Nordic Council of Ministers

Nordic Working Paper

Evaluation of Specific Environmental Release Category fact sheets and their background documents

Testing the applicability of the newly adopted Quality Criteria Template as a tool for the evaluation

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Helsinki, February 2021

This working paper was funded by the Nordic Council of Ministers.
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NA2021:903
ISSN 2311-0562
http://dx.doi.org/10.6027/NA2021-903

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EVALUATION OF SPECIFIC ENVIRONMENTAL RELEASE CATEGORY FACT SHEETS AND THEIR BACKGROUND DOCUMENTS

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EXECUTIVE SUMMARY

Background

The purpose of the development of Specific Environmental Release Categories (SPERCs) is to give more realistic sector specific information on operational conditions and risk management methods related to environmental emissions from production, formulation and use of chemical mixtures, in comparison to the default worst-case environmental release factors resulting from the conditions of use described in the Environmental Release Categories (ERCs).

SPERCs take an intermediate role between the broad Environmental Release Categories and the higher tier estimation of emissions. SPERCs still have a broad applicability domain within a specified use but are not intended to cover all emission situations that could occur in operations.

The objective of a SPERC fact sheet is to summarize the SPERC key facts provided in the corresponding SPERC background document for a certain operation. It gives an overview of the SPERC essentials for the chemical safety assessment. A SPERC background document is a reference document, which provides a description of the emission situation for a use specified by an industrial sector and a justification and applicability domain of the environmental release factors.

Since the early stages of introducing SPERCs, workshops and surveys have been organized to further develop the SPERCs and the guidance for creating them. The current SPERC fact sheet format and guidance date from 2016.

A number of SPERCs have been created for various industrial sectors by sector organizations during the past decade. Validation of SPERCs in a consistent way has been considered a measure to increase confidence in the SPERCs and the use of their outcomes in chemical safety assessment in general. To this end, a Quality Criteria Template (QCT) was created by the SPERC Task Force, in the context of the Exchange Network on Exposure Scenarios (ENES), to be used for validation. The ENES network was established by ECHA together with sector organisations Cefic, Concawe, Eurometaux, Fecc, and DUCC to share knowledge, techniques and approaches to building and applying (REACH) exposure scenarios.

Objective

The project objective was to review a set of available SPERC fact sheets and their background documents by applying the Quality Criteria Template, in order to survey how well this newly adopted tool is fit for purpose. This was seen to enhance the further process of streamlining REACH and enforcement as well as the clarity and usability of the SPERCs, both for registrants developing chemical safety assessments and for national enforcement and regulatory agencies.

Evaluation

All evaluated SPERCs are comprised of a fact sheet and a background document. The level of detail differed between SPERCs both in the fact sheets and the background documents. Apparently, the expected risk resulting from the use of substances or products was rather low in the evaluated test set, judging from the broad scopes and the lack of obligatory risk management measures in many of the SPERCs. The generic approach in creating many of the evaluated SPERCs was compensated for by conservatism of release factors. Conservatism was achieved by worst case assumptions of use rates and release factors, and emission values from older technology, assuming technical progress, in most of the evaluated SPERCs.

Conclusions

In general, the Quality Criteria Template for validation was considered a good and practical tool. The same tool offers both guidance for the evaluation and report format for the evaluation results, with illustrative quality scoring for each section and overall results.

The Quality Criteria Template as a tool promotes the consistent quality of SPERCs and standardized quality criteria enable comparable evaluation of the SPERCs.

Some targets for improvement were identified below, to further enhance the usability of the Quality Criteria Template.

- structural issues to clarify the connection between the Quality Criteria Template and the SPERC fact sheet format,
- adding more specific guidance on the quality requirements in some parts of the Quality Criteria Template, to help to provide the SPERC fact sheets with relevant data concerning operational conditions and risk management measures,
- adding a separate section in the Quality Criteria Template to evaluate the release factors in relation to the operational conditions and risk management measures, to emphasise the importance of the adequacy of release factors,
- dividing the section for release factors in the Quality Criteria Template into sub-sections according to the environmental compartments that are target for releases, to enhance a more in depth evaluation of the release factors,
- creating a template or guidance for the background documents, to improve the consistent compilation and use of information,
- need to discuss possibilities to clarify or standardize the quality criteria for conservatism,
- adding some further guidance to the Quality Criteria Template about the overall judgement and scoring.

One of the project targets was to consider the specific climatic and geographical conditions of Nordic countries in parallel, by assessing whether special climatic measures need to be included into SPERCs to assure that risks are properly addressed. Temperature differences in the biological treatment of waste waters was expected to be the most relevant question. The focus was on on-site biological treatment because release factors are to be calculated before connection to municipal sewage treatment.

Biological waste water treatment, in combination with mechanical and chemical stages, is widely applied also in the Nordic countries both for municipal and industrial waste waters, despite of temperature challenges. The obligation for efficient waste water treatment and emission limits are set in environmental permits, which are monitored and controlled by authorities. The requirement to apply best available techniques (BAT) to treat industrial effluent comes from the Industrial Emissions directive (2010/75/EU).

Technical solutions for treatment are site, process and volume specific. It can be assumed that climatic differences within the EU countries do not necessitate any specific modifications for the SPERCs.

1 Background and objective

Specific Environmental Release Categories (SPERCs) are elements of environmental emission estimation for chemical safety Assessment (CSA) under REACH. SPERCs describe the conditions of safe use for exposure estimation, taking into account sector specific information of environmental emissions.. The purpose of the development of SPERCs is to provide better sector specific information on operational conditions and risk management measures related to environmental emissions from production, formulation and use of chemical mixtures, in comparison to the default worst-case environmental release factors resulting from the conditions of use described in the Environmental Release Categories (ERCs). The ERC release factors have broad applicability domains, often leading to significant overprediction of releases and, hence, of environmental exposure (1).

In the SPERC fact sheet guidance it is outlined that SPERCs take an intermediate role between the broad environmental release categories (ERC) of the REACH guidance and higher tier estimations of emissions or measured emissions. This also implies that SPERCs still have a broad applicability domain within a specified use but are not intended to cover all possible emission situations which may occur. They are developed to cover the majority of the situations typically occurring within the specified use described.

SPERCs have been developed by several industry sector organizations during the past decade. They are available on the European Chemicals Agency's (ECHA) website and/or on the websites of the sector organizations. SPERCs as a tool for improving chemical safety assessment have been evaluated and future developments discussed several times since the first SPERCs were published. In a multi-stakeholder workshop in April 2011, experts from industry and authorities met to discuss experiences and future developments regarding the use of specific environmental release categories (SPERCs) in chemical safety assessment (CSA) under the REACH regulation. The summary report of the workshop briefly explains what a SPERC is, why SPERCs are needed, what the challenges of the concept are, and what improvements are needed to make SPERCs a useful tool for assessments under REACH (2). In the feedback it was determined, among other points, that

- it is difficult for non-experts to understand SPERCs because there is often only a vague description of processes and a weak relationship between operational conditions and release factors,
- it is difficult for users to determine whether the SPERC covers the process and whether the release factor is applicable,
- another area of uncertainty in the application of SPERCs is whether the release factor takes risk management measures into account, and whether emissions from cleaning and maintenance operations are covered,
- information sources are not always accessible to SPERC users or adequately referenced in the fact sheet.

Proposals for improvements of SPERCs were summarised in the workshop report, with a view to overcome the identified general shortcomings. A harmonized and structured format for SPERCs was one of the practical improvements implemented since by launching the SPERC fact sheet format, which was modified in 2016 to the current format. This format was applied in most of the evaluated SPERCs.

A clear need for improvement was identified for the definition of processes and/or activities covered in each SPERC and clarification of which operational conditions the release factors apply to and whether or not these release factors account for risk management measures.

On the other hand, one of the sector organizations stated in their background document that although SPERCs are specific, they still reflect emissions of a broad application area of a substance within an industry

sector. For their purpose, the SPERCs are overly conservative and, therefore, their emission estimates are not intended to reflect all regulatory requirements that may relate to environmental emission thresholds.

All in all, SPERCs have a deciding role in the environmental emission estimations determined in chemical safety assessments (CSA), and therefore a need for validation of the SPERCs was identified. Consequently, the SPERC Task Force has developed, under the Exchange Network on Exposure Scenarios (ENES) working programme 2019-2020, a Quality Criteria Template (QCT) tool and guidelines for validation of SPERCs, published in 2020. The ENES network was established by ECHA together with sector organisations Cefic, Concawe, Eurometaux, Fecc, and DUCC to share knowledge, techniques and approaches to building and applying (REACH) exposure scenarios.

The objective of the Nordic SPERC evaluation project was to review and evaluate a test set of available SPERC fact sheets and their background documents to study how well this newly adopted Quality Criteria Template tool is fit for purpose. The work was funded by the Nordic Working Group for Chemicals, Environment, and Health (NKE), subordinated to the Nordic Council of Ministers for the Environment and Climate. The project was steered by experts from the Nordic chemical agencies, represented in the Nordic Exposure Group (NEXPO) and a group of experts from the European Chemical Agency (ECHA). Cooperation with the industry sector organizations has been active and fruitful. The project work was carried out in the Finnish Safety and Chemicals Agency (Tukes) during 2020.

The conclusion report of the SPERC Quality Criteria Template evaluation project is available at the website of the Nordic Council of Ministers and Nordic cooperation (https://www.norden.org/en/publications) in the form of a Nordic Working Paper. The results are distributed to relevant EU bodies and working groups: ECHA, REACH Exposure Expert Group (REEG), SPERC Task Force and Nordic enforcement authorities. The results are communicated to industry organizations by the working groups.

2 Materials and Methods

2.1 SPERCs and background documents

Approximately 90 SPERCs, with a number of sub-SPERCs, from nine sector organizations were initially available for the project. The material was obtained from ECHA's webpage on use maps, from the websites of industry sector organizations and from sector organizations directly. The SPERCs published by the following organizations were included in the evaluation against the Quality Criteria Template tool.

AISE	International Association for Soaps, Detergents and Maintenance Products
CEPE	The European Council of the Paint, Printing Ink and Artists‘ Colours Industry
Cosmetics Europe	Cosmetics and personal care products
ECPA	European Crop Protection Association
EFCC	European Federation for Construction Chemicals
ESIG	European Solvents Industry Group
Eurometaux	REACH Metals Gateway - Information system to guide the EU and International Metals Industry in the implementation process of the EU REACH and CLP Regulations
FEICA	Association of the European Adhesive and Sealant Industry
Fertilizers Europe	Fertilizers Europe

The available SPERCs covered all the life cycle stages:

- Manufacture (M)

- Formulation (F)
- Use at Industrial Sites (IS)
- Widespread use by Professional Workers (PW)
- Consumer use (C)
- Service Life (SL)

The set of representative SPERCs for the test evaluations was selected based on pilot phase evaluation (3 SPERCs from formulation and industrial use stage), taking into account the views of the steering group. The emphasis of the selection was to cover all life cycle stages (LCS), except for consumer use, and most of the available environmental release categories (ERC). Substance/product domains were to represent different physicochemical characteristics of chemical constituents such as physical state, water solubility, volatility and solvent content. Process types and environmental release compartments were also considered.

It is important to note that the objective of the project was not to validate specific SPERCs but to test the evaluation method. The SPERCs served as test material and therefore project codes were used when referring to each of the evaluated SPERCs.

