SPECIFIC ENVIRONMENTAL RELEASE CATEGORIES (SPERCS) FOR PROFESSIONAL AND CONSUMER USE OF FERTILIZER SUBSTANCES

Background document

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GENERAL DISCLAIMER

SPERCs are specific environmental release categories, meant to specify broad emission scenario information (ERCs) as suggested for the use of substances throughout their life cycles (Reihlen et al., 2016). Although specific, SPERCs still reflect emissions of a broad application area of a substance within an industry sector. For their purpose SPERCs are overly conservative and, therefore, their emission estimates are not intended to reflect all regulatory requirements that may relate to environmental emission thresholds.

The quality of the developed SPERCs and this background document have been reviewed in the context of the Exchange Network on Exposure Scenarios (ENES), according to the SPERCs Quality Criteria v.0.14 (June 2019).

1. PURPOSE STATEMENT

1.1. INTRODUCTION

In order to comply with the requirements of European Regulation (EC) No. 1907/2006 (REACH), a chemical safety assessment needs to be performed for substances manufactured or imported above 10 tonnes/year. In addition, an exposure and risk assessment must be performed for hazardous substances. Fertilizers are considered as formulations and therefore no registration or chemical safety assessment is required for fertilizers as such under REACH. However, the use of the individual constituents needs to be covered in the Chemical Safety Report (CSR) of the substances.

Fertilizers are applied to correct apparent soil nutrient deficiencies, in order to ensure optimal growth and harvest of cultivated crops. Mineral fertilizers provide nutrients for crops according to their needs. Fertilizers may also contain co-formulants which are needed for example to prevent the caking of granules. Currently, the environmental exposure and risk assessment of hazardous substances used in fertilizer formulations is mainly described in a qualitative way, because of the lack of appropriate tools for fertilizer specific environmental exposure assessment. The new European fertilizer regulation (Regulation (EU) 2019/1009) explicitly mentions that all substances incorporated into EU fertilizing products, on their own or in a mixture, shall have been registered pursuant to Regulation (EC) No 1907/2006 (REACH), with a dossier containing as a minimum the information requirements for the registration of substances in quantities of 10 to 100 tonnes and a chemical safety report covering the use as a fertilizing product, unless explicitly covered by one of the registration obligation exemptions provided for by Annex IV or Annex V of the REACH Regulation.

Under the umbrella of Fertilizers Europe and FARM (REACH consortium of manufacturers of Fertilizers and Related Materials), the fertilizer sector developed a fertilizer sector uses map in accordance with ECHA guidelines and templates. Fertilizer uses and practices were described in detail to enable the exposure assessment of fertilizer substances for REACH purposes. As it became obvious that the environmental assessment of fertilizer uses can not be performed quantitatively by using the environmental release categories (ERCs) and exposure tools currently available for exposure assessment under REACH, it was decided to complete the uses map by generating sector specific ERCs (SPERCs) and a specific environmental exposure tool for fertilizer uses.

As a first step, **SPERCs** were developed for the purpose of environmental risk assessment of environmentally hazardous substances in fertilizers, soil improvers and related products. For each group of similar uses, realistic emission factors to air, water and soil were derived taking into account method of application (e.g. foliar spraying, direct application into/onto soil) and product properties (solids, granules, liquids).

Secondly, a **Fertilizers Environmental Exposure tool (FEE) tool** was developed for environmental fate modelling of fertilizer substances and soil improvers, since in the standard REACH models for environmental exposure assessment (EUSES, ECETOC TRA, CHESAR), currently no local scenario for direct emissions to soil exists. Quantitative exposure scenarios, resulting in the calculation of realistic worst-case local Predicted Environmental Concentrations (PEC local) for fertilizer constituents in the various environmental compartments (soil, water, sediment) were established. Several refinement options are included in the tool (e.g. selection of specific crops, crop growth stages and yield scenarios) as well as risk management options related to drift and runoff reduction. The FEE tool is recommended to be used for any future environmental exposure assessment of fertilizer compounds instead of the default REACH models.

