European Sustainable Phosphorus Platform

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The European Sustainable Phosphorus Platform (ESPP) is a not-for-profit association (ASBL) registered in Brussels, Belgium
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ESPP comments on JRC by-products report:

Deadline: 4th June 2020

A) Proposed answers to questionnaire page 42

Overall we congratulate JRC on a report which is clear and well documented.

Q1. Comments on Scope

§3 "Scope" of the JRC report is mainly devoted to defining what is considered to be a "by-product" under CMC11, leading to the conclusions formulated in lines 539-361.

The conclusions lines 359-361 exclude animal by-products (which is logical, in that these are dealt with under CMC10), however it is not clear how these conclusions will be implemented:

- Does this mean that the definition of "by-product" applicable for CMC11 is different from that of the Waste Framework Directive?
- Will there be EU guidance as to what is considered a "by-product" under CMC11 or will it rely on Member States' decisions on a case-by-case basis (as currently under the Waste Framework Directive)?

This is an important question. Different Member States currently may have different opinions as to whether a given material from a given process is a product, a waste, a by-product or something else (e.g. one Member State has the concept of "continued use"). **It is problematic and contrary to the level playing field if status is different in different countries: a company can sell a material as a CE fertilising product component material (classified as a by-product and conform to CMC11 criteria) in one country, but another company producing the same material from the same process cannot do so (not classified as a by-product in that country).**

However, we also underline that the Fertilising Products Regulation (and CMC11) should not duplicate the Waste Framework Directive and REACH, to avoid contradictions, confusion or complications.

We refer to the comments by UNIFA on Figure 1 line 101 (see UNIFA document uploaded to CIRCA).

Q2. Directional framework

We support the overall directional framework proposed, with the following comments:

"Positive List" approach

Although we understand the reasons for proposing a "**positive list**" of by-products, this approach poses a number of problems:

- Art. 42 specifies that the Commission should define agronomic efficiency and safety criteria for by-products. It does not specify the establishment of a positive list. There is no indication of such a list in the CMC11 outline adopted by Council and Parliament.
- A positive list is likely to prevent innovation and be an obstacle to the circular economy, unless every possible relevant by-product is identified a priori, which does not seem feasible.

As currently proposed, the positive list approach would specify not only the material and its contaminants, but also the production process from which it is a by-product. The same material could be eligible for CMC11 if it was a by-product of one process, but not if it were a by-product of another process. This would require **traceability**., but this is not feasible: a by-product is (by definition) REACH registered and placed on the market without traceability (because it is not a waste, and is not subject to producer-responsibility).

If a positive list approach is used, then it is important both to **ensure that by-products with significant potential for use in fertilising products are not missed out** now, and to **enable future integration of additional by-products into the positive list** as a function of technological progress by a process which is reasonably rapid and simple. We also suggest that **the "positive list" approach is not appropriate for by-products used in small quantities as processing and performance additives** (see below).

We suggest that the proposed timeline (\$7.2) does not adequately allow collection of information on by-products used, or susceptible to be used, in fertilising products. As proposed, the final "positive list" candidate by-products would be finalised by Autumn 2020, for a delegated act in Spring-Summer 2022. **We request that a first positive list be finalised as indicated Autumn 2020 but that relevant other by-products could be added to this list until Autumn 2021**, on condition that information is provided showing their significant potential and their coherence with the draft criteria.

A clear, simple and rapid system should further also be defined to **enable addition of other by-products beyond this date**.

Although, we understand that the contaminants susceptible to be present will depend partly on the process generating the by-product and on the substrates used (logic of higher protection and limitation of compliance costs, c.f. lines 437-442), we suggest that **the "positive list" should be as generic as possible and not be too narrow and limiting in its definition of the processes generating the by-product**. Within the 'positive list' of by-products, the process and substrates for each by-product should be defined by a negative list (exclusion of substrates posing unacceptable risks) and avoidance of risks should be ensured by specifying contaminant limits in the by-product (list of safety criteria for each type of material). Otherwise, new processes or evolving substrates will be excluded, or subject to delays for inclusion, so hindering adaptation to technological progress. **The detailed identification of processes and substrates engaged in this report should be used for the JRC screening exercise, but should not be transformed into a regulatory list**.