2.2 Quality Criteria Template

The purpose of the quality criteria is described in the Quality Criteria Template. They are intended to be used as a self-assessment tool by the SPERC developers to check the completeness and quality of their own SPERCs. External reviewers (industry, consultants or Member States) may also use the quality criteria to provide feedback to the SPERC developers.

SPERCs are meant to be applied in computing typical emission situations during the use of a substance or mixture for environmental exposure analysis. To that end, SPERCs strike a balance between the degree of detail needed for describing a given use situation and the generic character of a safety assessment under REACH. Hence, SPERCs that describe a broad range of uses must depict a larger variance of release rates, which results in less realism for each single use covered but a higher conservatism overall. Conversely, a SPERC that describes a narrow application scope, can be more realistic towards the specific use and the release factors and the derivation of emission relevant factors therefore may be less conservative.

The SPERC Quality Criteria Template (Version 1.0 - January 2020) was employed in the test validations of the selections of SPERCs (Appendix 1).

The quality criteria are divided into 7 main sections and their sub-sections with different topics. The template gives guidance for the meaning and content of each section of evaluation, and it serves as a fill-in evaluation report as well. The structure of the template and its sections follow the structure of the SPERC fact sheet format in broad terms. The evaluation of each section in the Quality Criteria Template ends in scoring on the scale:

1 Good (No need for further improvement)
2 Acceptable (OK, but room for improvement or aspects to be verified)
3 Insufficient (Improvement is required)
4 Not applicable (Criteria not applicable to the specific SPERC under review)

2.3 Guidance

The information requirements for SPERC fact sheets are based largely on the ECHA's Guidance on Information Requirements and Chemical Safety Assessment, Chapter R.12: Use description (3) and Chapter R.16: Environmental exposure assessment (4).

The present SPERC Fact sheet Guidance Document includes the SPERC Fact sheet Format with Explanations from 2016 (5). CEFIC previously prepared guidance for fact sheets in 2012 (6), which has been analysed and commented by UBA for further developments in 2014 (1).

The use of the Quality Criteria Template is instructed in each section of the template.

The current project compared the quality criteria to the information requirements in the present SPERC fact sheet format and guidance, complemented with more specific information in the background documents. A SPERC background document is a reference document, which provides the description of the emission situation for a use specified by an industrial sector, the justification and applicability domain of the environmental release factors, and the references/information sources/methods used in the derivation of the release factors.

2.4 Pilot phase

2.4.1 SPERC data set

The available material (SPERC fact sheets and background documents) was combined to make a data set for the project. The material was obtained from ECHA's webpage on use maps, from the websites of industry sector organizations and from sector organizations directly.

The fact sheets were reviewed and organized according to a set of parameters such as life cycle stage, use type, use site, environmental release category, environmental release compartment and water contact. A preliminary set of representative SPERC fact sheets was selected for test evaluations. Three of these fact sheets were chosen for evaluation in the pilot phase. The final data set of 27 SPERCs was selected for test evaluations during the pilot phase (Table 1).

The life cycle stages (LCS) manufacture (M), formulation (F), industrial use (IS), professional (and consumer) widespread use (PW(C) and service life (SL) were covered. The specification in the table was selected from the substance domain of the SPERCs, to describe the main physicochemical properties and/or emission situations. The environmental release categories (ERC) of the SPERCs are also listed in the table. The project code given for each SPERC in the data set and the application of the SPERC fact sheet format to compile the SPERCs are shown in the Table 1.

Table 1 The types of selected SPERCs for evaluation and their project codes.

LSC	Specification(s)	ERC	ERC name *	SPERC Project code	FS format Y(es) / N(o)
M		1	Manufacture of the substance	1/a	Y
F	water borne	2	Formulation into mixture	2/a-1	Y
		2	Formulation into mixture	2/a-2	Y
		2	Formulation into mixture	2/a-3	Y
		2	Formulation into mixture	2/a-4	Y
		3	Formulation into solid matrix	2/a-5	N
	solvent borne	2	Formulation into mixture	2/b-1	Y
		2	Formulation into mixture	2/b-2	Y
		2	Formulation into mixture	2/b-3	Y
		2	Formulation into mixture	2/b-4	Y
IS	water borne, water, soluble	4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	3/a-1	Y
		4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	3/a-2	Y
		4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	3/a-3	Y
		5	Use at industrial site leading to inclusion into/onto article	3/a-4	Y
		5	Use at industrial site leading to inclusion into/onto article	3/a-5	Y
	solvent borne, volatile	4, 5	Use of non-reactive processing aid at industrial site (no inclusion into or onto article) / Use at industrial site leading to inclusion into/onto article	3/b-1	Y
		7	Use of functional fluid at industrial site	3/b-2	Y
		4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	3/b-3	Y
		5	Use at industrial site leading to inclusion into/onto article	3/b-4	N
PW	spraying, volatile	8a,c,d,f	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) Widespread use leading to inclusion into/onto article (indoor) Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) Widespread use leading to inclusion into/onto article (outdoor)	4/a-1	Y
		8a	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)	4/a-2	Y
PWC	outdoor, water release	8f	Widespread use leading to inclusion into/onto article (outdoor)	5/a-1	Y
		8c	Widespread use leading to inclusion into/onto article (indoor)	5/a-2	Y
	outdoor, water/soil release	8d	Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)	5/b-1	Y
		8e	Widespread use of reactive processing aid (no inclusion into or onto article, outdoor)	5/b-2	Y
SL	water/soil release	10a	Widespread use of articles with low release (outdoor)	7/a	N
	waste	11a	Widespread use of articles with low release (indoor)	7/b	N

- Further description of ERCs can be found in ECHA Guidance on Information Requirements and Chemical Safety Assessment. Chapter R.12: Use description (4).

Most of the selected SPERC fact sheets (SPERC FSs) applied the SPERC fact sheet format and all the fact sheets referred to an available background document (BD) and/or published literature data. In most cases one background document covered several SPERCs. The SPERC fact sheets included a variable number, from one

to thirty, of sub-SPERCs. The sub-SPERCs were typically based on water solubility and/or vapour pressure of the substances.

The fact sheet format is available on ECHA's website https://echa.europa.eu/fi/csr-es-roadmap/use-maps/templates-and-submission.

2.4.2 Pilot method

The pilot phase evaluation aimed at creating a systematic approach for the test evaluations by using the method with three selected SPERCs. This also helped to establish a practical working process for the evaluation.

The quality criteria and related guidance for each section comprises of a title question and a verbal description of some examples and issues to be considered in the evaluation. The wide variety of life cycle stages, substance/product and process domains and operational conditions in SPERCs was found to complicate the application of the quality criteria in a consistent way to different SPERCs.

In order to achieve a consistent, systematic and transparent approach for evaluation, the guidance in each section of the Quality Criteria Template was formulated into questions to be answered in the course of the evaluation. This method was used as a working tool in the first phase of test evaluations. The results of the question list were summarised in the explanation of the evaluation and in the observations for improvements in the validation template. The questions formulated as working tools for each section of the Quality Criteria Template are presented in Appendix 2.

It was attempted to establish general self-guidance criteria for the different scores to be allocated for each section of the Quality Criteria Template, in order to achieve a consistent way for evaluation. It is important to note that no absolute scale of quality is available and the scale used is relevant only within the database evaluated. This means that e.g. the score 'good' refers to comparison within the group of evaluated SPERCs.

The self-guidance criteria used are presented in each of the following chapters of actual evaluations. Nonetheless, it was noted already during the pilot phase that the line between 'Good' and 'Acceptable' score is unavoidably sliding. Therefore, the scores should be seen only as indicative signs of the completeness of the fact sheets. The applicability of the criteria for SPERCs representing different life cycle stages, operational conditions and emission patterns leaves room for case-specific interpretation.

3 Evaluation of SPERC fact sheets and background documents

The criteria used and observations in the course of test evaluations are described for each section of the Quality Criteria Template. The structures of the Quality Criteria Template and the SPERC fact sheet format were compared where relevant, in estimating the practicality of the validation tool.

The detailed results of the evaluation are summarized in tabular format in Appendix 2. The 'Explanation of evaluation' and 'Remarks for improvements' parts are based on the set of questions formulated for each item and self-guidance criteria.

3.1 Section 1 - Title

QCT: The quality criteria in the template concerning title information are formulated in the header:

1.1 Is the SPERCs title simple, concise, unambiguous and understandable?

FS: In the fact sheet, both title and SPERC code is required:

1.1 Title of SPERC

1.2 SPERC code

SPERC Fact Sheet data

In the quality evaluation SPERCs title, SPERC code and fact sheet filename were considered, as they compose together the information required for an unambiguous and understandable SPERC fact sheet identification.

Cefic (The European Chemical Industry Council) has issued guidance for chemical safety assessments, including the creation of SPERCs (6). The guidance gives recommendations on how to name the SPERCs in an unequivocal and systematic way in order to facilitate searching. In this evaluation the names of SPERCs that follow this guidance have been considered most adequate.

The name of SPERC consists of different parts, which are described below.

'[ORG NAME].2.1.a.v1'	SPERC name
'[ORG NAME]'	specifies the entity, which is responsible for the content of the SPERC
'2'	specifies the ERC which is refined by the SPERC
'1'	an index number given by the entity responsible for the content of the SPERC
'a'	one SPERC may contain several sets of default values that can be indicated by lower case letters
'v1'	the version number

Primarily it was considered that the fact sheet file name should ideally provide information of the sector organization, life cycle stage and substance/product and process domain.

Quality Criteria

In the majority of cases in the data set (18/27), the SPERC title fulfilled the requirements for a simple, concise, unambiguous and understandable title. In some cases, it is recommended that the covered SPERC/sub-SPERCs should be specified more clearly in the header of the fact sheet. The file name should also contain more information of the content and purpose of the file on its own.

In some cases, the SPERC fact sheet file name lacked information for identifying the file and its purpose, which makes it difficult for the user to find the appropriate SPERC.

In the test set, all scores were 'Good' or 'Acceptable'. No 'Insufficient' scores were given.

3.2 Section 2 - Scope

QCT: The quality criteria in the template concerning the scope information are formulated in the headers:

2.1 Is the scope of the SPERC clear, verifiable and consistent with underlying ERCs?

2.2 Is the scope described as substance and/or process domain consistent with the OC/RMM identified as driving the release?

FS: In the fact sheet, the scope is divided to substance/product domain and process domain:

2.1 Substance/product domain

- Substance types/ functions/ properties included or excluded
- Additional specification of product types covered
- Inclusion of sub-SPERCs

2.2 Process domain

- Description of activities/processes

2.3 List of applicable Use Descriptors

- Life cycle stage (LCS), sector of use (SU), product category (PC)

SPERC Fact Sheet data

A general observation from the whole SPERC fact sheet data set was that the scope of the SPERCs were very broad in most of the cases and covered a variety of substances and processes. This reflects the purpose of SPERCs outlined in the SPERC fact sheet guidance, i.e. SPERCs strike a balance between the degree of detail needed for describing a given use situation, the generic character of a safety assessment under REACH and the scope of the coverage that is affordable. Hence, if the expected risk is low the SPERCs are defined to cover broad use ranges, therefore allowing a SPERC to address uses of substances without a critical environmental hazard profile where emissions from a process are intrinsically low. However, there are SPERCs for narrower uses, e.g. if higher environmental risks are expected that may require relatively strict technical control of the process.