The main focus of the FEE tool is on fertilizer micronutrients such as manganese, copper and zinc, which are all identified as hazardous for the aquatic environment; but the tool allows for the assessment of other inorganic and organic substances in fertilizers as well.

Further information on this project, including downloads of the SPERC factsheets, the FEE tool and user guidance document, can be found on the website of Fertilizers Europe: http://www.reachfertilizers.com/

This document provides background information to the Fertilizers Europe SPERC factsheets for professional and consumer use of fertilizer substances, soil improvers and related products (Fertilizers Europe SPERC 8e.1.v2 - 8e.4.v3). Specific information is provided on product and process domains, and on operational conditions relevant to environmental exposure (Chapter 2 and 3), on risk management measures (Chapter 4) and on the derivation and justification of release factors used as input for the exposure assessment (Chapter 5).

1.2. SPERCS

The standard approach for environmental exposure assessment under REACH is to select the most appropriate Environmental Release Category (ERC) for each use, as described in R.16 of the REACH Guidance on Information Requirements & Chemical Safety Assessment (ECHA, 2016). These ERCs are defined as generic, broadly applicable emission scenarios. They define the fractions of a substance emitted to the various environmental compartments, and provide default assumptions on standardized local environmental properties.

ERC8e, referring to widespread use of reactive processing aids (no inclusion into or onto article; outdoor) was selected as the most relevant ERC for outdoor use of fertilizer nutrients by Fertilizers Europe uses map work (http://www.reachcentrum.eu/consortium/farm-reach-consortium-112.html#). ERC8e default worst-case release factors to air, water and soil are 0.10%, 2% and 1%, respectively. This ERC was regarded as the most applicable choice because fertilizer nutrient substances “react upon use” as they dissolve and react with soil constituents and become available for crop uptake. Emissions to air are generally not expected to happen from inorganic fertilizers. ERC8e emission estimates reflect the process of losses to the environment from the local use of substances, but do not reflect emissions to soil, water and air through direct application. Furthermore, although ERCs provide for standardization, they often lead to unrealistic emission estimates. The REACH R.16 guidance acknowledges that an “ERC should be used as a starting point for emission estimation” and explicitly encourages the use of more refined or specific information on emissions, resulting in the development and use of specific ERCs (SPERCs).

Based on extensive use mapping of fertilizer application technologies, the uses were grouped towards common emission potential to the environment and corresponding SPERCs were developed for each group. These SPERCs are used to specify broad emission scenarios, as defined in the ERCs. Even though they are more specific, SPERCs still describe emission scenarios applicable to a wide range of substances within an industry sector, and are intended to represent conservative estimates of environmental exposure. Grouping was mainly based on the physical form of the fertilizers and their mode of application.

For the outdoor application of fertilizers and related products, four different SPERCs have been developed. SPERC1 (Fertilizers Europe SPERC 8e.1.v2), SPERC2 (Fertilizers Europe SPERC 8e.2.v2) and SPERC4 (Fertilizers Europe SPERC 8e.4.v3) can be used to assess the exposure of both professional and consumer fertilizer uses. SPERC3 (Fertilizers Europe SPERC 8e.3.v2) is applicable only for professional fertilizer use. The SPERCs covered in this background document are described in Table 1.