For example, the first by-product proposed in Table 2, page 29, is ammonium sulphate from "caprolactam, used for nylon". Why exclude other ammonium salts, if in the future technological progress modifies the caprolactam production process? Why limit to use in polyamide production: although this is the biggest use of caprolactam, it is also used for production of certain pharmaceuticals.

<u>By-products already used today</u>

We propose to specify that **any by-product which is already used in fertilising products under CE 2003/2003 should be eligible under CMC11**.

<u>REACH and "sameness"</u>

We underline that **REACH registration is required for by-products** and that **REACH registration requires "sameness" to the REACH registered pure material**, that is, requires that the by-product does not have hazardous properties or contaminants significantly different. If a by-product version of a chemical contains contaminants susceptible to pose and environmental or health hazard when the chemical is used as a fertilising product, and these contaminants are not present in the "virgin" (CMC1) version of the chemical registered under REACH, then this would have to be flagged in the CSR of the by-product and "sameness" would not be there. The FPR by-products criteria should take this into account, and not add duplicative requirements.

<u>By-products used as additives</u>

We raise the question of by-products used as additives in fertilising products, both mineral and organic. As recognised in \$5.2.3 pages 22-23, **there are many additives used in low quantities, not directly for their agronomic value**, but in processing or to improve different characteristics of the final fertilising product.

It is probably **not feasible to develop a "positive list" of all such additives, and it is also not useful because for additives which are used in low concentrations in the final product**.

We suggest that for additives present in the final product below a certain concentration limit (to be defined, w/w dry mass):

- The "positive list" requirement should not apply
- Instead, general safety specifications should be required, for example that the by-product must not be Classified with any GHS labelling for chronic health or environmental effects

We also request that it be clarified that **the "criteria on agronomic efficiency" required by art. 42(7)** will include criteria for by-products used as technical additives to improve fertilising product production, handing, use or management.

It is probably also not feasible to require that by-products used in low quantities as fertilising product processing or handling additives be registered under REACH with a dossier containing Annexes VI-VIII and CSR covering "use as a fertilising product", as currently specified in $2 of CMC 11.

We suggest that, where additives are present in the final product below a defined concentration limit, this point of CMC11 be modified to require simply registration under REACH.

Q3. Additional information on contaminants

As indicated in our comments table below, we suggest to:

- More clearly refer to the information in the REACH dossiers for candidate by-products – the REACH dossier should provide the core environment and health safety information for the chemical(s) in the by-product, as relevant for use in a fertilising product

- Refer to the two studies for EG Environment on contaminants in fertilisers (AMEC, with the reservations expressed below; Arcadia, underway) – see details in comments on line 372 in table below

- Microplastics should be considered: see ECHA restriction proposal https://echa.europa.eu/fr/-/echa-proposes-to-restrict-intentionally-added-microplastics

Q4-6. See text comments in table below

Q7. Other by-product candidates

As indicated in our comments table below, we suggest to add:

- Pulp and paper industry biosolids

- Ammonium nitrate, ammonium phosphate or other ammonium salts from air cleaning systems or other liquid or solid purification systems (add to Table 2, Group 4, page 32) and not limit to "ammonium sulphate" only. The production is analogue to ammonium sulphate but with nitric or phosphoric acid instead of sulphuric acid.