The substance/product domain was described using generic (organic) substance types or groups, such as alcohols, pigments, resins, polymers, massive metals, volatile organic compounds and petrochemicals. In some cases, physicochemical characteristics were given (e.g. water-borne, solvent-borne, volatile, non-volatile). The same SPERC often covered different states of matter (liquid, solid, powder) and volatiles/non-volatiles. Volatile and non-volatile ingredients were usually separated by a boiling point threshold of 250°C.

The process domain typically followed the life cycle stage (LCS) and specific sector use (e.g. formulation of adhesives, industrial use of coatings, professional application of inks) and some process specifications (e.g. spraying, rolling, use as fuel).

From the environmental emissions point of view, any one process is often comprised of typical steps of handling materials such as filling, transporting, mixing and cleaning. These phases were in many cases described in the background documents together with emission estimations.

The substance/product domains and process domains were often quite broad and generic. Therefore, this was not considered to be negative for the evaluation as such. Well described process steps with related environmental releases in the background document were considered positive.

Quality Criteria

The Quality Criteria section 2.1 covers the whole scope description in the fact sheet. According to the Quality Criteria Template guidance somewhat more detailed information would be required than that available in most of the evaluated SPERC fact sheets. For instance, the requirement for clear and explicit boundaries of the scope may not be met due to the broad scope covered in the SPERCs. In the test evaluations less stringent criteria were applied because of the broad scope of the SPERCs.

The Quality Criteria section 2.2 goes beyond only scope and compares the scope with the operational conditions (OCs) and risk management measures (RMMs) driving the releases. The OCs and RMMs are described in sections 3 and 4 in the SPERC fact sheet and therefore the comparison cannot be made before these sections have been evaluated both in fact sheets and background documents. The reason for this, according to the guidance of the Quality Criteria Template, is that the process domain should provide insight as to the relevant sections in the process concerning water contact or air emission from volatile substances, i.e. conditions of use. This structural difference between the SPERC Fact Sheet Format and the Quality Criteria Template, presented some challenges for the evaluation.

In most SPERC fact sheets and background documents the substance and process domain were consistent with the OCs identified as driving the release. However, the main emission points were described in generic terms as a SPERC typically covers a broad range of substances and process types. In some SPERCs the description of emission points was missing or ambiguous. The evaluation process showed that the clearest and most accurate way to describe process steps and emission points was a summary in a tabular form in the background document. A clear and systematic format for presenting emission points was considered a positive criteria in the evaluation.

The connection between the substance and/or process domain and the OC/RMM driving the releases was not always clearly described in the fact sheet or in the background document, but reference was given to a sector specific BAT/BREF document (Best Available Technology and Reference documents) or an OECD Emission Scenario Document for relevant activities leading to emissions. Lack of a summary in the background document of the referenced document as well as missing literature references were considered 'Insufficient' in the scoring.

Involvement of water in the process caused some inconsistencies in the fact sheets and background documents. In the fact sheet water contact should be given in the conditions of use (section 3 CoU), emission abatement needs to be reported in the onsite risk management (section 4 RMM) and release factor to water (RF) in the exposure assessment (section 5 EA). In some cases, for instance, no water contact during use was reported but release factor to water > 0% is given. In other cases, water was clearly involved especially in the cleaning steps, but very scarcely addressed or totally missing in the RMM/abatement methods. These discrepancies were considered as negative criteria in the evaluation.

Similar inconsistencies was seen for air emissions. For instance, fugitive losses of volatile chemicals to air during mixing and cleaning operations were mentioned, but the main ingredients were non-volatile in the SPERC involved. The role of volatile components/process aids remained somewhat unclear.

The scope in relation to the OC/RMM criteria in the Quality Criteria Template are less applicable for professional and/or consumer uses and service life operations life cycle stages.

In the evaluation of the test set of SPERCs ,the given scores for scope were either 'Good', 'Acceptable' or 'Insufficient'.

3.3 Section 3 - Operational conditions

QCT: The quality criteria in the template concerning the information on operational conditions (OC) are formulated in the headers:

3.1 Are the OCs clearly described and practically verifiable?

3.2 Do the OCs properly reflect the main drivers for release potential of substances into the environment?

3.3 If a use rate has been provided: Is it transparent, how the use rate has been derived and how representative is it?

FS: In the fact sheet the operational conditions are divided in the following way:

3.1 Conditions of use (CoU)

- Location of use
- Water contact during use
- Connected to a standard municipal biological STP
- Rigorously contained system with minimisation of release to the environment
- Further operational conditions impacting releases to the environment

3.2 Waste Handling and Disposal

SPERC Fact sheet Data

In the ECHA guidance R.16 (4) it is stated that the core part of the exposure assessment (and generation of the exposure scenario) is the definition of the appropriate conditions of use ensuring that any risks are controlled. The term "conditions of use" includes operational conditions (OCs) and risk management measures (RMMs). In the fact sheet format and the Quality Criteria Template these issues are presented in consecutive sections.

The first four questions in the section 3.1 of the fact sheet format are straightforward; location of use is to be indoor and/or outdoor, water contact during use and need for rigorous containment are yes or no, as well as connection to the municipal sewage treatment plant (STP). A few discrepancies in water contact versus release factors were noted. For instance, in some cases no water contact occurs, but a release factor to water is reported.

Water contact/yes	19
Water contact/no	5
of which RF water > 0%: RF water = 0%:	 2 3
Water contact/yes&no/unclear	3

Manufacture, formulation and industrial uses take place indoors, but professional and consumer uses may also take place outdoors. A rigorously contained system was not suggested in any of the SPERCs and so it is not discussed further in the evaluation.

Connection to a municipal sewage treatment plant (STP) was reported as default in 18 SPERCs, but in some SPERCs there was also a site-specific biological treatment prior to the STP. In 8 SPERCs only site-specific biological treatment was given. In one SPERC the treatment of waste water remained unclear.

No spreading of sludge from biological waste water treatment to agricultural or arable land was allowed in 6 of the evaluated SPERCs. However, in these SPERCs no alternative method for treating sludge was described either.

According to the fact sheet guidance, further operational conditions should contain descriptions of condition of use that impact releases to the environment (as many separate fields as relevant for the condition in the sector). These fields can be used to list for instance operational conditions to achieve high raw material efficiency and at the same time significantly impacting the release, e.g.:

- optimized cleaning process (e.g. pig systems for tubes, “Cleaning in Place (CIP)”, two-liner systems (i.e. single use disposable reactor cover that is incinerated after use as solid waste)
- dedicated storage tanks for raw materials, premixes and final products with low cleaning frequency
- re-use of process grey water for cleaning
- closed tubing systems preventing volatilization and spillages
- closed reactors preventing volatilization
- process automation
- smart rinsing techniques
- other

This section should contain most of the information evaluated in the sections 3.1 and 3.2 of the quality criteria. A general observation was that the descriptions of condition of use (CoU) in the SPERCs were highly diverse. In approximately half of the SPERCs only very short - if any - description of CoU was given, for example "Volatile compounds subject to air emission controls. Wastewater emissions generated from equipment cleaning with water." or "Maximum efficiency of use of input raw materials through the highest conversion into formulated products." However, a somewhat more thorough description of CoUs was available in the background document in many of the cases.

In some SPERCs the CoUs were well described in a concise way, for instance "Metal salts are dissolved in a water-borne application fluid in a reservoir or treatment baths. It is pumped to dedicated machine(s) in order to be applied to the substrate or it is kept in a bath. With each piece of substrate a fraction of the application fluid is carried-over from the treatment bath. Via a sequence of rinsing steps this fraction of the application fluid is continuously emitted to the wastewater. Spray applications are housed-in. Re-use of rinsing water. Periodically, the reservoirs are emptied of the spent reservoir fluid and refilled with fresh reservoir fluid."

Indicative and/or worst-case use rates were available in most of the SPERCs in section 5. The maximum site tonnages have been established for instance by using expert sector knowledge along with published information. Literature surveys have also been exploited. Use rates were split into small scale and large scale operations in several cases. Detailed information concerning specific operational conditions affecting use rates was not reported in the evaluated SPERCs.

Typically, a maximum daily usage was defined for any one substance/product per day at any one location. The daily maximum substance rates may be divided for functional substance groups such as 'pigment/extender/filler', 'binder', 'water', 'organic solvent/coalescent' or 'additive'. However, it was not clear in all cases whether the use rate was focused on individual substances/groups or a sum of them.

Quality Criteria

A general scenario in many cases was that descriptions of operational conditions were rather generic and it was difficult to link them to specific environmental releases. In one case, the generic way of describing the OC was justified with the explanation that the SPERC relies on the principle that the set of operational

conditions applicable to a particular process are highly site-specific, but some general details can be used to characterize the various production activities. Therefore, the sources of releases are not specified and the information on OCs and their connection to releases is rather generic.

Conversely, some background documents presented explicit descriptions of process steps and emissions points in a clear tabular format, which was considered a merit in evaluation. In other cases, OCs were not described either in the fact sheet or in the background document, but reference was given to a sector specific BAT/BREF document. A summary of relevant information should be provided in the FS or BD, but this was missing in some of the SPERCs. This was considered 'Insufficient' in scoring.

Section 3.2 of the fact sheet contained information on waste handling and disposal, while waste emissions are not separated from other operational conditions in the Quality Criteria Template. Waste emissions and waste handling are reported in rather generic terms in most of the SPERCs and background documents. Recycling, re-use of materials and avoiding of production of waste are emphasized.

Section 3.3 in the quality criteria concerns transparency and representativeness of the use rates. This information is given in section 5 of the fact sheet, where a numerical value for a local use rate is asked. The daily use amount at the local site corresponds to a typical amount of a substance used daily at an industrial site and may be indicative, i.e. for the assessor as a realistic starting point for the assessment. In the guidance use rate is not obligatory information in the SPERC fact sheet, and explanations may be provided to support registrants in defining a use rate, for example providing mixture amount for the use, typical fractions of components in the mixture, etc.

The decision whether the OC descriptions meet the quality criteria well enough in sections 3.1 and 3.2 was somewhat difficult to make due to the large variation in the evaluated SPERCs. One reason for the diversity and generality of the OC descriptions seemed to be the broad coverage of the process domain in many of the SPERCs. In section 3.3 the validity of the background data and calculation methods of use rates was not evaluated, but the availability and justification of them was accepted in general. The field was not mandatory in the fact sheet and therefore no stringent quality criteria was applied.

Professional and consumer (PW&C) use of products in a widespread manner is a lifecycle stage that is characterized by a range of use conditions, which results in rather generic OC descriptions. The OCs may not be clearly linked to specific environmental releases, however the releases are usually considered small. The PW&C uses of products by small businesses are usually not associated with specific mandatory requirements to minimize potential environmental releases. Recommended procedures are typically implemented as standards of good practice to reduce the potential for air, water, and soil release.

The OC concept is not directly applicable to service life use of articles. The main drivers for release potential of substances into the environment are variable and can be related e.g. to weathering in outdoor contact. Dedicated recollection infrastructure can be required for waste.

In the evaluation of the test set of SPERCs the given scores for operational conditions were either 'Good', 'Acceptable' or 'Insufficient'.

