1 above).
Annulla a Cana a C Randa	(0.03)	
Route of exposure	a, pasty lime preparations Exposure estimate	s. Method used, comments
Oral	Exposure estimate	Qualitative assessment
Orai		Oral exposure does not occur as part of the intended product use.
Dermal	Splashes	Qualitative assessment
Definital	Opidoneo	If risk reduction measures are taken into account no human exposure is
		expected. However, splashes on the skin cannot be excluded if no protective
		expected. However, splashes on the skin cannot be excluded if no protective gloves are worn during the application. Splashes may occasionally result in
Eve	Splashes	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	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. Qualitative assessment
Eye	Splashes	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. Qualitative assessment If appropriate goggles are worn no exposure to the eyes needs to be
Eye	Splashes	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. 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
Eye	Splashes	 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. 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,
Eye	Splashes	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. 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
Eye	Splashes	 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. 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
		 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. 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. Qualitative assessment
		 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. 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 Post-application ex	posure	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. 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. Qualitative assessment Not expected, as the vapour pressure of limes in water is low and generation of mists or aerosols does not take place.
Inhalation Post-application ex	posure	 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. 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. Qualitative assessment Not expected, as the vapour pressure of limes in water is low and generation
Inhalation Post-application ex	posure e will be assumed as the ac	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. 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. Qualitative assessment Not expected, as the vapour pressure of limes in water is low and generation of mists or aerosols does not take place.
Inhalation Post-application ex No relevant exposure dioxide from the atmo Environmental expo	posure a will be assumed as the ac osphere. osure	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. 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. Qualitative assessment Not expected, as the vapour pressure of limes in water is low and generation of mists or aerosols does not take place.
Inhalation Post-application ex No relevant exposure dioxide from the atmo Environmental expor Referring to the OC/F	posure will be assumed as the ac osphere. osure RMMs related to the environ	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. 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. Qualitative assessment Not expected, as the vapour pressure of limes in water is low and generation of mists or aerosols does not take place.
Inhalation Post-application ex No relevant exposure dioxide from the atmose Environmental export Referring to the OC/F pH of the influent of a	posure e will be assumed as the ac osphere. osure RMMs related to the environ a municipal wastewater treat	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. 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. Qualitative assessment Not expected, as the vapour pressure of limes in water is low and generation of mists or aerosols does not take place.
Inhalation Post-application exp No relevant exposure dioxide from the atmose Environmental expo Referring to the OC/F pH of the influent of a biological activity. The	posure e will be assumed as the ac osphere. osure RMMs related to the environ a municipal wastewater trea e influent of a municipal wa	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. 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. Qualitative assessment Not expected, as the vapour pressure of limes in water is low and generation of mists or aerosols does not take place.

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 9.13: Consumer use of CO_2 absorbent in breathing apparatuses

Exposure S	Scenario F	Format (2) addı	ressing	uses carried out by	consume	ers	
1. Title							
Free short ti	tle			Consumer use of CO ₂ absorbent in breathing apparatuses			
Systematic t	title based	on use descripto	r	SU21, PC2, ERC8b		<u> </u>	
Processes, t	asks activ	ities covered		Filling of the formulation into the cartridge			
				Use of closed circuit breathing apparatuses			
				Cleaning of equipment			
Assessment	Method*			Human health			and an elistence of a second
		A qualitative assessme The inhalation exposure Hemmen, 1992).			oral and dermal exposure. Dutch model (van		
				Environment			
				A qualitative justification	n assessm	ent is provided.	
2. Operat	tional co	nditions and	d risk	management me			
RMM				ar form. Furthermore, a c			-18%) is added which
will further reduce the dustiness of							
reacting with CO ₂ to form the carb						, ,	,,
PC/ERC				o article categories (AC) and env	ironmental relea	se categories (ERC)
PC 2	PC 2 Use of closed circuit breathing app						
	breathed	air will flow through	gh the at	sorbent and CO2 will qui	ckly react	(catalysed by wat	ter and sodium
			n dihydro	xide to form the carbona	te. The CC	2-tree air can be	re-breathed again, after
addition of oxygen. Handling of the absorbent: The ab			The obe	orbent will be discorded	after each	use and refilled h	efore each divo
ERC 8b Wide dispersive indoor use resulting							
					amatrix		
Product cha		nsumers ex	posur	e			
Description		Concentration	of the	Physical state of	Dustine	ss (if relevant)	Packaging design
preparation		substance in the preparation		the preparation	Duoimoco (in roio runi)		
CO ₂ absorbe	nt	78 - 84% Depending on the application the main component has different additives. A specific amount of water is always added		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" CO ₂ a	absorbent	(14-18%). ~ 20%		Solid, granular	Very low dustiness (reduction by 10 %		1-3 kg in breathing apparatus
100						d to powder)	
Amounts us							
		reathing apparatu		1-3 kg depending on the	e kind of b	reathing apparatu	JS
		n <mark>of use/exposu</mark> r			_		
Description		ate the		on of exposure per ever		frequency of e	
Filling of the t cartridge				33 min per filling, in sum <	< 15 min		ve (up to 4 times)
Use of closed apparatus			1-2 h	۱ <u>ـ</u>		Up to 4 dives a	
Cleaning and		if equipment ienced by risk m	< 15 m			After each dive	(up to 4 times)
Description task		Population exp	osed	Breathing rate	Exposed	d body part	Corresponding skin area [cm²]
Filling of the		adult		1.25 m ³ /hr (light	hands		840
formulation ir cartridge	nto the			working activity)			(REACH guidance R.15, men)
Use of closed					-		- /
breathing app							
Cleaning and of equipment	l emptying				hands		840 (REACH guidance R.15, men)