- Iron(hydr)oxide produced during iron removal in drinking water processing (see details annexed)

- Humic and fulvic acids from drinking water production (see details annexed)

- Copper salts from etching, for example of printed circuit boards in the electronics industry. For further information contact: silvia.tonti@yara.com

- Fluorogypsum, that is gypsum from hydrofluoric acid production. For further information contact: silvia.tonti@yara.com

- Seaweed/plant filter cake (see under (B))

B) Comments on text

Line 71-72 Page 5	It should be noted that REACH registration requirement applies to by-products exactly as it does to primary products,. Furthermore, when a product is sold between companies, quality control and product specification are normally requested and controlled. The risk of missing composition information might primarily apply to by-products which are exempted from REACH registration (e.g. natural materials, polymers, …). Reference to REACH regulation should specify that this is the main regulatory framework to ensure safety and known composition of a by-product, except for materials which are exempted from REACH registration
Line 95-97 Page 6	This sentence seems to imply that by-products cannot be freely circulated in EU other than the ones regulated by FPR. Instead a wording saying "...enable free movement on the internal market of fertiliser products containing CMC 11..."
Line 101, Fig 1	See comments by UNIFA (UNIFA document uploaded to CIRCA).
Box 1 on Page 7 Box 2 on Page10 Box 3 on Page 11	It should be clearly indicated that these boxes are given as indicative examples of <u>possible</u> classification as primary product / by-product / waste, and not as final conclusions of JRC, and not as European Commission guidance. These examples should not prevent a different conclusion for a material at a later stage of the project. When referring to waste treatment operations with definitions such as "recycling" or "recovery", it is also important to remember, that the same industrial practises can be regarded as "production operation" or "recycling operation", as the difference comes not from the technical processes but from the material handled – whether it is waste or raw material.
Line 204 Page 9	Throughout the FRP annex II (CMCs), REACH registration "*covering the use as a fertiliser product*" should be amended to "*in a fertiliser product*" to include technical additives into the definition.
Line 218-219 Page 9	Please align with Table 6.2. for sulphuric acid: Sulphuric acid is not in the scope, as it is normally not present in the fertilising product as such.
Line 242-244 Page 10	The sentence related to mixing is unclear and could imply that by-products cannot be used as precursors in CE fertilisers production? For example, in the NPK production ammonium sulphate partially reacts.
Line 305 Page 11 Box 4	The example is true for by-product sulphuric acid from any industry (chemicals, refinery). Specifying "*food industry*" could lead to confusion, in that it suggests (implicitly) that the sulphuric acid is clean or safe. We would also suggest to clarify in this box that the example is NOT true if the spent sulphuric acid is a "waste" and not a "by-product": if it is a waste, then it cannot be used in a reaction to produce CMC1. If the spent sulphuric acid is REACH registered, it is generally considered as a PRODUCT. We also suggest to clarify the phrase "*reacted with rock phosphate, dried and granulated*", because at present this mixes two concepts (so may lead to confusion): the "reaction" which means that this leads to CMC1 not to CMC11, and the drying and granulation which are normal industrial processing compatible with CMC11. Note that granulation is optional: single super phosphate can also be sold as a powder.
Lines 332-339 Page 12	Certainty of the use as a by-product should primarily refer to ECJ rulings, whereas the DG ENV guidance only gives indications is not legally binding. COM/2007/0059 (Communication from the Commission to the Council and the European Parliament on the Interpretative Communication on waste and by-products" COM/2007/0059 final) refers to the Avesta Polarit, Saetti and Spanish Manure cases as examples where use was regarded to be certain. The primary focus in this workstream should be the agronomic and safety criteria, because the certainty of use can vary from case to case for individual by-product producers. For example, the sales price or financial value of the material at a certain point of the value chain can be very complicated to assess, and should not be a focus area of the JRC work. The JRC report should remind that the Waste Framework Directive does not refer to the financial value as a criteria. The added value of the material can also come from the lower cost compared to materials that it is substituting,
Line 363 Page 12	We suggest to add to the bullet point "*safety and agronomic criteria*" the indication that this will take into account the relevant information in the REACH dossier, which is required by CMC11
Line 351 Page 12	Assessment of the agronomic efficiency of a by-product must take into account both direct use as a nutrient, but also indirect agronomic impacts relating to technical functions of additives which improve the characteristics of the fertiliser product, either by acting during production / procession or by acting in the fertilising product itself, for example by improving chemical or physical stability, flowability and spreadability.
Lines 359-361	See comments under Q1 concerning the definition of "by-products"
Line 359	Add after "*used directly <u>without further processing other than normal industrial practice</u>*" as specified lines 221-231