Table 1. SPERCs for professional and consumer use of fertilizer substances

SPERC code	Title	Application area
Fertilizers Europe SPERC 8e.1.v2	Outdoor use - direct application of solid fertilizers to soil; surface spreading	Professional and consumer use of nutrients in solid granular fertilizers, applied onto soil surface with or without crop cover.
Fertilizers Europe SPERC 8e.2.v2	Outdoor use - direct application of solid or liquid fertilizers to soil; incorporation, placement, mixing, seed treatment, drip irrigation	Professional and consumer use of nutrients in solid and liquid fertilizers. Fertilizers become either placed into soil, ploughed into soil or will penetrate into soil when using fertigation dripping system.
Fertilizers Europe SPERC 8e.3.v2	Outdoor use - application of fertilizers by helicopter	Professional use of nutrients in fertilizers. Spreading happens from helicopter.
Fertilizers Europe SPERC 8e.4.v3	Outdoor use - spray application of fertilizers in liquid form; soil surface spreading, sprinkler, pivot, foliar spray, slurry	Professional and consumer use of nutrients in fertilizers in liquid form.

1.3. FEE TOOL

In the standard REACH models for environmental exposure assessment (EUSES, ECETOC TRA, CHESAR), currently no local emission scenario for direct application to soil exists. In addition, the default local environmental exposure assessment for REACH does not take into account several processes that are important for the environmental fate of fertilizer constituents, e.g. plant uptake with subsequent crop harvest, or losses via spray drift and transfer from soil surface to surface water at the local scale via runoff or drainage. Therefore, an exposure tool was developed for local environmental fate modelling of fertilizer substances: the Fertilizers Environmental Exposure (FEE) tool. **The FEE tool is recommended for use in any future quantitative environmental exposure assessment of fertilizer compounds instead of the standard REACH models.**

As a first step, environmental exposure can be calculated by the FEE tool for the various compartments (soil, water and sediment), using default release factors from the Fertilizers Europe SPERCs, plus selection of a “generic crop”.

Refinement options can be made in the tool by including the choice of a specific crop type, growth stage and yield scenario, in order to refine drift and runoff estimates, and include crop offtake by harvest.

In the FEE tool, environmental fate calculations are based upon equations from the REACH R.16 Guidance document (ECHA, 2016) and complemented with calculation methods and parameters from Steps 1-2 in FOCUS (a validated first tier model used in exposure assessment of plant protection products; FOCUS, 2015) and Simplebox (the regional REACH environmental exposure model; RIVM, 2014) where required. The local scenario for environmental exposure assessment in the FEE tool is based upon the standard exposure scenario of the 'Steps 1-2 in FOCUS' model: a 1 ha agricultural field, surrounded by a shallow water body (width of 2.5 m and depth of 0.3 m). Crop types that can be selected for a refined exposure assessment are based upon the FOCUS crops as listed in 'Steps 1-2 in FOCUS' (FOCUS, 2015). For the crop yield scenarios, yield data for the various crops from the Eurostat database (averages 2012-2014; Eurostat, 2016) has been used to establish low, high and medium yield scenarios. These yield scenarios, when combined with concentrations of the fertilizer substances taken up by the different crops, allow for the calculation of crop offtake, i.e. the amount of a substance that is removed from the field by harvest. More details and specific guidance on the use of the FEE tool can be found in the **FEE tool user guidance document** (Fertilizers Europe, 2019).

2. SCOPE

Fertilizers are designed to close the gap between the natural nutrient supply of the soil and the nutrient requirement of cultivated crops and are therefore applied if soil availability of nutrients is low. Fertilizers can contain both macro- and micronutrients that are essential for optimal plant growth. Nutrients are primarily (actively) taken up by the plant from soil pore water, via the plant's root system, but also via foliage for spray applications. When a plant is harvested, the nutrient content in the harvested parts is lost from the soil system, thereby lowering the soil nutrient reserves (Fertilizers Europe, 2016). Non-harvested plant parts are expected to be left on the field and to become part of the soil organic matter, and as such are still considered as part of the soil nutrient content.

Application mode, substance properties, crop type, crop developmental stage and yield scenarios are all important in order to estimate environmental exposure of fertilizer substances. The Fertilizers Europe SPERCs, providing a first step for the default assessment of a specific use within a use group, are mainly based upon product type and application method, which will be further discussed in the next paragraphs.