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Other given operation	onal conditio	ons affecting consumer					
Description of the ta		Indoor/outdoor	Room volume	Air exchange rate			
Filling of the formulat		NR	NR	NR			
cartridge							
Use of closed circuit	breathing	-	-	-			
apparatus							
Cleaning and emptyin	ng of	NR	NR	NR			
equipment	a constanta	d to information and be					
		lothing. Do not breathe d	havioural advice to consumers				
		avoid the soda lime to di					
Keep out of reach of			y out.				
Wash thoroughly afte							
In case of contact wit	h eyes, rinse	immediately with plenty o	of water and seek medical advice.				
Do not mix with acids							
			assure a proper use of the breat	hing apparatus.			
		d to personal protection					
149).	, goggles and	protective clothes during	handling. Use a filtering half mas	sk (mask type FFP2 acc. to EN			
	environm	ental exposure					
Product characteris							
Not relevant for expo		nent					
Amounts used*							
Not relevant for expo		nent					
Frequency and dura							
Not relevant for expo							
		ced by risk managemer	it				
Default river flow and		ons affecting environme	ntal expective				
Indoor		ins allecting environme					
	sures relate	d to municipal sewage	treatment plant				
			d sludge treatment technique				
Conditions and mea	sures relate	d to external treatment	of waste for disposal				
Not relevant for expos							
		d to external recovery	of waste				
Not relevant for expos			•				
		and reference to					
			efined exposure estimate and the				
			on exposure, the RCR is based or				
				(as inhalable dust). Thus, the RCR			
Since lime substance	sarety marg	In since the respirable fra	d eyes a qualitative assessment h	lable fraction according to EN 481.			
exposure and exposu			a eyes a quantative assessment i	las been performed for definar			
			their own CO ₂ scrubber) it can be	e assumed that instructions will be			
taken into account to	reduce expos	sure	_ ,				
Human exposure							
Filling of the formul	1						
Route of exposure	Exposure	estimate	Method used, comments				
Oral	-		Qualitative assessment	as part of the intended product use.			
Dermal	-		Qualitative assessment	as part of the intended product use.			
Connar			If risk reduction measures are	taken into account no human			
		exposure is expected. However, dermal contact to dust from					
			loading of granular soda lime o	or direct contact to the granules			
			cannot be excluded if no protect				
				ally result in mild irritation easily			
Evo	Duct		avoided by prompt rinsing with Qualitative assessment	water.			
Eye	Dust		If risk reduction measures are	taken into account no human			
				m loading of the granular soda lime			
			is expected to be minimal, ther	efore eye exposure will be minimal			
			even without protective goggle	s. Nevertheless, prompt rinsing with			
			water and seeking medical adv	vice after accidental exposure is			
			advisable.				

Singleton Birch Limited

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	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.
t breathing apparatus	grandial form.
	Method used, comments
-	Qualitative assessment
	Oral exposure does not occur as part of the intended product use
-	Qualitative assessment
	Due to the product characteristics, it can be concluded that derma exposure to the absorbent in breathing apparatuses is non-existent.
-	Qualitative assessment
	Due to the product characteristics, it can be concluded that eye exposure to the absorbent in breathing apparatuses is non- existent.
negligible	Qualitative assessment
	Instructional advice is provided to remove any dust before
	finishing the assembly of the scrubber. Divers filling their own CO
	scrubber represent a specific subpopulation within consumers.
	Proper use of equipment and materials is in their own interest;
	hence it can be assumed that instructions will be taken into
	account.
	Due to the product characteristics and the instructional advices given, it can be concluded that inhalation exposure to the
	absorbent during the use of the breathing apparatus is negligible.
ing of equipment	absorbent during the use of the breathing apparatus is negligible.
	Method used, comments
	Qualitative assessment
	Oral exposure does not occur as part of the intended product use
Dust and splashes	Qualitative assessment
	If risk reduction measures are taken into account no human
	exposure is expected. However, dermal contact to dust from
	emptying granular soda lime or direct contact to the 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.
Dust and splashes	Qualitative assessment
Dust and splashes	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.
Small task: $0.3 \mu g/m^3 (7.5 \times 10^{-5})$	Quantitative assessment
Large task: 3 µg/m³ (7.5 × 10⁻⁴)	Dust formation while pouring the powder is addressed by using
	the Dutch model (van Hemmen, 1992, as described in section
	9.0.3.1 above) and applying a dust reduction factor of 10 for the
	granular form and a factor of 4 to account for the reduced amount of lime in the "used" absorbent.
	negligible