3.4 Section 4 - Risk management

QCT: The quality criteria in the template concerning the information on risk management are formulated in the headers:

4.1 Are the RMM described in a clear manner?

4.2 Are RMMs adequate for the substance/product domain?

4.3 Are RMMs clearly linked to release sources?

FS: In the fact sheet the obligatory risk management methods onsite are divided in the following way:

4. Obligatory RMMs onsite

- RMM limiting release to air
- RMM Efficiency (air)
- Reference for RMM Efficiency (air)
- RMM limiting release to water
- RMM Efficiency (water)
- Reference for RMM Efficiency (water)
- RMM limiting release to soil
- RMM Efficiency (soil)
- Reference for RMM Efficiency (soil)

SPERC Fact sheet data

Description of the risk management measures (RMM) applied is required in the SPERC fact sheet. Where relevant, detailed information on sub-SPERC level (e.g. related to physicochemical properties of substances) should be provided. The effectiveness of the RMM should be accounted for in the release factors. Reference to the source for the selected RMM and its efficiency should also be reported.

There would have been a point available in the fact sheet for 81 RMM descriptions for air, water and soil in the data set of evaluated SPERC fact sheets (27 FSs). 'None obligatory' was reported for 39 RMM descriptions and 'not applicable' for 12 RMM descriptions. Hence, no RMMs were prescribed for 51 potential emission sources out of 81. No efficiencies for these RMMs were reported, respectively. Nevertheless, optional RMMs were described for releases to air and water in many cases. Also, quite often guidance for good practice was provided, such as air extraction systems with dust filters and local exhaust ventilation systems, although no obligatory RMMs were required.

The selection of RMMs depends on the physicochemical characteristics of the substance/product domain (solubility, volatility, state of matter, degradability) and on the process domain (closed/open processes).

The hazard profiles of the substances might have an impact on the required risk management measures, but this was not discussed in particular in any of the SPERCs. The reason for not pointing out the hazard properties of individual substances was most likely due to the broad substance/product domains in many cases, consisting of different types of substances with varying profiles. Therefore, the RMMs were focused on generic types of emissions like VOCs, dust formation and non-soluble substances.

RMMs for releases to air in the SPERC fact sheets consisted of technical procedures considered appropriate by the SPERC developer, such as electrostatic precipitators or cyclones or fabric/bag filters or ceramic/metal mesh filters. In several cases, instruction was given to control VOCs according to the IED (Industrial Emissions Directive) abatement methods or use of solvent management plan.

RMMs for releases to water in the SPERC fact sheets comprised of source-specific or onsite abatement methods, such as oil-water separation (e.g. via oil water separators, oil skimmers or dissolved air flotation), chemical precipitation or sedimentation, filtration, electrolysis, reverse osmosis or ion exchange and of site-specific biological treatment. Connection to a municipal STP was assumed in the majority of the SPERCs, but

the release factors to water should be estimated before connection to the STP. The default worst-case release factors to water before STP, resulting from the conditions of use described in the environmental release categories (ERCs), are presented in the ECHA guidance, Appendix A.16-1 (3).

RMMs to reduce releases to soil in the SPERCs were not obligatory or not applicable in the majority of cases. The sludge from biological treatment or municipal STP was by default assumed to be applied to agricultural soil according to the ECHA guidance (4), but in 7 of the evaluated SPERCs the spreading of sludge from biological waste water treatment to agricultural or arable land was not allowed. In these cases, the fate of sludge remained unclear, which may suggest the potential for environmental emissions to soil.

Numerical values for estimated efficiencies of RMMs were given only in a few SPERC fact sheets or their background documents. Efficiency estimates might be available in some of the sector specific EU or OECD guidance documents, which were not summarized in the fact sheets. In many of the fact sheets, abatement methods were considered site and substance specific, for which efficiencies can be optimized onsite.

Quality criteria

In the RMM sections 4.1, 4.2 and 4.3 of the Quality Criteria Template the validation questions are:

- whether the RMMs are described in a clear manner in the fact sheets and background documents,
- whether the RMMs are adequate for the substance/product domain and
- whether the RMMs are clearly linked to release source.

The quality criteria guidance for interpretation of the requirements for these questions instructs for more detailed information than is available in most of the SPERC fact sheets and background documents.

The links between RMMs and release sources were usually only generic. The linkage between RMM technique and substance/product domain was not specified in detail. No exact sources of emission were specified, and no pathways were described in most of the SPERCs. Typically applicable RMMs and abatement techniques were given for air and water emissions.

Requirements for effectiveness and possibilities to achieve it were usually not given, but the generic technique (like oil-water separation or dust filtration methods) were given with literature values of efficiency ranges. The effectiveness of RMMs for reduction of specific substances was not described or discussed, probably due the broad substance/product domain in most SPERCs. The abatement methods focus more on release types (dust, powder of VOC to air and insoluble substances like oils to water), but the pathways and sources were unclear in many of the cases. For instance, the pathway of the substances removed from air to leave the site (for example via waste water or waste) was not demonstrated.

Reference to BAT/BREF document, OECD ES document, specific regulations or other sector or process type specific guidance for RMMs was given in about one third of the fact sheets. The literature information was not summarized in the background documents in all cases, which was considered a negative criteria in evaluation.

Overall, the level of detail and clarity of RMM information varied a lot in the SPERC background documents.

Accordingly, the application of the evaluation criteria in the Quality Criteria Template was somewhat ambiguous, and the line between the scores 'Good' and 'Acceptable' was not that clear. If the SPERC covers a wide range of substances/products and processes, what level of detail can be required for the pathways of releases, abatement methods and their efficiencies? In this evaluation, a rather generic level of RMM descriptions, focused on certain release types, was accepted as sufficient.

3.5 Section 5 - Release factors

QCT: The quality criteria in the template concerning the release factors are formulated in the headers:

5.1a MEASURED DATA - Are measured data representative and well documented?

5.1b MODELLED DATA - Is the documentation on the model and the modelling report available?

5.1c LITERATURE DATA - Is the literature source provided and assessed to be representative/robust?

5.1d READ-ACROSS DATA – Is the read-across sufficiently robust and well explained?

FS: In the fact sheet, section 5 concerns exposure assessment input parameters:

5.1 Substance use rate

- Amount of substance use per day
- Fraction of EU tonnage used in region
- Fraction of regional tonnage used locally
- Justification / information source

5.2 Days emitting

- Number of emission days per year
- Justification / information source

5.3 Release factors

- sub-SPERC identifier
- ERC
- sub-SPERC applicability

5.3.1 Release Factor – air

- Numeric value / percent of input amount (Air)
- Justification of RFs (Air)

5.3.2 Release Factor – water

- Numeric value / percent of input amount (Water)
- Justification of RFs (Water)

5.3.3 Release Factor – soil

- Numeric value / percent of input amount (Soil)
- Justification of RFs (Soil)

5.3.1 Release Factor – waste

- Numeric value / percent of input amount (Waste)
- Justification of RFs (Waste)

SPERC Fact sheet data

The final aim of the release estimation is to calculate the release rates as they are the main input parameters to be fed into the exposure estimation (3). In most cases, the release rates will not be measured but calculated from a release factor applied to the tonnage assumed to be present in a use process. The release factor expresses the fraction (either kg/kg or %) of the used amount being released via a given release route.

Release factors (RFs) are derived separately for different environmental compartments: air, water, soil (and waste). The UBA report concerning standardisation of release factors for the exposure assessment under REACH (1) emphasizes that the dependency of RFs on the operational conditions and risk management measures should be clearly described and that the plausibility of the (derivation) of the RFs and the documentation on which it is based is essential. It should also be clearly reported which RMMs are considered in the RFs.

Default worst-case release factors resulting from the conditions of use described in the ERCs (Environmental Release Categories) are presented in the ECHA guidance R.16 (4), which are elaborated in SPERCs to give more realistic substance- and process-specific release factors for exposure estimation. In the UBA report (1), it is concluded that comparison of RFs used to worst-case RFs for ERCs should be required.

In the SPERC fact sheet guidance the underlying ERCs should be reported in the SPERC, but no comparison of RFs in ERCs and SPERCs is required. Section 5 in the fact sheet format is for exposure assessment input and consists of substance use rate, days emitting and release factors to different compartments. For RFs a numeric value/percent of input amount should be given. All information in the section should be justified in the fact sheet or in the background document.

Release factors were reported for one to four compartments in all evaluated SPERCs, depending on the identified emissions. In many of the SPERCs the RFs have been derived separately for a number sub-SPERCs, 30 at most. Volatility and/or water solubility were usually the criteria for separation. Therefore, the RFs in one SPERC may cover several releases. The reported RFs in the evaluated SPERCs, with the underlying worst-case RSs from ERCs, are shown in Table 2.

The comparison shows that the maximum release factors to air (when a range is reported) were close to or the same as the default worst-case values for ERCs, so they can be considered rather conservative estimates. However, the ranges of RFs to air were very wide when also lower RFs are reported, from '0 to 100%'.

On the other hand, RFs for releases to water were estimated to be clearly lower than the default worst-case values in ERCs, even for maximum RF values when a range was given. This could reflect good water and spill control at industrial sites in general and/or efficient on-site abatement techniques including circulation of waters. The RFs should be reported before connection to a sewage treatment plant, but this was not made clear in all of the SPERCs.

In some of the SPERCs it was reported that the abatement measures were not accounted for in the release factors to air and/or water, because the measures were optional or in order to derive conservative RF values.

Little releases to soil were identified in the SPERCs and the few RFs reported for soil releases were usually close or the same as the default values for ERCs. One 100% RF was reported for a fertilizer use, where application to soil is intentional.

No default values for releases of waste are available for ERCs. The release factors in SPERCs reflected clearly the type of use; for industrial indoor use the releases can be controlled and were low (except for use as detergents), whereas the releases from widespread uses and service life were higher.

Table 2 a-d. The reported release factors (RF) in the evaluated SPERCs for different environmental compartments, with the underlying worst-case release factors in ERCs.