Line 368 Page 12	It is important to state clearly that FPR does not prevent by-products being entered into the market as any other type of product (not as a fertilising product) or in a national fertiliser.
Line 372 Page14, $4	We suggest to add to $4 a section $4.3 clarifying the links to chemical policy objectives: REACH, Green Deal.
Line 372 Page14 $4	This section should also refer to the two studies launched by the European Commission (DG ENVI) into contaminants and safety of fertilising products: - Completed 'AMEC' study "Digestate and compost as fertilisers: Risk assessment and risk management options. Final Report" Ramboll – Peter Fisk –WOOD, ref. 40039CL00313, 8th February 2019 https://etendering.ted.europa.eu/cft/cft-document.html?docId=57674 This study should be taken into account, but with consideration of the major reservations expressed by ESPP together with a number of other stakeholders (letter to DG ENVI & DG GROW, 11th February 2020) - The second study now underway (consultants ARCADIA for DG ENVI): EU Commission tender ENV/2019/OP/0001, 2019/S 132-323039 "Contaminants in fertilisers: Assessment of the Risks from their Presence and of the Socio-economic Impacts of a Possible Restriction under Reach" https://etendering.ted.europa.eu/cft/cftdisplay.html?cftId=5131
Lines 397-398 Page 14	It is not true that control of hazardous properties and environmental risk of by-products is intrinsically low where the by-products are REACH registered. See our comments on REACH registration and "sameness" under Q2.
Line 416 Page 15 $5.1.1	The "Overview" on safety should refer to the obligatory requirement of a REACH dossier, covering use as a fertilising product, specified in CMC11
Line 425, page 15	See our comments on the 'positive list' approach under Q2
Line 428 Page 15	After "to be considered as a by-product" -> add "under CMC11". Explanation: the objective of the positive list is not to define what is a by-product, but to identify which by-products are eligible for CMC11
Line 435 page 15	ESPP accepts the arguments for using a "positive list" approach, however it should be clarified here that it must be possible to add new by-products to this list, as function of technical progress. This should refer to art. 42(b) of the FPR (see line 875, page 26). However, not only the principle should be cited, but also a mechanism should be proposed: how can possible new additions be made to the positive list, whilst on the one hand ensuring appropriate assessment of safety and agronomic value, but on the other hand without a three year process as per the proposals line 959, page 38?
Line 442 Page 15	The compliance costs of using a by-product as a CMC in fertilising products do not need to be lower than using virgin materials for the same purpose. The same rules shall apply to virgin materials as to by-products: The producer shall be aware of the composition and potential contaminants of the product, and to be able to control them equally according to the conformity assessment requirements of FPR. CMC 11 should not provide a shortcut to FPR conformity, and such approach would not be supported.
Line 454 Page 16	We support this approach of screening of contaminants and evaluating them, however with the goal to end up as commonly usable sets of criteria as possible for CMC 11 for products from various source processes without restricting the processes or materials unnecessarily.
Line 476 Page16	Despite that it is generally true that core concept of REACH aims to deal with the chemical properties of the main component, not with the risks of contaminants, it is nonetheless inaccurate to suggest that, under REACH, (all) grades of a chemical are "*the same as long as they consist of the same constituent(s)*". To our understanding, for a mono-constituent REACH registration: - The REACH dossier should define "sameness", that is what % of the material must be the main chemical, and what impurities are tolerated at what levels - Overall, the principle is that impurities must not significantly modify the chemical properties specified in the REACH dossier - Hazardous impurities at significant levels must be declared - The REACH Registration includes information about production process and site, which is connected to contaminants Multi-constituent and UVCB dossiers are even more complex.
Line 486 Page 16	By-products may be derived not only from "*air cleaning systems*" but also from treatment of liquid or solid flows, on condition that the treatment process generating the by-product is integrated into the production process, and that the waste is not isolated and treated separately (as explained in $3.4, page 10). The current phrasing could be misleading, by somehow suggesting that "air cleaning" is a special case, different from liquid or solid flow treatment. We suggest to modify to "*air cleaning systems or other liquid or solid purification systems*"