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

								1.1	
Exposure Scenario	Forma	it (2) add	ressing	g uses carried	d out by	[,] consum	ers		
1. Title									
Free short title				Consumer use	Consumer use of garden lime/fertilizer				
Systematic title based on use descriptor			SU21, PC20,						
Processes, tasks activities covered			Manual application of garden lime, fertilizer Post-application exposure						
Assessment Method*									
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 t					
				Environment		model (va	in Heininen,	1992	.).
				A qualitative ju	stificatio	n assassm	ent is provid	۵d	
2. Operational cor	dition	is and r	isk ma					cu.	
RMM							re in place		
		ated risk management measures are in place. ctivity referring to article categories (AC) and environmental release							
I G/ERG	categories (ERC				ie outegoi				
PC 20		Surface s	preading	g of the garden	lime by s	hovel/hand	l (worst case) and	soil incorporation.
		Post-app	lication e	exposure to play	ing child	ren.			
PC 12		Surface s	preading	g of the garden	lime by s	hovel/ han	d (worst case	e) an	d soil incorporation.
		Post-app	lication e	exposure to play	ring child	ren.			
ERC 8e		Wide dis	persive c	outdoor use of re	eactive su	ubstances i	in open syste	ems	
2.1 Control of con	sume	rs expo	sure						
Product characteristic									
Description of the		entration	of the	Physical stat	e of	Dustine	ss (if releva	nt)	Packaging design
preparation		tance in t		the preparati		Dustine		,	r uokuging ucoign
propulation		aration		the preparati	on				
Garden lime	100 %			Solid, powder		High dus	tv		Bulk in bags or
Carden inne	100 /	0		Cond, powder		r light duo	ity		containers of 5, 10 and
									25 kg
Fertilizer	Up to	20 %		Solid, granular		Low dusty			Bulk in bags or
	0010	20 /0		Cond, granala	-	Low dust	uusty		containers of 5, 10 and
							25 kg		
Amounts used									20 119
Description of the pre	paration	n		Amount used	l per eve	nt	Source	e of i	information
Garden lime							formation and direction of use		
Fertilizer								and direction of use	
Frequency and duration	on of us	elexnosu	re	Toog/III (up t	o mg/m	(compost)			
Description of the tasl	(ic/cxposu		on of exposure	nor ove	nt	frequency	ofe	vents
Manual application	•	_		es-hours		frequency of events 1 tasks per year			
Marida application				ding on the size of the treated		i tasks per year			
			area	ung on the size		calcu			
			ddlers playing on grass (EPA		Relevant for up to 7 days after				
		ure factors handbook)		application		to r days alter			
Human factors not inf	luenced	l by risk n					application		
Description of the		lation exp		Breathing rat	te	Exposed	d body part		Corresponding skin
task				g ,					area [cm ²]
Manual application	al application Adult			1.25 m ³ /hr Hands		Hands a	nds and forearms		1900 (DIY fact sheet)
Post-application			NR NR		NR				
Other given operation			ectina c		osure	1			1 · ··· •
Description of the tasl			or/outdo			volume		Air	exchange rate
Manual application	-	outdo		1 m ³ (personal space		ace small	NR		
manual application						ound the u			
Post-application		outdo	or		NR			NR	
Conditions and measu	ires rela			n and behavio		ice to con	sumers		
Do not get in eyes, on s								ne F	EP2 acc. to EN 149)
Keep container closed a						ing nair ma	Lon (mask ty		12000.10 - 1119).
In case of contact with e					and se	ek medical	advice		
Wash thoroughly after h			atory wit	in picity of wate		en medical	advice.		
Do not mix with acids a			es to wa	ter and not wate	er to lime	s			
Incorporation of the gar							facilitate the	effe	ct.
Conditions and measu									
Wear suitable gloves, g									
wear suitable gloves, g	uggies a	and protec	uon cioti	ies.					

Wear suitable gloves, goggles and protection clothes.