2.a Air

SPERC project code	ERC	LCS	RF air % min(/max)	RF air % max	Default worst-case RF % in ERC
1/a	1	M	0.001	5	5
2/a-1	2	F	0.0097	2.2	2.5
2/a-2	2	F	0.0097	3.6	2.5
2/a-3	2	F	2.25		2.5
2/a-4	2	F	0.0097		2.5
2/a-5	3	F	0.005		30
2/b-1	2	F	0.0095	3.6	2.5
2/b-2	2	F	0.08		2.5
2/b-3	2	F	0.005		2.5
2/b-4	2	F	0.25	2.5	2.5
3/a-1	4	IS	98		100
3/a-2	4	IS	5		100
3/a-3	4	IS	98.5		100
3/a-4	5	IS	1.7		50
3/a-5	5	IS	0		50
3/b-1	4, 5	IS	1.5	95	100
3/b-2	7	IS	0.6	5	5
3/b-3	4	IS	98.5		100
3/b-4	5	IS	0.2		50
4/a-1	8	PW	0	98	100, 15, 100, 15
4/a-2	8	PW	95		100
5/a-1	8	PWC	0		15
5/a-2	8	PWC	0		15
5/b-1	8	PWC	0.8	99.8	100
5/b-2	8	PWC	0		0.1
7/a	10	SL	0		0.05
7/b	11	SL	0		0.05

2.b Water

SPERC project code	ERC	LCS	RF water % min(/max)	RF water % max	Default worst-case RF % in ERC
1/a	1	M	0.001	1.0	6
2/a-1	2	F	0.25	0.5	2
2/a-2	2	F	0.005	0.5	2
2/a-3	2	F	0.5		2
2/a-4	2	F	0.505		2
2/a-5	3	F	0.005		0.2
2/b-1	2	F	0	0.005	2
2/b-2	2	F	0.02		2
2/b-3	2	F	0		2
2/b-4	2	F	0.0005	0.5	2
3/a-1	4	IS	0.002	2.0	100
3/a-2	4	IS	0.0001	0.1	100
3/a-3	4	IS	0.3		100
3/a-4	5	IS	0.3		50
3/a-5	5	IS	5.0		50

3/b-1	4, 5	IS	0	1.0	50
3/b-2	7	IS	0.001		5
3/b-3	4	IS	0		100
3/b-4	5	IS	0.5		50
4/a-1	8	PW	0	2.0	100, 30, 100, 5
4/a-2	8	PW	1.0		100
5/a-1	8	PWC	1.5		5
5/a-2	8	PWC	1.5		30
5/b-1	8	PWC	0.002		100
5/b-2	8	PWC	1.57		2
7/a	10	SL	1.2		3.2
7/b	11	SL	0		0.05

2.c Soil

SPERC project code	ERC	LCS	RF soil % min(/max)	max	Default worst-case RF % in ERC
1/a	1	M	0.01		0.01
2/a-1	2	F	0		0.01
2/a-2	2	F	0		0.01
2/a-3	2	F	0		0.01
2/a-4	2	F	0		0.01
2/a-5	3	F	0.1		0.1
2/b-1	2	F	0		0.01
2/b-2	2	F	0		0.01
2/b-3	2	F	0		0.01
2/b-4	2	F	0.01		0.01
3/a-1	4	IS	0		5
3/a-2	4	IS	0		5
3/a-3	4	IS	0		5
3/a-4	5	IS	0		1
3/a-5	5	IS	0		1
3/b-1	4, 5	IS	0		5
3/b-2	7	IS	0		5
3/b-3	4	IS	0		5
3/b-4	5	IS	1		1
4/a-1	8	PW	0	2	n.a., n.a., 20, 0.5
4/a-2	8	PW	4		n.a.
5/a-1	8	PWC	0		0.5
5/a-2	8	PWC	0		n.a.
5/b-1	8	PWC	0	99	20
5/b-2	8	PWC	100		1
7/a	10	SL	1.25		3.2
7/b	11	SL	0		n.a.

2.d Waste

SPERC project code	ERC	LCS	RF waste % min(/max)	max	Default worst-case RF % in ERC
1/a	1	M	0.2		n.a.
2/a-1	2	F	0.5		n.a.
2/a-2	2	F	0.5	1	n.a.
2/a-3	2	F	0.2	3	n.a.
2/a-4	2	F	0.2	3	n.a.
2/a-5	3	F	1		n.a.
2/b-1	2	F	0.75	1	n.a.
2/b-2	2	F	0.2	3	n.a.
2/b-3	2	F	0	1	n.a.

2/b-4	2	F	4		n.a.
3/a-1	4	IS	0.1	5	n.a.
3/a-2	4	IS	10		n.a.
3/a-3	4	IS	0	6	n.a.
3/a-4	5	IS	0	6	n.a.
3/a-5	5	IS	5	90	n.a.
3/b-1	4, 5	IS	3	52	n.a.
3/b-2	7	IS	2		n.a.
3/b-3	4	IS	0	6	n.a.
3/b-4	5	IS	1		n.a.
4/a-1	8	PW	0	60	n.a.
4/a-2	8	PW	10		n.a.
5/a-1	8	PWC	4	25	n.a.
5/a-2	8	PWC	4	25	n.a.
5/b-1	8	PWC	0.01		n.a.
5/b-2	8	PWC	0.01		n.a.
7/a	10	SL	10		n.a.
7/b	11	SL	54		n.a.

Quality Criteria

In the SPERC fact sheet format guidance the release factors (RFs) are intended to describe the total release from the contributing activity to each compartment (taking into account the operational conditions and risk management measures specified in sections 3 and 4). The method for determining the RFs shall be provided (e.g. use of measured data, use of literature data, use of release model, expert judgement by employing qualitative arguments, argumentation based on physicochemical data) and a reference to the source of information (published literature, company data unpublished, expert statement).

Accordingly, the validation criteria in the Quality Criteria Template are focused on the data sources and documentation of the information used for RFs (a. measured data, b. modelled data, c. literature data, d. read-across data) and the documentation and representativeness of the data. The validity criteria consist of comprehensive questions on the data used for derivation of RFs, such as the number of data points and companies, processes/products covered, use rates, data analysis etc. for measured data, modelling reports and representative use rates for model data, literature references, processes/products and conditions of use (CoUs), documentation and summaries for literature data, and similarities in processes, products/substances, CoUs etc. for read-across.

The data sources a. to d. are separated into different sections in the Quality Criteria Template, but the type of data used for derivation of RFs in the SPERCs was not always clear. Measured or modelled data may have been published in a scientific article and may cover a wider range of processes and substance/product domains or read-across may have been justified in an OECD ES document and so on.

The derivation of RFs in the evaluated SPERCs was based on all the data types listed above except for modelled data for a case specific purpose. Expert judgement and sector knowledge were often applied for assessment of the available data.

Literature data consisted of BAT/BREF documents, OECD Exposure Scenario Documents, literature surveys, published articles and specific regulations. In two cases, the measured the data was collected from a multi-metal background database of site-specific release factors, which were used for derivation of RFs for the SPERC. The data and methods have been introduced in a published research article. RFs from similar types of processes, CoUs and substance/product domains in sector specific OECD ESDs were used for read-across in several cases.

Justification of the release factors used was in most cases available in the background document. In many of the background documents the justification seemed comprehensive and plausible whereas in some cases the justification was superficial. There were six cases where reference to a data source for derivation of RFs was given in the SPERC fact sheet or the background document, but no summary was provided in either of them. This was considered a fault leading to the score 'Insufficient' in the evaluation.

The dependency of RFs on the operational conditions and RMMs was usually described in a rather generic way in the SPERC background documents. It is possible that the dependency of RFs on the OCs and RMMs was described in detail in the reference documents, but evaluation of the source documents was not in the scope of the current project and hence the quality of source data cannot be commented upon. Most of the evaluated SPERCs covered a wide range of substance/product and process domains with different OCs and RMMs, which can be expected to complicate clear descriptions of the connections between RFs and OCs and RMMs. The dependence of RFs on substance properties (volatility, water solubility) was covered with separate sub-SPERCs in several cases.

3.6 Section 6 - Conservatism

QCT: The quality criteria in the template concerning the level of conservatism is formulated in the header:

> 6.1 – Is the level of conservatism appropriate?

FS: There is no requirement for estimation of conservatism in the SPERC fact sheet format. Instead, conservatism is usually estimated in the background documents of fact sheets.

SPERC Fact sheet data

To ensure sufficient conservatism of the release factors, several approaches and methods were applied in the evaluated SPERCs:

- worst case assumptions in use rates
- worst case assumptions in RFs
- emissions values from older technology: RFs reflect technology from 10 years back, technical progress assumed since RFs have been created
- maximum values of the estimated emission ranges in the OECD reference document applied
- use of 90th percentiles of reported release factors
- integration of all on-site processes resulting in coverage of all related processing steps of the use
- inclusion of older data in the database
- coverage of multiple substance speciation and linking best case OC/RMMs (from BREF) with worst-case RF (from database)
- adjustment factors applied to guarantee that adequate margins of protection were built into determinations of RFs
- upward rounding was applied to guarantee that adequate margins of protection were built into determinations of RFs
- RMMs were not considered in the derivation of release factors and hence the release factors represent conservative estimates

Conservatism was based on worst-case assumptions of use rates, RFs and emission values from older technology, assuming technical progress, in most of the evaluated SPERCs. The methods to warrant

conservatism in derivation of RFs was usually described in the background documents, varying in level of detail; some descriptions were comprehensive and some only superficial.

No specific requirements for the level of conservatism of release factors are stated in the SPERC fact sheet guidance nor in ECHA guidance concerning environmental exposure assessment. The default release factors associated to each ERC can be seen to represent the upper limit for conservatism of RFs as they assume no specific risk management measures are in place. As no benchmark level for sufficient conservatism are available for derivation of release factors, the validity criteria cannot be very stringent.

Quality Criteria

In the Quality Criteria Template (section 6) some quality measures are defined for evaluation of conservatism:

- Does the scope of the SPERC cover sufficiently all uses described by the CoU and RMMs?
- Is the level of conservatism, i.e. the conservative derivation of release factors, etc., sufficiently described in the background document?
- Is the level of conservatism balanced compared to the scope? (i.e. broader scope requires more conservatism and vice versa). Conservatism can result from different aspects, e.g. from the mathematical analysis of data (e.g. taking a 90%ile, summing up from individuals to a category, etc.), the read-across from different processes and/or a worst case approach, where assumptions were taken from the process with the worst emission aspects.

The first question is somewhat difficult to evaluate due to the broad scopes in many of the SPERCs and on the other hand due to the rather generic CoU and RMM descriptions. The links between CoUs, RMMs and release factors were not always clear.

In most of the evaluated SPERCs the methods to ensure conservatism of the RFs consisted of those listed in the Quality Criteria Template and they were described in the background document in varying level of detail. However, the assignment of 'sufficiency' to the descriptions of conservative derivation of RFs was seen difficult without defined target levels. Therefore, the score 'Good' was given for conservatism in all cases where justification and method(s) for a warranting conservatism were available in the BD.

3.7 Section 7 - Summary and overall judgement

QCT: The quality criteria evaluation is summarized and an overall judgement is given in the last section of the template:

7.1 - Overall judgement of the reviewer

FS: Summary and overall judgement are not applicable in the fact sheet and the background document.

Quality Criteria

In the Quality Criteria Template the description of the validation criteria is summed up in the question: "Based on the documented information, are the release factors considered representative and reliable for the conditions of use described in the SPERC and the type of substances (by physicochemical properties) contained in products/processes covered by the SPERC?"

Here, the overall judgement of the evaluation was based on the scoring of the previous sections. The score for each main section was derived so that the majority of sub-score values define the main score. For instance, if in section 3 the score from 3.1 and 3.2 was 'Acceptable' and score from 3.3 was 'Good' then the overall score for section 3 was 'Acceptable'. In case of two sub sections, the better score was set for the

overall score of a section. Again, the overall score for the whole evaluation was set according to the majority of the section score values. In case of even scores of the six sections, the better score took precedence. For balance, an 'Insufficient' score drops e.g. one 'Good' score to 'Acceptable'. Thus, the chosen way of scoring more or less gave weight to the good scores. However, no guidance is available for choosing the final scores and other approaches may be applied.

Due to the rather gentle scoring approach more than two thirds of the evaluated SPERCs received and overall score 'Good' (Table 3). Nevertheless, some general remarks can be made of the SPERCs.

Table 3. Scoring results from the test evaluation of SPERCs (sections 5.1a, b, c and d are alternative sources of data for release factors, n/a = not available source).