Line 504 Page 17	It is important that consultation is officially communicated to industry sectors and other stakeholders widely, because many potentially useable by-products come from sectors that have not traditionally followed fertiliser regulations. For example: food industry, chemical industry, water industry, waste treatment and recycling industries …
Line 555 Page 18	It should be underlined that various metals (Cu, Co, Zn, Se) are not only potential pollutants but also necessary plant micro-nutrients, which are needed in fertilisers with controlled practises and amounts.
Line 641 Page 21	The text "*absolute concentration of contaminants, without further consideration of* …" should be clarified to indicate that this concentration will be considered in a risk assessment or soil accumulation approach
Line 668-669 Page 21	Technical additives that a fertiliser product needs to incorporate should be included into the assessment. refer to chapter 5.2.3.2. on page 23.
$5.2.3 pages 22-23	We suggest that the "positive list" approach is not appropriate for by-products used as technical additives, and that a more flexible approach should be accepted for by-products used at concentrations below a certain limit to be defined (w/w dry mass)
$5.2.3 pages 22-23	It should be specified that the "criteria on agronomic efficiency" required by art. 42(7) will include criteria for by-products used as technical additives to improve fertilising product production, handing, use or management.
$5.2.3 pages 22-23	We suggest that the "normal" requirements of REACH only (not as currently specified in CMC11 $2) be required" for by-products used below a certain concentration limit (limit to be defined, w/w dry mass)
Line 715 Page 23	Please clarify which kind of "additional criteria" are planned to be considered for technical additives?
Line 718 Page 23	See our comments on the 'positive list' approach under Q2
Line 732-733 page 23	We propose to specify that any by-product which is already used in fertilising products under CE 2003/2003 should be eligible under CMC11.
Table 2, page 29	*"Ammonium sulphate" – "Caprolactam, used for nylon*". Modify "nylon" (a trade name) to polyamide. Why exclude other ammonium salts, if in the future technological progress modifies the caprolactam production process? Why limit to use in polyamide production: although this is the biggest use of caprolactam, it is also used for production of certain pharmaceuticals.
Table 2, page 29	"Binary salts" is not a precise substance definition, it could refer to a plenty of very difference chemical substances. A better definition of which materials would be assessed is needed (also in reference to REACH compliance).
Table 2, page 29	The material listed as "Calcium Nitrate (nitrate of lime)" covers two different chemical products with separate CAS numbers (Calcium Nitrate and Nitric acid, ammonium calcium salt). Nitric acid, ammonium calcium salt, often also known as "Calcium Nitrate" is typically considered as one primary product of the ODDA-process, and several technical process steps are needed to obtain the final product, such as neutralization with NH3, evaporation, granulation etc. There are chemical reactions taking place during the process. CN, or Nitric acid, ammonium calcium salt, has a unique CAS number (CAS: 15245-12-2, EINECS-no: 239-289-5). In the EU/2003/2003 this is recognized as a specific type designation, and in FPR it shall be considered belonging to CMC1. These materials are not produced in N fertilizer process but in the NPK fertilizer process using the ODDA-design.
Table 2, page 30	"Sulphate salts" is not a precise substance definition, it could refer to many very difference chemical substances. Cobalt sulphate for example contains a nutrient (Co), is a sulphate salt, and it is classified as CMR1. A better definition of materials is needed (also in reference to REACH compliance).
Table 2, Group 2, page 31	Seaweed/plant filter cake. By-product leftover after the extraction process to make a seaweed/plant extract. No identified hazards other than the intrinsic properties of the seaweed/plant material and the extracting agents.
Table 2, page 31	Gypsum: why is diiron trioxide listed as a hazard in fertilisers?
Table 2, page 31	"Grinded steel slag" is a family that covers quite many different processes and compositions. What is the basis for considering these materials having a favourable outlook? These slags typically contain e.g. Mn Oxide, titanium oxide and other non-specified metal oxides. The substance identity, hazard profile and the assumed agronomic value need to be completed before deciding whether further assessment adds value.
Table 2, page 31	Sulphate salts from metal processing is a family that covers quite many different processes and compositions. What is the basis for considering these materials having a favourable outlook? The substance identity, hazard profile and the assumed agronomic value need to be completed before deciding whether further assessment adds value.