The Fertilizers Europe SPERCs cover local scale, widespread use of solid and liquid fertilizers, soil improvers and related products in crop growing by professionals and consumers. Farmers are considered professional users. The SPERCs are focused on outdoor uses in an agricultural setting, including use in a.o. forestry, horticulture, gardens and golf courses. They also include the use of fertilizers in covered structures when crops are cultivated in contact with the soil (e.g. non-permanent covers, walk-in tunnels and nurseries). In this case, outdoor use represents a worst-case for environmental exposure. Greenhouse structures, with no direct soil contact and with (partly) closed water circulation systems are not covered by the Fertilizers Europe SPERCs as described in this background document.

The Fertilizers Europe SPERCs cover both the application stage, as well as the mixing and loading step of the fertilizer uses. Emissions from formulation and re-packaging at industrial manufacturing sites are not addressed by the Fertilizers Europe SPERCs.

List of applicable Use Descriptors
LCS: PW, C (Widespread use by professional workers; Consumer use)
SU: 1 (Agriculture, forestry, fishery)
PC: 12 (Fertilizers)

2.1. INGREDIENTS AND PRODUCT TYPES

Next to macronutrients, fertilizers may also contain micronutrients (e.g. Cu, Mn and Zn) in different proportions. This is important, since nutrient requirements can vary widely between crop types, depending on e.g. soil properties, climatic conditions, crop root system and foliar coverage. In addition, the rate and ratio at which nutrients are needed, changes over the crops' life cycle (Fertilizers Europe, 2016). Besides nutrients, fertilizers may contain also other ingredients in low concentrations, like fillers, coatings, surfactants and preservatives. These substances (both organic and inorganic) can also be covered by the Fertilizers Europe SPERCs and the environmental fate modelling in the FEE tool.

Fertilizers exist in different product types, based on their physical form: solids (granular, prilled, compacted or salt mixtures), liquids, soluble solids and pastes. Depending on the type of fertilizer, nutrients can either be directly available for uptake by the plant, or being slowly released throughout the growing season. Granular products comprise the largest category of fertilizers in Europe, but water-soluble and liquid fertilizers for use in fertigation systems or foliar sprays are increasingly being introduced.

2.2. APPLICATION TECHNIQUES

Depending on the market, fertilizer product type and sector of use, the method of application can vary. Four main groups of application techniques can be distinguisheld:

- Firstly, solid fertilizers are commonly applied mechanically (by tractor) on agricultural land by surface spreading. Application can take place on bare soil, or in case of topdressing for grassland and autumn cereals there is crop cover present during the surface spreading.
- Secondly, a more targeted method of application for both solid and liquid fertilizers is by incorporation, placement, seed treatment and drip irrigation. With these methods fertilizers become either placed into soil, ploughed into soil or will locally penetrate into soil by the assistance of water. This type of application is especially used when sowing cereals and for crops like fruits and vegetables and in areas subject to water scarcity or salinity. This technique ensures that nutrients are delivered to the crop with minimal loss to the environment.
- Thirdly, a less common method of application is aerial application of fertilizers by helicopter. This type of application method is especially used for production forests, in remote locations that are inaccessible by other means.
- The fourth method of application is spray application of fertilizers in liquid form, e.g. by soil surface spreading, sprinkler, pivot, foliar spray or slurry. Fertilizer products are either in liquid form or pastes which will be diluted or solids which will be dissolved in water before application. Foliar application provides an additional route of nutrient absorption besides uptake by the plant roots.

3. EMISSION RELEVANCE OF OPERATIONAL CONDITIONS

Table 2 provides an overview of the different activities involved in the widespread use of fertilizer substances, soil improvers and related products, by professional and consumer users, and their relevance regarding direct emissions to the environment. Since these products are intentionally applied to agricultural soil (bare soil or soil covered with crops), the most important phase concerning emissions is the application stage, with soil being the main receiving environmental compartment. For more information regarding respective release factors see Chapter 5.3.