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2.2 Control of e	nvironmental exposur		
Product characterist			
		a from dust measurem	ents in air as a function of the distance from application)
Amounts used			
Amount used	Ca(OH)2	2,244 kg/ha	In professional agricultural soil protection, it is
Amount used	CaO	1,700 kg/ha	recommended not to exceed 1700 kg CaO/ha or
	CaO.MgO	1,478 kg/ha	the corresponding amount of 2244 kg
	Ca(OH)2.Mg(OH)2		$Ca(OH)_2/ha$. This rate is three times the amount
		2,030 kg/ha	needed to compensate the annual losses of lime
	CaCO3.MgO	2,149 kg/ha	by leaching. For this reason, the value of 1700 kg
	Ca(OH)2.MgO	1,774 kg/ha	CaO/ha or the corresponding amount of 2244 kg
	Natural hydraulic lime	2,420 kg/ha	$Ca(OH)_2/ha$ is used in this dossier as the basis
			for the risk assessment. The amount used for the
			other lime variants can be calculated based on
			their composition and the molecular weight.
Frequency and dura	tion of use		
		lications during the ve	ar are allowed, provided the total yearly amount of 1,700
kg/ha is not exceeded		nications during the ye	al are allowed, provided the total yearly amount of 1,700
	not influenced by risk ma	nagomont	
		nagement	
Not relevant for expos		a dua num an fait a sur	
	onal conditions affecting er	ivironmental exposu	re
Outdoor use of produ			
Soil mixing depth: 20			
	s and measures at process		vent release
There are no direct re	leases to adjacent surface w	aters.	
Technical conditions	s and measures to reduce	or limit discharges, a	ir emissions and releases to soil
Drift should be minimi			
Conditions and mea	sures related to municipal	sewage treatment p	ant
Not relevant for expo			
	sures related to external t	and a first start and former at a first	
		reatment of waste to	r disposal
		reatment of waste to	r disposal
Not relevant for expo	sure assessment		r disposal
Not relevant for expositions and mea	sure assessment asures related to external r		r disposal
Not relevant for export Conditions and mean Not relevant for export	sure assessment sures related to external r sure assessment	recovery of waste	r disposal
Not relevant for expo Conditions and mea Not relevant for expo 3. Exposure est	sure assessment sures related to external r sure assessment imation and reference	recovery of waste	
Not relevant for expo Conditions and mea Not relevant for expo 3. Exposure esti The risk characterisa	sure assessment sures related to external r sure assessment mation and reference tion ratio (RCR) is the quotie	recovery of waste to its source nt of the refined expos	ure estimate and the respective DNEL (derived no-
Not relevant for expo Conditions and mea Not relevant for expo 3. Exposure est The risk characterisa effect level) and is give	sure assessment sures related to external r sure assessment imation and reference tion ratio (RCR) is the quotie ven in parentheses below. For	recovery of waste to its source nt of the refined exposor pr inhalation exposure,	ure estimate and the respective DNEL (derived no- the RCR is based on the long-term DNEL for lime
Not relevant for expo Conditions and mea Not relevant for expo 3. Exposure est The risk characterisa effect level) and is giv substances of 1 mg/m	sure assessment sures related to external r sure assessment imation and reference tion ratio (RCR) is the quotie ven in parentheses below. For n ³ (as respirable dust) and th	recovery of waste to its source nt of the refined exposor prinhalation exposure, he respective inhalation	ure estimate and the respective DNEL (derived no- the RCR is based on the long-term DNEL for lime n exposure estimate (as inhalable dust). Thus, the RCR
Not relevant for expo Conditions and mea Not relevant for expo 3. Exposure est The risk characterisa effect level) and is giv substances of 1 mg/m includes an additiona	sure assessment sure assessment imation and reference tion ratio (RCR) is the quotie ven in parentheses below. For n ³ (as respirable dust) and the l safety margin since the respiration	e to its source nt of the refined exposor inhalation exposure, he respective inhalation pirable fraction is a su	ure estimate and the respective DNEL (derived no- the RCR is based on the long-term DNEL for lime n exposure estimate (as inhalable dust). Thus, the RCR p-fraction of the inhalable fraction according to EN 481.
Not relevant for expo Conditions and mea Not relevant for expo 3. Exposure est The risk characterisa effect level) and is giv substances of 1 mg/m includes an additional Since lime substance	sure assessment sure assessment imation and reference tion ratio (RCR) is the quotie ven in parentheses below. For n ³ (as respirable dust) and the I safety margin since the respiration of the test are classified as irritating to	e to its source nt of the refined exposor inhalation exposure, he respective inhalation pirable fraction is a su	ure estimate and the respective DNEL (derived no- the RCR is based on the long-term DNEL for lime n exposure estimate (as inhalable dust). Thus, the RCR
Not relevant for expo Conditions and mea Not relevant for expo 3. Exposure est The risk characterisa effect level) and is giv substances of 1 mg/m includes an additional Since lime substance exposure and exposu	sure assessment sure assessment imation and reference tion ratio (RCR) is the quotie ven in parentheses below. For n ³ (as respirable dust) and the I safety margin since the respiration of the test are classified as irritating to	e to its source nt of the refined exposor inhalation exposure, he respective inhalation pirable fraction is a su	ure estimate and the respective DNEL (derived no- the RCR is based on the long-term DNEL for lime n exposure estimate (as inhalable dust). Thus, the RCR p-fraction of the inhalable fraction according to EN 481.
Not relevant for expo Conditions and mea Not relevant for expo 3. Exposure est The risk characterisa effect level) and is giv substances of 1 mg/m includes an additional Since lime substance exposure and exposure Human exposure	sure assessment sure assessment imation and reference tion ratio (RCR) is the quotie ven in parentheses below. For n ³ (as respirable dust) and the I safety margin since the respiration of the test are classified as irritating to	e to its source nt of the refined exposor inhalation exposure, he respective inhalation pirable fraction is a su	ure estimate and the respective DNEL (derived no- the RCR is based on the long-term DNEL for lime n exposure estimate (as inhalable dust). Thus, the RCR p-fraction of the inhalable fraction according to EN 481.
Not relevant for expor Conditions and mea Not relevant for expor 3. Exposure esti The risk characterisa effect level) and is giv substances of 1 mg/m includes an additional Since lime substance exposure and exposure Human exposure Manual application	sure assessment asures related to external re- sure assessment imation and reference tion ratio (RCR) is the quotie ven in parentheses below. For n ³ (as respirable dust) and the l safety margin since the respiration of the set as are classified as irritating to are to the eye.	e to its source nt of the refined exposor or inhalation exposure, he respective inhalation pirable fraction is a su o skin and eyes a qual	ure estimate and the respective DNEL (derived no- the RCR is based on the long-term DNEL for lime a exposure estimate (as inhalable dust). Thus, the RCR p-fraction of the inhalable fraction according to EN 481. itative assessment has been performed for dermal