<table>
<tr><td>Table 2, page 31</td><td>Calcium phosphates from feed phosphate production: On-purpose produced calcium phosphates are primary products, not by-products. A production unit can classify their product as a feed grade or fertiliser grade depending on the achieved quality of the product. The same technical processes can be used for production of both grades, as also applies to several other materials both used as feed or fertiliser (such as feed grade or fertiliser grade ammonium phosphates). These products should not be considered as by-products but should be covered by CMC1.</td></tr>
<tr><td>Table 2 page 31</td><td>“Harvested mushroom growing media”. It should perhaps be noted that this does not include such media which are wholly or partly derived from Animal By-Products (e.g. from manures)</td></tr>
<tr><td>Table 2, page 31</td><td>“Residues from air cleaning systems”. It should be clarified under what conditions such residues are considered or not considered to be Animal By-Products. For example: ammonia salts generated by scrubbing of stable ventilation air, by scrubbing of biogas from anaerobic digestion of manures, by scrubbing of offgases from manure storage tanks …</td></tr>
<tr><td>Table 2 Group 4, page 32</td><td>Replace “Ammonium sulphate” (from air cleaning systems or other liquid or solid purification systems) by “Ammonium sulphate, ammonium nitrate, ammonium phosphate or other ammonium salts”. The production is analogous to that of ammonium sulphate but with e.g. nitric or phosphoric acid instead of sulphuric acid.</td></tr>
<tr><td>Table 2 Group 4, page 32</td><td>For “Dust particles, including calcium carbonates ….” Add under PFC2 Liming Materials (under tentative uses). This is already operational today (see UNIFA comments).</td></tr>
<tr><td>Table 3, page 34</td><td>Ammonium phosphates from fire extinguisher maintenance, it is stated that these are considered to be not by-products because “Derived from waste”.
How can these be taken into account in the FPR? The EU potential for this recycled materials is estimated at c. 100 000 t/y (www.phosphorusplatform.eu/Scope127)</td></tr>
<tr><td>Table 3, page 34</td><td>Silage run-off liquid. This is run-off from ensilage of grass or other vegetable by products (e.g. non-grain part of maize). It is thus not an animal by-product.</td></tr>
<tr><td>Table 3, page 34</td><td>Phosphogypsum is not a residue of phosphorus fertilizers but a by-product of phosphoric acid production. The quality of phosphogypsum depends on the impurity profile of the phosphate rock, which varies largely from one mineral deposit to another, as well as on the technical choices made in the acid process to remove fluorides. European domestic phosphate rock has the highest purity in the world, with exceptionally low concentrations of harmful impurities. Agricultural application of phosphogypsum based on domestic phosphate rock is ongoing successfully and safely under both national fertilisers regulation and under EC 2003/2003. It has a type designation in the Finnish fertilizer regulation, and it has been scientifically studied as a soil improver. There is long term scientific data about the product's capacity to trap excess phosphorus on the fields and thus prevent P leakage to water courses, with a huge environmental benefit to water quality.
Such phosphogypsum should be moved from 6.2 to 6.1. and absolutely deserves an assessment.</td></tr>
<tr><td>Table 3, page 34</td><td>Fluorogypsum, generated in the production of Hydrofluoric acid, is missing but is also currently used, should be added to 6.1. and assessed.</td></tr>
<tr><td>Table 3, page 34</td><td>We propose an approach, where the work should aim to create a rather generic safety and quality profile for "by-product gypsum" as CMC 11, for relevant PFCs, and assess all currently recognized and used by-product gypsum grades against it (e.g. phosphogypsum, sulfogypsum, fluorogypsum).</td></tr>
<tr><td>Table 3, page 34</td><td>Lime mud and black liquor are completely different substances and should not be presented on the same row in table 3 candidate materials, on page 34.
This line should be replaced with the following:
<table>
<tr><th>candidate material group</th><th>chemical composition or nature of material</th><th>process description, by-product from the production of</th><th>tentative use</th><th>identified hazards</th><th>group and material-specific legislative criteria / standards</th><th>additional comment / outstanding issues</th></tr>
<tr><td>Group 1: residues from the chemical industry</td><td>Lime mud (CaCO3)</td><td>Side stream from paper and pulp mills</td><td>PFC 2</td><td></td><td></td><td>Forest industry side stream lime mud is widely used in Finland in agriculture as liming material.</td></tr>
<tr><td>Group 1: residues from the chemical industry</td><td>Lime dust (CaCO3)</td><td>Lime dust from paper and pulp mills’ flue gas cleaning.</td><td>PFC 2</td><td></td><td></td><td>Forest industry side stream lime dust is widely used in Finland in agriculture as liming material.</td></tr>
<tr><td>Group 1: residues from the</td><td>Burnt lime (CaO)</td><td>Side stream from paper</td><td>PFC 2</td><td></td><td></td><td>Forest industry side stream burnt lime is widely used in Finland in agriculture as liming material.</td></tr>
</table></td></tr>
</table>