LCS	ERC	Section scores														Overall
		1	2.1	2.2	3.1	3.2	3.3	4.1	4.2	4.3	5.1a	5.1b	5.1c	5.1d	6	7
M	1	G	G	G	A	A	A	G	A	A	n/a	n/a	G	n/a	G	G
F	2	G	G	A	A	G	G	G	A	A	n/a	n/a	I	n/a	G	G
F	2	G	A	A	A	G	G	A	A	A	n/a	n/a	I	n/a	G	A
F	2	G	G	G	G	G	G	G	G	G	n/a	n/a	G	G	G	G
F	2	G	G	A	G	G	G	G	G	G	n/a	n/a	G	G	G	G
F	3	A	G	I	I	I	A	G	G	A	G	n/a	n/a	n/a	G	G
F	2	G	G	G	A	A	G	A	G	A	n/a	n/a	I	n/a	G	A
F	2	G	G	A	G	G	G	G	G	G	n/a	n/a	G	G	G	G
F	2	G	G	G	G	G	G	G	G	G	n/a	n/a	n/a	A	G	G
F	2	G	G	G	A	A	G	G	A	A	n/a	n/a	G	n/a	G	G
IS	4	A	A	G	A	A	A	G	G	A	n/a	n/a	A	n/a	G	G
IS	4	A	A	G	A	A	A	G	G	A	n/a	n/a	I	n/a	G	A
IS	4	G	G	G	G	G	G	G	G	G	n/a	n/a	n/a	G	G	G
IS	5	G	G	G	G	A	G	G	G	G	n/a	n/a	n/a	G	G	G
IS	5	G	G	G	G	G	G	A	G	G	n/a	n/a	G	n/a	G	G
IS	4, 5	G	G	G	G	G	G	G	G	G	n/a	n/a	I	n/a	G	G
IS	7	A	G	G	A	A	A	G	G	A	n/a	n/a	A	n/a	G	G
IS	4	G	G	G	G	G	G	G	G	G	n/a	n/a	n/a	G	G	G
IS	5	A	A	I	I	I	A	G	G	A	G	n/a	n/a	n/a	G	A
PW	8acdf	G	G	A	A	G	G	A	A	A	n/a	n/a	G	n/a	A	G
PW	8d	G	G	G	G	A	A	G	A	A	n/a	n/a	G	n/a	A	G
PWC	8f	G	G	G	G	G	G	G	G	G	n/a	n/a	n/a	G	G	G
PWC	8c	G	G	G	G	G	G	G	G	G	n/a	n/a	n/a	G	G	G
PWC	8d	G	G	A	A	G	G	G	G	A	n/a	n/a	A	n/a	G	G
PWC	8e	G	G	A	G	G	G	G	A	G	n/a	n/a	A	A	G	G
SL	10a	A	A	G	A	A	A	A	A	A	n/a	n/a	A	n/a	A	A
SL	11a	A	A	G	A	A	A	G	A	A	n/a	n/a	I	n/a	A	A

3.8 General observations on the evaluated SPERCs

Some general observations can be made of the selected set of SPERCs according to the test evaluations:

- most of the SPERCs have been compiled according to the SPERC fact sheet format and guidance,
- all evaluated SPERCs included a background document and/or a literature source,
- in many cases one background document covered several SPERCs,
- the structures of background documents were variable and some followed the structure of fact sheets, while others did not,

- the substance and product domain in the SPERCs were typically very broad and covered e.g. several large groups of organic chemicals,
- chemical characteristics of the substances covered in the SPERC were variable, which impacts the applicability of RMMs and RFs,
- in many of the SPERCs the substance domain has been divided into separate (sub-)SPERCs based on physicochemical characteristics, but in some not, and therefore the SPERCs may be rather generic for substance specific exposure estimations,
- the process domain and identification of emission points was not described in an exact way in all SPERCs which makes it difficult to apply the release factors properly for exposure scenarios,
- due to the wide scopes of SPERCs it was not clear whether the release factors were relevant for any one substance within the scope.

Variation in the level of detail provided in SPERCs was detected already in 2011 in a Multi-Stakeholder Workshop on SPERCs (2). It was stated in the workshop report that the differentiation is the result of case-by-case decisions made in the process of defining each SPERC. These decisions considered the hazard profile of the substances used, the typical amounts of substances used, the sector-specific processes or activities and their variation, the corresponding variation in release factors, and the need to cover the majority of sites. The report concluded that in defining SPERCs, a balance must be achieved between standardization and efficient communication in the supply chain. At the same time, a sufficient level of differentiation is required so that the SPERC defaults allow an appropriate level of environmental protection to be defined for the majority of operations while avoiding the implementation of costly measures that do not offer added protection.

There is a relationship between emission intensity, hazard profile of substances and applicability of SPERCs. Requirements set for SPERCs depend on the risk to be controlled. Differences in degree of detail in SPERC documentation was discussed in the report from the Exchange Network for Exposure Scenarios (ENES) workshop in 2016 (7). If the hazard of a substance is low, a low degree of process control and no risk management may be assumed and a SPERC with a broad applicability domain is appropriate. If substances are used in well-controlled industrial processes and the hazard is relatively low, no risk management may be required. If, in contrast, relatively hazardous substances (as such or in products) are used at large-scale in industrial processes, a high degree of specific process control and risk management will be required. Consequently, the applicability domain of the SPERC would be relatively narrow.

It was concluded in the ENES workshop of 2016 that the generic nature of SPERCs is acceptable if it follows conservative assumptions. These correspond to conservative RFs that are higher than those in more specific assessments. The conservatism in RFs can compensate the relatively low degree of detail in the description of the conditions, still qualifying the SPERCs for lower tier exposure assessments. In view of the importance of conservatism in the credibility of SPERCs, it was concluded that it is necessary to explicitly describe in the background document how this conservatism is achieved for a SPERC. These conclusions are reflected in the introduction and guidance of the Quality Criteria Template.

The varying level of detail and differences in the breadth of scope seem prominent in the evaluated SPERCs as discussed in the earlier chapters.

4 Findings on the Quality Criteria Template as a tool

The main purpose of this project was to test and comment on the functionality and correctness of the new quality criteria procedure for validating SPERC fact sheets and background documents. Different viewpoints were considered for this examination.

The purpose of the quality criteria, defined in the introduction of the tool, is to support and document a quality assessment of the SPERC background document and, where relevant, the corresponding fact sheets by considering the following topics (see Quality Criteria Template, Appendix 1):

- Is the scope of the SPERC clear in terms of process-types and/or product-types covered?
- Are the main Conditions of Use (CoU), including Operational Conditions (OC) and risk Management Measures (RMMs) driving the environmental release clearly identified, understandable and verifiable?
- Are the factors resulting from the key drivers for environmental emissions (water, soil, air) adequately quantified, and is it sufficiently explained how the release fractions (RF) were estimated?

In the assessment of the practicability of the Quality Criteria Template as a tool, several viewpoints were identified and considered in the test evaluations of the SPERCs. The focus was on the functionality of the tool in practical evaluation work and on the other hand on enabling consistent and transparent evaluation of the given information.

- Comparison of the Quality Criteria Template and the SPERC fact sheet format: is the information to be evaluated according to the quality criteria required and available in the corresponding SPERC?
- Does the Quality Criteria Template as a tool support a standardized and transparent way of validation of the SPERCs? Are the validation results comparable with each other?
- A SPERC consists of a concise and formatted SPERC fact sheet and a more detailed background document of free format. How well does this structure support finding information for validation of the quality?
- The meaning of the questions in each section in the Quality Criteria Template are well guided. Is this guidance clear enough for understanding the quality requirements?
- Do the sections and questions of the Quality Criteria Template cover sufficiently the areas of interest for environmental emission estimation?

In the following section the issues above are studied partly in general and partly section by section of the Quality Criteria Template.

4.1 Comparison of the Quality Criteria Template tool and the SPERC fact sheet format

4.1.1 Quality Criteria - Title

FS format			**QC template**		
Title	Subtitle	Keywords	Title	Subtitle	Keywords
1 Title	1.1 Title of SPERC	contributing activity/ applicability domain	1 Title	1.1 Is the SPERCs title simple, concise, unambiguous, understandable?	selection of the most appropriate SPERC
	1.2 SPERC code	systematic name			

The title of SPERC should be simple, concise, unambiguous and understandable to enhance the selection of the most appropriate SPERC by the user. The criteria seem straightforward, but some ambiguity was found in the naming and file names of the evaluated SPERCs. Especially the file names of the background documents, which were unidentifiable in several cases. The titles of background documents also lacked information in some cases, making it difficult to know to which SPERC(s) the background document was related.

The fact sheet format requires naming of contributing activity and applicability domain and a systematic name for SPERCs according to CEFIC guidance.

Suggestions for improvement:

- Using a systematic SPERC code should be made a quality criteria.
- Titles of background documents should be included in the quality criteria.
- File names of SPERCs and their background documents should also be named unambiguously.

4.1.2 Quality Criteria - Scope

FS format			**QC template**		
Title	Subtitle	Keywords	Title	Subtitle	Keywords
2 Scope	2.1 Substance/ product domain	substance properties/ product types/ product specifications/ sub-SPERCs	2 Scope	2.1 Is the scope of the SPERC clear, verifiable and consistent with underlying ERCs?	boundaries of scope/ process type/ product type/ substance properties
	2.2 Process domain	activities/ processes/ sources of release		2.2 Is the scope described as substance and/or process domain consistent with the OC/RMM identified as driving the release?	relationship between substance type, product, process, RRM/ and environmental release
	2.3 List of applicable use descriptors	Life cycle stage Sector of use Product category			

In the fact sheet format the description of scope consists of substance/product domain, process domain and use descriptors. The underlying ERC (Environmental Release Category) should be included in the SPERC title and SPERC code.

The first quality criterion concerns clarity, verifiability and consistency with the underlying ERC, based on boundaries of the scope and descriptions of process and product types and substance properties. In the evaluated SPERC fact sheets this information was usually very concise and generic. The boundaries of the scope were in many cases broad and product/substance domain named a number of (organic) substance groups included. Substance properties included information on e.g. volatility and solubility, if any. More

specific information was found in background documents, but not always. A variable number of sub-SPERCs were included in about one third of the evaluated SPERCs.

The second quality criterion concerns the relationship and consistency between substance types, product and process domains and the operational conditions and risk management measures in respect to environmental releases. In the fact sheet format the operational conditions (OCs) and risk management measures (RMMs) are reported and evaluated independently in later sections. Therefore, this type of quality criteria question that compares and summarizes information from different sections was seen somewhat premature at this point, and in order to find the correct data for one section in the quality criteria, several sections of the fact sheet/background document must be visited.

Suggestions for improvement:

- The quality evaluation could follow more precisely the information provided in each section of the SPERC fact sheet format, i.e. the quality of scope could be evaluated as such.
- The questions for evaluating the consistency of the relationship between the scope and emission points and the OCs and RMMs of the SPERC could be relocated to the end of the template. This would make the evaluation more efficient and straightforward.
- The lines between 'Good', 'Acceptable' and Insufficient' scores could be specified: how detailed information should be required of a typically generic scope?