Not relevant for expo Conditions and mea Not relevant for expo 3. Exposure est The risk characterisa effect level) and is giv substances of 1 mg/r includes an additional Since lime substance exposure and exposure Human exposure Manual application Route of	sure assessment sure assessment imation and reference tion ratio (RCR) is the quotie ven in parentheses below. For n ³ (as respirable dust) and the l safety margin since the respiration of the test are classified as irritating to	e to its source nt of the refined exposor or inhalation exposure, he respective inhalation pirable fraction is a su o skin and eyes a qual	ure estimate and the respective DNEL (derived no- the RCR is based on the long-term DNEL for lime n exposure estimate (as inhalable dust). Thus, the RCR p-fraction of the inhalable fraction according to EN 481.
Not relevant for expor Conditions and mean Not relevant for expor- 3. Exposure estimation The risk characterisan effect level) and is given substances of 1 mg/m includes an additionan Since lime substance exposure and exposure Human exposure Manual application Route of exposure	sure assessment asures related to external re- sure assessment imation and reference tion ratio (RCR) is the quotie ven in parentheses below. For n ³ (as respirable dust) and the l safety margin since the respiration of the eye. Exposure estimate	e to its source nt of the refined exposure, re respective inhalation pirable fraction is a su o skin and eyes a qual	ure estimate and the respective DNEL (derived no- the RCR is based on the long-term DNEL for lime a exposure estimate (as inhalable dust). Thus, the RCR p-fraction of the inhalable fraction according to EN 481. itative assessment has been performed for dermal sed, comments
Not relevant for expor Conditions and mea Not relevant for expor 3. Exposure est The risk characterisa effect level) and is giv substances of 1 mg/r includes an additiona Since lime substance exposure and exposure Human exposure Manual application Route of	sure assessment asures related to external re- sure assessment imation and reference tion ratio (RCR) is the quotie ven in parentheses below. For n ³ (as respirable dust) and the l safety margin since the respiration of the set as are classified as irritating to are to the eye.	recovery of waste to its source nt of the refined exposure, ne respective inhalation pirable fraction is a sul o skin and eyes a qual Method us Qualitative	ure estimate and the respective DNEL (derived no- the RCR is based on the long-term DNEL for lime a exposure estimate (as inhalable dust). Thus, the RCR o-fraction of the inhalable fraction according to EN 481. itative assessment has been performed for dermal sed, comments assessment
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Not relevant for expo Conditions and mea Not relevant for expo 3. Exposure est The risk characterisa effect level) and is giv substances of 1 mg/r includes an additional Since lime substance exposure and exposure Human exposure Manual application Route of exposure	sure assessment asures related to external re- sure assessment imation and reference tion ratio (RCR) is the quotie ven in parentheses below. For n ³ (as respirable dust) and the l safety margin since the respiration of the eye. Exposure estimate	recovery of waste to its source nt of the refined exposure, ne respective inhalation pirable fraction is a sul o skin and eyes a qual Method us Qualitative Oral expos Qualitative	ure estimate and the respective DNEL (derived no- the RCR is based on the long-term DNEL for lime a exposure estimate (as inhalable dust). Thus, the RCR o-fraction of the inhalable fraction according to EN 481. itative assessment has been performed for dermal sed, comments assessment ure does not occur as part of the intended product use. assessment
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Not relevant for expo Conditions and mea Not relevant for expo 3. Exposure est The risk characterisa effect level) and is give substances of 1 mg/m includes an additiona Since lime substance exposure and exposure Human exposure Manual application Route of exposure Oral	sure assessment sure assessment mation and reference tion ratio (RCR) is the quotie ven in parentheses below. For n ³ (as respirable dust) and the l safety margin since the respirable dust) and the l safety margin since the respiration are classified as irritating to are to the eye. Exposure estimate	recovery of waste to its source the refined exposure, the respective inhalation to skin and eyes a qual to skin and eyes a qual to gradie the the the the the the the the the th	ure estimate and the respective DNEL (derived no- the RCR is based on the long-term DNEL for lime a exposure estimate (as inhalable dust). Thus, the RCR o-fraction of the inhalable fraction according to EN 481. itative assessment has been performed for dermal sed, comments assessment ure does not occur as part of the intended product use. assessment ction measures are taken into account no human is expected. However, dermal contact to dust from
Not relevant for expo Conditions and mea Not relevant for expo 3. Exposure est The risk characterisa effect level) and is give substances of 1 mg/m includes an additiona Since lime substance exposure and exposure Human exposure Manual application Route of exposure Oral	sure assessment sure assessment mation and reference tion ratio (RCR) is the quotie ven in parentheses below. For n ³ (as respirable dust) and the l safety margin since the respirable dust) and the l safety margin since the respiration are classified as irritating to are to the eye. Exposure estimate	recovery of waste to its source to its source to ithe refined exposure, the respective inhalation pirable fraction is a su o skin and eyes a qual	ure estimate and the respective DNEL (derived no- the RCR is based on the long-term DNEL for lime a exposure estimate (as inhalable dust). Thus, the RCR p-fraction of the inhalable fraction according to EN 481. itative assessment has been performed for dermal sed, comments assessment ure does not occur as part of the intended product use. assessment ction measures are taken into account no human is expected. However, dermal contact to dust from of lime substances or by direct contact to the limes
Not relevant for expo Conditions and mea Not relevant for expo 3. Exposure est The risk characterisa effect level) and is give substances of 1 mg/m includes an additiona Since lime substance exposure and exposure Human exposure Manual application Route of exposure Oral	sure assessment sure assessment mation and reference tion ratio (RCR) is the quotie ven in parentheses below. For n ³ (as respirable dust) and the l safety margin since the respirable dust) and the l safety margin since the respiration are classified as irritating to are to the eye. Exposure estimate	to its source to its source to its source to ithe refined exposure, the respective inhalation pirable fraction is a su o skin and eyes a qual	ure estimate and the respective DNEL (derived no- the RCR is based on the long-term DNEL for lime a exposure estimate (as inhalable dust). Thus, the RCR p-fraction of the inhalable fraction according to EN 481. itative assessment has been performed for dermal sed, comments assessment ure does not occur as part of the intended product use. assessment ction measures are taken into account no human is expected. However, dermal contact to dust from of lime substances or by direct contact to the limes excluded if no protective gloves are worn during
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Singleton Birch Limited.