	chemical industry		and pulp mills				
	Group 1: residues from the chemical industry	Wood based fibre sludge	Fibre sludge consists of wood fibres, from paper and pulp mills	PFC 3			Fibre sludge is widely used in Finland in agriculture to improve soil quality. Fibre sludge is hygienic and free of pathogens and can be used as a fertilizing product without further processing. A study of the ability of fibre sludge to reduce erosion and nutrient leaching has been made by Natural Resources Institute Finland, Luke, which will be published in the autumn. Poster can already be found from: https://soilfood.fi/wp-content/uploads/2019/05/NSPPulp-Posteri_ESPP_Soilfood_Ravinnekuitu-hanke.pdf

Table 3, page 35	Ammonia sulphate recovery of ammonia from liquid fraction of digestate. This should be clarified. If ammonia sulphate is recovered in ammonia removal from biogas in or post the anaerobic digester, then it is a by-product of biogas production, and should appear in table 2 (favourable outlook). If ammonia sulphate is recovered from e.g. a manure or a digestate, for example in air cleaning on a storage tank, or in a deliberate degassing process intended to reduce air emissions during field application of the manure/digestate, then it is a by-product of processing of the manure/digestate.
Table 3, page 35	Ammonia sulphate recovery of ammonia from liquid fraction of digestate. This should not be limited to "*ammonia sulphate*". Other ammonia salts can be generated as a by-product of digester gas / biogas scrubbing, depending on the acid used for scrubbing, e.g. ammonium nitrate, ammonium phosphate.
Table 3, page 35	Black liquor and lime mud: add also from paper industry Widen to consider other pulp and paper industry biosolids
Table 3, page 35	Phosphogypsum should be moved to table 2 (favourable outlook) where radioactivity and fluorine levels are below limits to be specified. Phosphogypsum will also be generated in phosphorus recovery and recycling processes, if e.g. ashes are 'attacked" using sulphuric acid.
Table 4, page 36	Ammonium sulphate from "municipal wastewater and industrial effluent treatment". This should be grouped with Ammonia sulphate in table 3. Technology is essentially the same: gas stripping which removes ammonia, carbon dioxide, methane, … from which ammonia salts are then separated and recovered using acid (sulphuric, nitric …). Because initial substrate is waste (e.g. manure in an anaerobic digester, manure in a stable or storage, municipal wastewater, industrial wastewater), so it must be clarified under what conditions the recovered ammonia salts can be considered as a by-product and not require End-of-Waste status. There is considerable potential for this route of nitrogen recovery from manure digestion and storage, other digestates, and from treatment of municipal wastewater or wastewater sludges, and clarification of this point should be a priority. Municipal wastewater alone contains nearly 400 million tonnes of nitrogen (N) per year in Europe. Recovery of ammonia salts from municipal wastewater or sludge treatment is an existing technology, already operating full-scale today and producing quality fertilising products, see e.g. http://www.circulary.eu/project/yara-recovery/
Table 4, page 36	This should not be limited to "*ammonia sulphate*". Other ammonia salts can be generated as a by-product of digester gas / biogas scrubbing, depending on the acid used for scrubbing, e.g. ammonium nitrate, ammonium phosphate.
Table 4, page 37	"Sulphate salts" is not a precise substance definition, it could refer to a plenty of very difference chemical substances. A better definition of materials and their hazard profiles is needed (also in reference to REACH compliance).
Table 4, page 37	Sulphate salts from methionine production should be moved to Table 2. Ammonium sulphate, for example, can come from methionine or from other production processes. The final material is the same, and is sold on the market as a product (see our comments traceability).