4.1.3 Quality Criteria - Operational conditions

FS format			**QC template**		
Title	Subtitle	Keywords	Title	Subtitle	Keywords
3 OC	3.1 Conditions of use (CoU)	location/ water contact/ STP/ containment/ OCs impacting releases to the environment	3 OC	3.1 Are the OCs clearly described and practically verifiable?	initial release/ BAT
	3.2 Waste handling and disposal	suitable treatment		3.2 Do the OCs properly reflect the main drivers for release potential of substances into the environment?	OC links to environmental releases
				3.3 If a use rate has been provided: Is it transparent, how the use rate has been derived and how representative it is?	indicative use rates/ justifications

In the fact sheet format, the operational conditions are divided into sections for conditions of use (CoU) and waste handling. The CoU consists of location of use, water contact during use, connection to municipal

sewage treatment plant (STP), need for rigorous containment and further operational conditions. Information needed for the first four parts is simple and can be given using just a few words. Further operational conditions are a free-text field and guided to describe in detail the CoUs having impact on releases. The field contained specific information on emission points in a variable degree in the evaluated SPERCs. In about one half of the cases the information given was rather scarce, but on the other hand in some cases the specific information was given in the background document.

The first quality criterion concerns the description and verifiability of the OCs. In the guidance rather detailed information is required, but it is accepted that "it is not always possible in a generic SPERC (or in the resulting exposure scenario) to describe and communicate the (complex) operational conditions in the industrial processes of a sector driving the initial releases of the substance into exhaust air, waste water or residue streams". The latter was the case in the majority of the evaluated SPERCs. Reference to a documented best/good practice or a Best Available Technique (BAT) was given in many cases.

The second quality criterion concerns the description of main drivers for release potential to the environment. This issue was well understood and described in many of the background documents and shortly described in part of the fact sheets. In some SPERCs the description of emission points was superficial. If reference to BAT/BREF or other sector specific data was given, a short summary was required in the BD as a quality criterion.

The third quality criterion concerns derivation of use rate and justification of it, but this is not an obligatory piece of information. The fact sheet guidance recommends to provide explanations for derivation to support registrants in defining the use rates. In the Quality Criteria Template guidance, it is accepted that "a use rate is generally site specific and cannot be provided as definite by a SPERC. Therefore, in general, SPERCs may provide indicative use rates that are based on conservative assumptions (i.e. high end of daily use rates) from industry use data." However, in the fact sheet format the use rate is to be provided in section 5 Exposure assessment, together with release factors. For an efficient evaluation process, this may be the logical place to evaluate use rates where available.

Suggestions for improvement:

- Evaluation of the use rates might be placed in section 5 of the Quality Criteria Template, in line with its location in the fact sheet format. In many SPERCs only indicative use rates were provided and the connection to operational conditions was generally not unambiguous.
- A requirement for information on proper waste handling could be added to the quality criteria more clearly.

4.1.4 Quality Criteria - Risk management

FS format			QC template		
Title	Subtitle	Keywords	Title	Subtitle	Keywords
4 Obligatory RMMs onsite		RMM air RMM water RMM soil/ method/ efficiency/ reference	4 RM	4.1 Are the RMM described in a clear manner?	effectiveness/ technical possibilities/ BAT/BREF

				4.2 Are RMMs adequate for the substance/ product domain?	plausibility/ effectiveness within domain
				4.3 Are RMMs clearly linked to release sources?	sources of release/ pathways/ links to RMM

In the fact sheet format, risk management measures (RMM) are separated by the different environmental compartments: air, water and soil. Only obligatory RMMs are required. Descriptions of RMMs are free-text, but the content of the text is not guided further in the fact sheet format. RMM efficiency and reference for that should also be given. In the evaluated SPERCs, the RMMs were shortly described in the fact sheets when obligatory, but in many cases optional RMMs were also described in the background documents. Numerical efficiencies were available for some SPERCs, and they were usually based on e.g. BAT/BREF documents. In some cases, empirical data was available.

The first quality criterion concerns description, effectiveness and technical possibilities to achieve the RMMs. The objective is that "a down stream user or an authority could practically verify whether such techniques or equivalents are in place". The content and requirements for this section are rather straightforward.

The second quality criterion concerns the adequacy, plausibility and effectiveness in relation to the substance/product domain. This linkage should be adequately described in the BD. In the evaluated fact sheets and background documents, there was a lot of variation in the presentation of the linkage between RMMs and substance/product domain. Somewhat more detailed guidance within the fact sheet format may help to harmonize the information.

The third quality criterion concerns description of the main sources/pathways of release from the process in the background document, and their linkage to the RMMs. This information is not clearly required in the fact sheet but rather in the background document. As with the previous criterion, a lot of variation was seen in the evaluated SPERCs, and somewhat more detailed guidance within the fact sheet format might help to harmonize the information.

Suggestions for improvement:

- The guidance for providing relevant information of risk management measures in the SPERC fact sheet format could be further developed.
- More detailed descriptions of sources and pathways of emissions and linkage between risk management measures and substance/product and process domain and emission points should be required in the fact sheet (and/or in the background document). This would be in line with the quality criteria.

4.1.5 Quality Criteria - Release factors

FS format			QC template		
Title	Subtitle	Keywords	Title	Subtitle	Keywords
5 Exposure assess-ment input	5.1 Substance use rate	local use rate/ daily use amount/ (fraction EU/regional tonnage for WDU)/ justification	5 RF	5.1a MEASURED DATA - Are measured data representative and well documented?	no. of data points, companies and substances analysed/ reasonable use rates/ data analysis
	5.2 Days emitting	days per year/ justification		5.1b MODELLED DATA - Is the documentation on the model and the modelling report available?	model docu-mentation/ model report/ representativen ess
	5.3 Release factors 5.3.1 Air 5.3.2 Water 5.3.3 Soil 5.3.4 Waste	sub-SPERCs/ numeric RFs/ justifications		5.1c LITERATURE DATA - Is the literature source provided and assessed to be representative/ robust?	references/ summary in BD/ no. of data points, companies/ consistency of CoUs
				5.1d READ-ACROSS DATA – Is the read-across sufficiently robust and well explained?	comparison of processes/ release driving factors/ properties of chemicals

In the fact sheet format the release factors (RF) and the information needed for derivation of RFs (use rates, emission days) are provided in the section. Sub-SPERCs may also be represented here for a differentiation of release factors with regard to physicochemical properties of substances. Release factors are derived separately for air, water, soil and waste. The fact sheet format instructs that RF describes the total release from the contributing activity to different environmental compartments (taking into account the OCs and RMMs specified in sections 3 and 4) and that the method for determining the RF (e.g. use of measured data, use of literature data, use of release model, expert judgement e.g. employing qualitative arguments, argumentation based on physicochemical data) and a reference to the source of information (published literature, company data unpublished, expert statement) shall be provided to justify the RFs.

In the evaluated SPERCs the method for derivation of release factors and the justifications for the RFs were in most cases available in the background documents. In many of the background documents the justification seemed comprehensive and plausible whereas in some cases the justification was superficial.

In the Quality Criteria Template the data sources a. to d. are separated into different sub-sections. However, the type of data used for derivation of RFs in the SPERCs is not always that obvious: measured or modelled data may have been published in a scientific article and may cover a wider range of processes, and substance/product domains or read-across may have been justified in an OECD ES document and so on.

As one of the main goals of SPERCs is to provide more sector specific release factors to replace the generic release factors of ERCs, the justifications of RFs to different environmental compartments are therefore very important in creating exposure scenarios.

Release factor (RF) expresses the fraction of substance released to air, water and soil and reflects the set of operational conditions and risk management measures prevailing in a given use of a substance. The emission rate is the product of the substance use rate and the applicable release factor. Predicted environmental concentration (PEC) is in turn the outcome of the environmental exposure assessment. It consists of emission estimations and the subsequent modelling of the fate of a substance in the environment (8).

Considering this the validation of release factors could be emphasized in the Quality Criteria Template.

Suggestions for improvement:

- The quality of use rate/daily emission data could be evaluated in this section.
- Evaluation of the adequacy of each release factor (RF) in relation to the operational conditions and risk management measures could be added separately to the quality criteria. The need for describing the relations of RFs to OCs and RMMs in sufficient detail could be added to the fact sheet format guidance.
- Section 5 of the Quality Criteria Template could be divided into sub-sections according to the environmental compartments that are the target for releases.
- The structure based on the source of data for release factors in the Quality Criteria Template could be reconsidered - the separation to sections from a. to d. is somewhat confusing in many cases.
- The evaluation criteria could be combined to form general criteria for justification of RFs, such as quality of documentation, references/sources of data, representativeness of RFs and so on.

4.1.6 Quality Criteria - Conservatism

FS format			**QC template**		
Title	Subtitle	Keywords	Title	Subtitle	Keywords
	n/a	n/a	6 CONS	6.1 Is the level of conservatism appropriate?	SPERC coverage/ conservative derivation of RFs/ description in the BD

The justification of conservatism is not required in the fact sheet format, but it was nevertheless provided in all BDs of the evaluated SPERCs.

The quality criteria concerning conservatism focus on the sufficient coverage of the scope of the SPERC with respect to all uses described by the CoU and RMMs. The conservative derivation of release factors should be sufficiently described in the background document and be in balance compared to the scope (i.e. broader scope requires more conservatism and vice versa).

From the evaluators' point of view, determination of 'sufficient' may be difficult in many cases and may lead to inconsistencies between evaluators and validations. It is generally acknowledged that the default RFs of

ERCs are in most cases overestimates and represent worst-case situations without any abatement measures. This has led to the need to develop SPERCs with more realistic RFs. In practice, the RFs in SPERCs should obviously be lower than the RFs in ERCs, but what is a proper safety margin that should be applied for derivation of the RFs? As shown in Table 2, the variation of release factors in SPERCs is high.

The most common methods used to ensure conservatism are:

- worst-case assumptions,
- engagement of older technology for RFs,
- ignoring on-site abatement methods in derivation of RFs,
- employment of maximum values of the estimated ranges in the reference documents.

Suggestions for improvement:

- It was recognized during the test evaluations that exact rules for quality criteria concerning the level of conservatism of the release factors may be impossible to create.
- However, any possibilities to clarify or standardize the quality criteria for conservatism could be discussed in relevant tables.

4.1.7 Quality Criteria - Overall judgement

FS format			**QC template**		
Title	Subtitle	Keywords	Title	Subtitle	Keywords
	Reference to SPERC background document	description of the emission situation(s)/ justification, applicability domain of the RFs/ references, information, sources, methods used for RFs	7 SUMMARY	7.1 Overall judgement of the reviewer	representative-ness/reliability of RFs vs. CoUs and substance/ product/process domains

The overall judgement in the Quality Criteria Template aims at evaluation of the representativeness and reliability of RFs in respect to CoUs and substance/product and process domains described and covered in SPERCs.

The quality of all previous sections is evaluated and scored separately according to the template. The overall score should reflect the scores in the sub-sections as described in chapter 3.7. However, there could be several ways to derive the overall score.

It is not obvious from the guidance whether the free text for overall evaluation in the template should be a summary of all the previous sections, or just a generic sentence of the reliability of RFs. The same questions concern the overall remarks on improvements.

Suggestions for improvement:

- Some further guidance could be added to the Quality Criteria Template on the purpose and use of the overall judgement.
- Rules how to create the average scoring could be developed.
- Should there be a number score for calculations, along with the verbal descriptions?