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Quicklime Range

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

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

Revision Date: December 2010

Printing Date: June 1, 2011

Inhalation (garden	Small task: 12 µg/m ³ (0.0012)	Quantitative assessment
lime)	Large task: 120 µg/m³ (0.012)	No model describing the application of powders by shovel/hand is available, therefore, read-across from the dust formation model while pouring powders has been used as a worst case. Dust formation while pouring the powder is addressed by using the dutch model (van Hemmen, 1992, as described in section 9.0.3.1 above).
Inhalation (fertilizer)	Small task: 0.24 μg/m³ (2.4 * 10 ⁻⁴) Large task: 2.4 μg/m³ (0.0024)	Quantitative assessment No model describing the application of powders by shovel/hand is available, therefore, read across from the dust formation model while pouring powders has been used as a worst case. Dust formation while pouring the powder is addressed by using the dutch model (van Hemmen, 1992, as described in section 9.0.3.1 above) and applying a dust reduction factor of 10 for the granular form and a factor of 5 to account for the reduced amount of limes in fertilizer.

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

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

and also via the oral route through hand-to-mouth activities.

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	Format (2) add	ressing	uses carried out by	/ consum	ers	
1. Title						
Free short title	Consumer use of lime		s as water treatme	ent chemicals		
Systematic title based	SU21, PC20, PC37, ERC8b					
Processes, tasks activ	Loading, filling or re-filling of solid formulations into container/preparation of lime milk Application of lime milk to water					
Assessment Method*	Human health:					
	A qualitative assessment has been performed for oral and dermal exposure as well as for exposure of the eye. Dust exposure has been assessed by the Dutch model (van Hemmen, 1992). Environment: A qualitative justification assessment is provided.					
2. Operational co	onditions an	d risk				
RMM	No furthe	er produc	t integrated risk manage	ement meas	sures are in place	
PC/ERC Description of a categories (ERC		ctivity referring to artic	cle categor	ies (AC) and env	ironmental release	
PC 20/37 Filling and re-fillin Transfer of lime su			g (transfer of lime subst ubstances (solid) into co tion of lime milk to water	ontainer for		
ERC 8b			ndoor use of reactive su		open systems	
2.1 Control of co						
Product characteristic		PCCU				
Description of the		of the	Physical state of	Dustine	ess (if relevant)	Packaging design
preparation	Concentration of the substance in the preparation		the preparation	Dustine	ss (il relevant)	Fackaging design
Water treatment chemical	Up to 100 %		Solid, fine powder		ve value from sheet see	Bulk in bags or buckets/containers.
Water treatment chemical	Up to 99 %		Solid, granular of different size (D50 value 0.7 D50 value 1.75 D50 value 3.08)		tiness on by 10% ed to powder)	Bulk-tank lorry or in "Big Bags" or in sacks
Amounts used						
Description of the prep	paration		Amount used per ev	ent		
Water treatment chemic aquaria		for	depending on the size	of the wate	er reactor to be fill	ed (~ 100g /L)
Water treatment chemic drinking water	al in lime reactor f	for	depending on the size	of the wate	er reactor to be fill	ed (~up to 1.2 kg/L)
Lime milk for further app	lication		~ 20 g / 5L			
Frequency and duratio		re				
Description of task Durati		on of exposure per ev	ent	frequency of e	vents	
Preparation of lime milk (loading, filling and refilling) 1.33 m (DIY-fa			er 2.4.2	1 task/month		
		al minutes - hours	;	1 tasks/ month		
Human factors not infl	uenced by risk n	nanagen	nent			
Description of the task	Population exposed		Breathing rate	Expos	sed body part	Corresponding skin area [cm ²]
Preparation of lime milk (loading, filling and refilling)	adult		1.25 m³/hr		f both hands	430 (RIVM report 320104007)
Dropwise application of lime milk to water	adult		NR	Hands	3	860 (RIVM report

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Dependention of the f	ماد	Indeer/autal	Deers values	Air evelopment of t
Description of the ta		Indoor/outdoor	Room volume	Air exchange rate
Preparation of lime mi	lik (loading,	Indoor/outdoor	1 m ³ (personal space, small	0.6 hr ⁻¹ (unspecified room
filling and refilling) Dropwise application of	of lime mills	indoor	area around the user)	indoor) NR
to water		muoor		
	sures relate	d to information and b	behavioural advice to consumers	
		lothing. Do not breathe		
Keep container closed				