Annexes:

Iron(hydr)oxide from drinking water production

process description

The iron(hydr)oxide is produced during de-ironing of groundwater.

In anaerobic groundwater iron can be found in relatively high concentrations. The iron needs to be removed when groundwater is used for the production of drinking water. This is mostly done by aeration. Aeration can be carried out by spraying open-air systems or in a cascade aerator where the raw water is transported along a number of weirs or steps.

The aeration is followed by rapid filtration on a sand filter. The iron present in anaerobic groundwater will be in the reduced state (Fe(II)). In the presence of oxygen, iron(II) will be oxidised to iron(III). The solubility product of iron(III)hydroxide is very low hence the iron(III) will quickly hydrolyse to form iron(III) hydroxide flocks that precipitate on the sand filter.

$4\ Fe^{2+} + O_2 + 10\ H_2O \Rightarrow 4\ Fe(OH)_3\downarrow + 8\ H^+$

In order to accelerate the sedimentation process and/or enhance the separation efficiency sometimes an inorganic flocculants ($FeCl_3$) is used in a dose of 5-10 mg/l Fe^{3+}.

tentative use identified

PFC 1(C)(II): inorganic micronutrient fertiliser

hazards group and material-specific legislative criteria/standards

Iron(hydr)oxide from drinking water production may contain heavy metals like arsenic. This is covered by contaminants limits for PFC 1(C)(II). Polymers like polyacrylamide are sometimes used to improve dewatering of the iron by-product.

The use of iron(hydr)oxide from drinking water in digester as a sulphur binder is allowed in the Netherland, Belgium, Germany and probably other countries as well. The digestate of these digesters is used as a fertiliser. These three countries have set limits to the amount of heavy metals for this purpose especially arsenic (Germany 80 mg/kg DM, Netherlands and Belgium 150 mg/kg DM. Nb. in Belgium the arsenic nom for other fertilisers is 20 mg/kg DM and in Germany 40 mg/kg DM, an exemption was made for the use of drinking water sludge in digesters).

Humic and fulvic acids from drinking water production

process description

The humic and fulvic acids are natural acidic organic polymers, produced during de-colorization of drinking water. Some ground and surface waters are rich in humic and fulvic acids. These humic and fulvic acids give a unwanted yellow colour to drinking water. The fulvic acids are removed by ion exchange technologies. The resin used for removal of the humic and fulvic acids is regenerated with sodium chloride (kitchen salt). The humic and fulvic acids are recovered from the brine solution by a combination of nanofiltration, diafiltration, forward osmose and/or electrodialysis.

tentative use identified

PFC 3(A): organic soil improver

hazards group and material-specific legislative criteria/standards

no hazards identified, current products are produced according to GMP+ standard

For information: UNIFA position

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