Table 2 Overview of steps involved in the widespread use of fertilizers, linked to potential for direct emissions to the environment

SPERC code	**Fertilizer Europe SPERC 8e.1.v2**	**Fertilizer Europe SPERC 8e.2.v2**	**Fertilizer Europe SPERC 8e.3.v2**	**Fertilizer Europe SPERC 8e.4.v3**
Product type	Solids	Solids, liquids	Solids, liquids	Solids, liquids
Application technique	Surface spreading	Precision placement	Aerial application	Spray application
Process steps				
Mixing and loading of fertilizers and subsequent cleaning of equipment	**Accounted for in the release factors**			
Disposal of empty containers or packaging	Empty containers or packaging disposed of as waste, according to local regulations. Emissions to environment are negligible compared to emissions during application stage.			
Fertilizer application, emissions to soil	Intentional release to soil – **accounted for in release factors**			
Fertilizer application, emissions to surface water	Direct release to surface water not relevant for solid fertilizers.	Not relevant for direct placement.	Direct emissions to surface water possible by drift during application.	Direct emissions to surface water possible by drift during application.
Fertilizer application, emissions to air	Not relevant for solid fertilizers, present in granular, prilled or compacted form.	Not relevant for solid fertilizers. For liquids, emissions to air and corresponding atmospheric deposition to soil are covered by release factors to soil.	Not relevant for solid fertilizers. For liquids, emissions to air and corresponding atmospheric deposition to soil are covered by release factors to soil.	Emissions to air and corresponding atmospheric deposition to soil are covered by release factors to soil.

4. APPLICATION OF RISK MANAGEMENT MEASURES

Fertilizers, soil improvers and related products are intentionally applied to agricultural soil or crop foliage, in order to be taken up by the cultivated crops. Therefore, risk management measures (RMMs) are not relevant for the soil compartment. The potential for emissions to surface water depends on the application technique. RMMs can be applied on a case by case basis, but are not taken into account in the derivation of the default release factors for the SPERCs (see Chapter 5.3 for more details).

For soil surface spreading of solid fertilizers (SPERC 8e.1.v2) and precision treatment of solid and liquid fertilizers (SPERC 8e.2.v2) direct emissions to aquatic systems are not relevant. Operators need to comply with European and national requirements specified under Cross-Compliance of the Common Agricultural Policy of the EU (https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/income-support/cross-compliance_en). Risk management measures are not relevant for these application types.

Aerial application of fertilizers takes place occasionally by helicopter spreading in remote regions of northern Europe (Finland, Sweden and Norway). For aerial application (SPERC 8e.3.v2) a potential exists for direct release to surface water, by drift during application. For this SPERC, a realistic worst case drift value based on FOCUS scenarios was defined (for details see Chapter 5.3). Refinement of this default drift value in the FEE tool is possible if buffer zones are being used and/or technical measures are introduced for reducing drift. In practice this is often the case, since certification schemes in Nordic countries (e.g. PEFC, FSC), comprising large shares of production forests, have strict criteria related to the protection of surface waters. These criteria include mandatory buffer zones, ranging from 5-25m (FSC, 2015; PEFC Norway, 2016; PEFC Suomi, 2014; SKSFS Sweden, 2011). In addition, the accuracy of helicopter spreading can be controlled by GPS assisted techniques. However, as no unambiguous data exist about the level of accuracy of these techniques and because a share of forests in Nordic countries is not certified, these risk reduction measures are not included in the default release factor to surface water for SPERC 8e.3.v2, but RMMs can be included in the FEE tool on a case by case basis, where appropriate.