Use only with adequat				
			of water and seek medical advice.	
Wash thoroughly after	r handling.			
		add limes to water and		
		d to personal protecti		
			e a filtering half mask (mask type FFP2 a	acc. to EN 149).
2.2 Control of e	environm	ental exposure		
Product characterist				
Not relevant for expos	sure assessm	ient		
Amounts used*				
Not relevant for expos		ient		
Frequency and durat				
Not relevant for expos				
		ced by risk managem	ent	
Default river flow and		ne offecting environm	antal avposure	
Indoor		ns affecting environn	ientai exposure	
	sures relate	d to municipal sewage	a treatment plant	
			and sludge treatment technique	
			nt of waste for disposal	
Not relevant for expos				
Conditions and measure				
Conditions and meas		u lo externar recover	v of waste	
Not relevant for expos			y of waste	
Not relevant for expos	sure assessm	ient		
Not relevant for expos 3. Exposure es	sure assessm stimation	ent and reference t	o its source	pective DNEL (derived no-
Not relevant for expos 3. Exposure es The risk characterisati	sure assessm timation ion ratio (RC	ent and reference t R) is the quotient of the	o its source refined exposure estimate and the resp	
Not relevant for expos 3. Exposure es The risk characterisati effect level) and is give	sure assessm timation ion ratio (RC en in parenth	ent and reference t R) is the quotient of the eses below. For inhala	o its source refined exposure estimate and the resp tion exposure, the RCR is based on the	acute DNEL for lime
Not relevant for expos 3. Exposure es The risk characterisati effect level) and is giv substances of 4 mg/m	sure assessm timation ion ratio (RC en in parenth i ³ (as respiral	ent and reference t R) is the quotient of the leses below. For inhala ble dust) and the respe	o its source refined exposure estimate and the resp	acute DNEL for lime halable dust). Thus, the RCR
Not relevant for expos 3. Exposure es The risk characterisati effect level) and is giv substances of 4 mg/m includes an additional	timation ion ratio (RC) en in parenth ³ (as respiral safety margi	ent and reference t R) is the quotient of the leses below. For inhala ole dust) and the respe n since the respirable f	o its source refined exposure estimate and the resp tion exposure, the RCR is based on the ctive inhalation exposure estimate (as ir	acute DNEL for lime halable dust). Thus, the RCR fraction according to EN 481.
Not relevant for expos 3. Exposure es The risk characterisati effect level) and is giv substances of 4 mg/m includes an additional	timation ion ratio (RC en in parenth ³ (as respiral safety margi s are classifie	and reference to and reference to R) is the quotient of the leses below. For inhala ole dust) and the respe n since the respirable f ed as irritating to skin an	o its source refined exposure estimate and the resp tion exposure, the RCR is based on the ctive inhalation exposure estimate (as ir raction is a sub-fraction of the inhalable	acute DNEL for lime halable dust). Thus, the RCR fraction according to EN 481.
Not relevant for expos 3. Exposure es The risk characterisati effect level) and is giv substances of 4 mg/m includes an additional Since lime substances exposure and exposure Human exposure	sure assessm timation ion ratio (RC en in parenth ³ (as respiral safety margi s are classifie re to the eye.	and reference to and reference to R) is the quotient of the leses below. For inhala ole dust) and the respe n since the respirable f ed as irritating to skin an	o its source refined exposure estimate and the resp tion exposure, the RCR is based on the ctive inhalation exposure estimate (as ir raction is a sub-fraction of the inhalable	acute DNEL for lime halable dust). Thus, the RCR fraction according to EN 481.
Not relevant for expos 3. Exposure es The risk characterisati effect level) and is giv substances of 4 mg/m includes an additional Since lime substances exposure and exposure Human exposure Preparation of lime r	sure assessm timation ion ratio (RC en in parenth ³ (as respiral safety margi s are classifie re to the eye. milk (loading	and reference to and reference to R) is the quotient of the leses below. For inhala ole dust) and the respe n since the respirable f ed as irritating to skin an	o its source refined exposure estimate and the resp tion exposure, the RCR is based on the ctive inhalation exposure estimate (as ir raction is a sub-fraction of the inhalable and eyes a qualitative assessment has be	acute DNEL for lime halable dust). Thus, the RCR fraction according to EN 481.
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Singleton Birch Limited, Melton Ross Quarries, Barnetby, North Lincolnshire, DN38 6AE

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Quicklime Range

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

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

Revision Date: December 2010

Printing Date: June 1, 2011

Inhalation	Small task: 1.2 µg/m³ (0.0003)	Quantitative assessment
(granules)	Large task: 12 µg/m ³ (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.
	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
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	sure	
The pH impact due to	use of lime in cosmetics is expected	to be negligible. The influent of a municipal wastewater treatment

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.

Singleton Birch Limited.

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ES number 9.15: Consumer use of cosmetics containing lime substances

1. Title	
Free short title	Consumer use of cosmetics containing limes
Systematic title based on use descriptor	SU21, PC39, ERC8a
Processes, tasks activities covered	5021, PC39, ERC6a
FIOCESSES, lasks activities covered	- Human health:
Assessment Method*	According to Article 14(5) (b) of regulation (EC) 1907/2006 risks to human health need not be considered for substances included in cosmetic products within the scope of Directive 76/768/EC. Environment A qualitative justification assessment is provided.
2. Operational conditions and risk ma	nagement measures
	ndoor use of processing aids in open systems
2.1 Control of consumers exposure	
Product characteristic	
Not relevant, as the risk to human health from this	use does not need to be considered
Amounts used	
Not relevant, as the risk to human health from this	use does not need to be considered
Frequency and duration of use/exposure	
Not relevant, as the risk to human health from this	use does not need to be considered
Human factors not influenced by risk managem	
Not relevant, as the risk to human health from this	
Other given operational conditions affecting co	
Not relevant, as the risk to human health from this	
Conditions and measures related to information	
Not relevant, as the risk to human health from this	
Conditions and measures related to personal p	
Not relevant, as the risk to human health from this	
2.2 Control of environmental exposure	
	2
Product characteristics	
Not relevant for exposure assessment Amounts used*	
Not relevant for exposure assessment	
Frequency and duration of use	
Not relevant for exposure assessment	
Environment factors not influenced by risk mar	agement
Default river flow and dilution	ingenien.
Other given operational conditions affecting en	vironmental exposure
Indoor	
Conditions and measures related to municipal	sewage treatment plant
Default size of municipal sewage system/treatment	
Conditions and measures related to external tr	
Not relevant for exposure assessment	
Conditions and measures related to external re	ecovery of waste
Not relevant for exposure assessment	
3. Exposure estimation and reference	to its source
Human exposure	
numanexposure	v other legislation and therefore need not be addressed under regulation (F)
Human exposure to cosmotice will be addressed by	V OTHER REGISTATION AND THEREFORE HEED NOT DE AUDIESSEU UNDER REGUIATION (ET
Human exposure to cosmetics will be addressed by $1907/2006$ according to Article $14(5)$ (b) of this regime	
Human exposure to cosmetics will be addressed by 1907/2006 according to Article 14(5) (b) of this register Environmental exposure	

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

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