For spray application of fertilizers in liquid form (SPERC 8e.4.v3) there is a potential for direct release to surface water via spray drift, depending on the crop type (which determines the spraying height or pattern). In this SPERC a default, realistic worst-case drift value is selected for a "generic crop", based on the FOCUS scenarios (for more details see Chapter 5.3). Refinement of the default drift value can be made in the FEE tool by selecting the specific crop type with corresponding drift values. In addition, a reduction in drift or runoff potential to adjacent water bodies due to the application of risk management measures (buffer zones, vegatitive filter strips or spray drift reducing equipment) can be selected in the tool. For more details on RMMs and refinement options is referred to the FEE tool user guidance (Fertilizers Europe, 2019). Emission reduction measures are not accounted for in the default release factors of the four Fertilizer Europe SPERCs. As a result, these SPERCs provide a conservative estimate of fertilizer emissions to the environment.

5. SPERC INFORMATION SOURCES AND JUSTIFICATION

Fertilizers Europe SPERCs have been developed as a first step in the environmental exposure assessment of fertilizer substances, soil improvers and related substances. These SPERCs cover direct emissions to the different environmental compartments. As a next step, environmental fate of fertilizer substances can be modelled using the FEE tool. The SPERCs are based upon information from FOCUS (FOrum for Co-ordination of pesticide fate models and their Use; FOCUS, 2015), and expert judgement. For more information, see Chapter 5.3.

5.1. JUSTIFICATION USE RATES

The local scale environmental exposure assessment is conducted using an application rate approach (kg/ha, in contrast to the regional assessment which is conducted using a tonnage based approach). Application rates can vary considerably depending on the fertilizers applied, soil characteristics, climatic conditions and cultivated crops. For the micro nutrients copper, manganese and zinc, **Generic exposure scenarios** have been developed for the respective SPERCs. These can be downloaded from the Fertilizers Europe website: http://www.reachfertilizers.com/

5.2. JUSTIFICATION NUMBER OF EMISSION DAYS

The number of emission days for the different SPERCs can be directly linked to the number of fertilizer applications per year. During fertilizer application, there will be a peak of direct emissions to the soil compartment and, depending on the SPERC, potentially also direct emissions to the surface water compartment. In general, for Fertilizers Europe SPERCs 8e.1.v2, 8e.2.v2 and 8e.4.v3 there are 1-5 applications per year, depending on the crop type and agricultural soil characteristics. For Fertilizers Europe SPERC 8e.3.v2, only 1 application per 6-10 years is common practice (1-4 applications during the whole life cycle of the forest trees; Hedwall et al, 2014).

In the FEE tool, as a conservative approach for environmental fate calculations, the total yearly fertilizer application rate can be considered as applied in one single dose. As refinement option, it is also possible to split the yearly fertilizer application, by including the number of applications per growing season, their respective application rates and the timing between applications.

5.3. JUSTIFICATION RELEASE FACTORS

The Fertilizers Europe SPERCs cover both the application stage, as well as the preceding mixing and loading step and the subsequent cleaning of equipment of fertilizer uses. Releases to the environment during mixing, loading and cleaning are considered negligible compared to releases during the application stage, and are therefore included in the estimated release factors. In **Table 3**, for each group of similar uses realistic worst-case emission estimates (% of initial application rate) to air, soil and surface water are summarized. RMMs are not taken into account in the derivation of the release factors (see Chapter 4 for more details). These environmental release factors for fertilizer uses can be considered as conservative and are likely to overestimate the actual fractions released to the environment.

Table 3. Initial release factors to the different environmental compartments

SPERC code	Air (%)	Soil (%)	Surface water (%)
Fertilizer Europe SPERC 8e.1.v2	0	100	0
Fertilizer Europe SPERC 8e.2.v2	0	100	0
Fertilizer Europe SPERC 8e.3.v2	0	100	3.32
Fertilizer Europe SPERC 8e.4.v3	0	100	1.57

Initial release factors to surface water were derived based on information from FOCUS (FOCUS, 2015) and expert judgement. Direct emissions to surface water can be caused by spray drift during product application, and default values for emissions to surface water were selected based upon Rautmann drift values (Rautmann et al, 2001) from the 'FOCUS Steps 1-2' model (a validated model used in exposure assessment of plant protection products; FOCUS, 2015). As a default drift value for Fertilizers Europe SPERC 8e.4.v3, the spray drift value for 'pome/stone fruit (late)' was selected as realistic worst-case for fertilizer spray applications. Considering the Rautmann drift values, some crops have higher drift rates (e.g. pome/stone fruit, early), but since at this stage the fruit trees have no leaves this stage is considered not relevant for foliar spray applications. For SPERC 8e.3.v2 the FOCUS drift value for aerial application was selected. Taking into account that only 1/10th of the agricultural field area contributes to the drift to nearby water bodies, the release fraction to surface water is expressed as the FOCUS drift default divided by 10 (in agreement with the calculation method in 'FOCUS Steps 1-2' model). For Fertilizers Europe SPERC 8e.3.v2 and SPERC 8e.4.v3 this leads to a release factor to surface water of 3.32% and 1.57%, respectively. Refinement of the release factor to surface water can be made in the FEE tool by taking into account crop specific drift values (according to FOCUS scenarios; FOCUS, 2015) or drift and runoff reduction due to specific risk management measures. For Fertilizers Europe SPERC 8e.1.v2 and Fertilizers Europe SPERC 8e.2.v2 spray drift is not a relevant process and release factors to surface water are set to 0%; SPERC 8e.1.v2 covers only solid fertilizers and SPERC 8e.2.v2 covers precision application (incorporation into soil, drip irrigation). For all SPERCs the respective release factors to surface water only take into accout direct releases caused by spray drift during application, indirect emissions to surface water (e.g. by erosion and run-off) are taken into consideration in the environmental fate calculations using the FEE tool.

As a conservative approach for all SPERCs, it is assumed that 100% of the fertilizer substance applied can be released to soil. This was based on the consideration that fertilizers are applied directly onto/into soil or on the foliage of the crops, in order to promote growth of the cultivated crops.

Volatilization to air is not relevant for solid fertilizers, soil improvers or related products. For liquids, volatilization can take place during application depending on the vapour pressure of the substance. In this case, emissions to air could lead to aerial deposition on (agricultural) soil. This pathway is considered to be covered by the release factors to soil, since for all SPERCs this was set to 100%. Therefore, releases to air are considered not relevant for the environmental exposure assessment of fertilizers, soil improvers and related products and this release factor is 0%.

The release factor to waste is 0.01% for fertilizers, based upon the OECD Emission scenario document of plastic additives (OECD, 2009).

6. CONSERVATISM

The conservatism in the emission estimates of the SPERCs for professional and consumer uses of fertilizer substances, soil improvers and related products, is warranted by using realistic worst-case estimates for both the use rates and the release factors. Regarding the use rates, the high end of the recommended application rates for the specific nutrients or substances considered are used for emission estimation.

For the release factors, as a conservative approach for all SPERCs, it was assumed that 100% of the fertilizer substance applied is released directly to soil. This is combined with realistic worst-case release factors to surface water, leading for some SPERCs to emission estimates of more than 100% of the application rate to the environment. For more details, is referred to Chapter 5.3.

This indicates that the SPERCs are conservative, and are therefore recommended as first step in the local scale environmental exposure assessment of fertilizer substances.

7. APPLICABILITY OF SPERCS

7.1. TIERED APPROACH

As a first step, environmental exposure estimates can be calculated for the various compartments using the default release factors from the Fertilizers Europe SPERCs, plus selection of a "generic crop" in the FEE tool. To complement the SPERCs, further refinements and environmental fate calculations can be performed in the FEE tool (Chapter 1.3). This tiered assessment covers the environmental exposure assessment for use of fertilizers, soil improvers and related products in Europe.

7.2. REGIONAL ASSESSMENT

The Fertilizers Europe SPERCs as described in this background document are intended for local scale assessment.

8. REFERENCES

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