4.2 Quality of the background documents

The purpose and requirements of the background documents of SPERCs are defined in the fact sheet format:

> "The objective of this fact sheet is to summarize the SPERC key facts provided in the corresponding SPERC background documents. It gives an overview of the SPERC essentials for the chemical safety assessment. A SPERC background document is a reference document, which provides the description of the emission situation(s) for a use specified by an industrial sector, the justification and applicability domain of the environmental release factors, and the references/information sources/methods used in the derivation of the release factors.
>
> Provide the reference to the background document, which provides the details underlying this SPERC fact sheet. This includes the title and where the document can be retrieved."

However, the definition of background document is rather ambiguous and there are no requirements for the format or level of detail of the background documents. In practice, the contents and structure of the BDs seemed rather variable in the evaluated material, which may complicate the quality validation. What is a sufficient level of detail e.g. for emission situation(s) for a use when a SPERCs covers - as in most cases - a broad applicability domain described in rather generic terms?

In the course of test evaluations, it was noted that the evaluation process was most efficient when the structure - sections, titles and numbering - were the same in the SPERC fact sheet and in the background document. In these cases, finding details and arguments for items summarized in the SPERC fact sheet was effortless.

Another practice that was considered good and illustrative was the use of a tabular format for instance for the description of main emission points, with justifications and comments on their role in deriving the release factors. This was considered especially clarifying when the background document covered several SPERCs (as in most cases). In the table, all process steps were listed and the related emissions and their extent to the different environmental compartments were described separately for different SPERCs (substance/product domains).

A tabular format was considered a clear structure for collecting and summarizing many other pieces of information in different sections of the background documents also.

Suggestions for improvement:

- Creating a template/model for background documents (BD) would have many benefits:
  - compilation of the BD would be easier for organizations when targets and level of detail are defined in a template or model BD,
  - a common template or model BD would make the BDs more consistent with the requirements,
  - the users of SPERCs would find the information needed for their own exposure estimations in an easier and clearer way,
  - transparent and better comparable BDs would simplify the validation of SPERCs and their BDs.

4.3 Consistency and transparency of the validation

The objective of the validation of the SPERCs is unarguably to enable a consistent and transparent evaluation of each SPERC so that the results of evaluations would also be comparable with each other.

For this purpose, the Quality Criteria Template for validation was considered a good and practical tool. The same tool offers both guidance for the evaluation and report format for the validation results, with illustrative scoring for each section and overall results. The Quality Criteria Template as a tool promotes the consistent quality of SPERCs, and standardized quality criteria enable comparable evaluation.

Nevertheless, during test evaluations it was found that performing a consistent evaluation with exactly the same criteria for different types of SPERCs with a different level and structure of detail in information given is challenging. In practice, the 'Explanation of evaluation' may easily remain somewhat generic and cursory if the broad, and sometimes unorganized, information provided in the FS and background document is summarized without any intermediate processing. This problem was observed already during the pilot phase of the test evaluations.

To further improve the usability of the Quality Criteria Template and promote a consistent evaluation of the SPERCs, an approach was tested, where the criteria described in free text of the quality criteria guidance were formulated to specific questions to be answered as a working tool for evaluation. The questions applied are presented in Appendix 2.

This approach for evaluation, based on specific questions for each section, was considered to contribute in keeping the evaluation criteria on the same level during the course of the long span of the test evaluations.

Suggestions for improvement:

- It might be useful to formulate the guidance in the Quality Criteria Template to more straightforward quality questions, as a working tool to support the consistent evaluation of validity of SPERCs during the course of evaluations and between different evaluators.

4.4 Quality Criteria and environmental exposure estimation

The actual goal of SPERCs is to provide realistic sector specific environmental release factors of substances to manufacturers, formulators and downstream users for their environmental exposure estimations. To that end, the justification and applicability domain of the environmental release factors must be well described, and the references/information sources/methods used in the derivation of the release factors are vital.

Suggestions for improvement:

- Evaluation of the adequacy of each release factor in relation to the operational conditions and risk management measures could be pointed out more clearly in the quality criteria in addition to evaluation the quality of sources, references and methods of derivation of the RFs.
- The need for describing relations of release factors to operational conditions and risk management measures could be added to the fact sheet format guidance.

4.5 Comparison of SPERCs within a same life cycle stage and type of domain - an example

One perspective to the SPERCs is to compare how the sector organizations have applied the guidance for SPERCs to their compilation of sector specific fact sheets. As an example, a set of SPERCs for formulation of water-borne substance or products or applying processes with water contact were compared (Table 4). Information in background documents was also considered in the comparison.

The title expresses the presence of water-borne substances in four out of five cases.

The scope shows the very broad substance and process domains in each of the SPERCs. Volatile ingredients in the substance domain are defined by a boiling point threshold of <250°C. Ranges of different ingredient types are given in the background documents.

The scope can be considered clear in a generic sense in all of the five SPERCs, but the comprehensiveness may limit the verifiability of them. All scopes are consistent with the underlying ERCs.

Overall, no major differences in approaches to describe the scope was seen between the five SPERCs.

The operational conditions were described shortly in the SPERC fact sheets. Main process stages and emission points to air, water and waste were provided in the background documents to a varying level of detail. References to sector specific OECD ESD or BAT/BREF documents were given. The process types and main process steps with emission points were clearly described and provided in a tabular form in some of the SPERCs, but links between OCs and specific environmental releases were not very clear in all of the SPERCs.

The emission points are typically related to transfer of substances, charging of raw materials, container cleaning, disposal of empty containers, dispersion/formulation/mixing, quality sampling, packaging/filling, equipment cleaning and waste disposal.

In the case of formulation of water-borne products, the emissions to water were almost exclusively caused by cleaning the equipment with water and disposing of the washings to wastewater.

As with the scope, no major differences in approaches to describe the operational conditions were seen between the five SPERCs, except for the level of detail in linkage between the processes and emissions. Water emission was not considered significant in four of the cases.

In the RMMs, no obligatory waste water abatement methods were suggested in four of the SPERCs. In one of the SPERCs (formulation of metals) obligatory RMMs were described, but clear links to emission points were not presented in the background document. No application of sludge to soil was allowed in this SPERC. Connection to municipal STP was assumed for all of the SPERCs.

Abatement or use of a solvent management plan was required for reducing air emissions in two SPERCs.

Release factors were calculated for all environmental compartments in all five SPERCs, except for the soil compartment where only one SPERC reported potential emissions to soil. Release factors to water were reported, although no RMMs were considered necessary. The range of RFs to water varied from 0.005 to 0.5% in this set of SPERCs.

To summarize, no major differences in the ways to report CoUs and emissions between the SPERCs taken into comparison were seen. A general feature in the SPERCs was that they cover rather broad scopes which leads to lesser details in the OC and RMM descriptions. This conclusion can be generalized to all the evaluated SPERCs.

Table 4. Comparison of a set of SPERCs, project codes 2/a-1 to 2/a-5 (life cycle stage = formulation, specification = waterborne or water contact).

Fact sheet	2/a-1	2/a-2	2/a-3	2/a-4	2/a-5
	3 sub-SPERCs (volatiles, >1000 tpa; volatiles <1000 tpa; solids)	3 sub-SPERCs (volatiles, >1000 tpa; volatiles <1000 tpa; solids)	No sub-SPERCs	No sub-SPERCs	No sub-SPERCs
2 SCOPE					
2.1 **S**ubstance domain (shortened)	Volatile organic compounds, Particulates, Volatile and non-volatile compounds in liquid mixtures, Solids in polymeric liquids, Intended compounds not classified as PBT or vPvB, Volatile compounds rapidly degradable, Water-borne mixtures may contain biocidal agents of product type 2, 6 or 7, Water borne coatings and inks: may contain solvent up to 25 % volatile content.	Volatile organic compounds, Particulates, Volatile and non-volatile compounds in liquid mixtures, Solids in polymeric liquids, Non-volatile compounds in solid, Intended compounds not classified as PBT/vPvB, Volatile compounds rapidly degradable, Organic solvent borne coatings and inks (solvent-borne up to 95 % vol. content, liquid solvent-free coatings close to 100 % non-vol. content), Water borne coatings and inks: may contain solvent up to 25 % vol. content.	Volatile substances which evaporate to a significant extent upon curing of the adhesives. Volatile ingredients are defined by a boiling point threshold of <250°C.	Substances which do not evaporate to a significant extent during formulation of the adhesive. Non-volatile ingredients are defined by a boiling point threshold of >250°C.	Alkali metals, alkaline earth metals, transition metals, post-transition metals, metalloids and their compounds but excludes non-metals, halogens, noble gases and metallo-organic compounds. SPERC valid for metals with solid water partition coefficient for suspended matter between 2,500 L/kg and 400,000 L/kg. Types of products: Metal (massive and/or powder).
2.2 Process domain (shortened)	Whole process of formulation/ manufacture of water borne liquid coatings and inks.	Whole process of formulation/manufacture of organic solvent and water borne liquid coatings and inks.	Storing, mixing, packaging, filling of substances (as part of preparations) and equipment cleaning, maintenance and associated laboratory activities.	Storing, mixing, packaging, filling of substances (as part of preparations) and equipment cleaning, maintenance and associated laboratory activities.	Since metal SPERCs are based on measured data at end-of-pipe on-site, indicated PROCs are integrated in the release fractions from raw materials handling to cleaning and maintenance.
3 OCs					
3.1 CoU (shortened)	Location / indoor Water contact / yes Connection to STP / yes Maximise the efficiency of use of input raw materials through the highest conversion into formulated products.	Location / indoor Water contact / yes Connection to STP / yes Maximise the efficiency of use of input raw materials through the highest conversion into formulated products.	Location / indoor Water contact / yes Connection to STP / yes High degree of automation in adhesive / sealant formulation. Typically a batch process. Maximum efficiency of use of input raw materials through the highest conversion into formulated products.	Location / indoor Water contact / yes Connection to STP / yes High degree of automation in adhesive / sealant formulation. Typically a batch process. Maximum efficiency of use of input raw materials through the highest conversion into formulated products. Use of closed or covered manufacturing equipment to minimise evaporative	Biological STP : Site specific Discharge rate of domestic STP >= 2E3 m3/day Chemical precipitation or sedimentation or filtration or electrolysis or reverse osmosis or ion exchange. Electrostatic precipitators or wet electrostatic precipitators or cyclones or fabric/bag filter or ceramic/metal mesh filter.

			Use of closed or covered manufacturing equipment to minimise evaporative losses of VOCs.	losses of solids below respective OELs. Use of general and manufacturing plant extraction. Dust filters during transfer and formulation of powder raw materials with efficiencies of 99%.	
3.2 Waste handling (shortened)	Process waste may be recycled or incinerated by waste disposal company.	Process waste may be recycled or incinerated by waste disposal company.	Equipment cleaned with water, washing disposed of with wastewater.	Equipment cleaned with water, washing disposed of with wastewater.	Dispose of waste product or used containers according to local regulations.
4 RMM					
Air - limiting release	Installation controlled under IED– abatement or use of solvent management plan	Installation controlled under IED– abatement or use of solvent management plan	None	None	(Wet) electrostatic precipitators or cyclones or fabric/bag filter or ceramic/metal mesh filter.
Air - efficiency	0.95 – 0.97	0.95 – 0.97	Not applicable	Not applicable	Removal rates from 0.1 to <50 mg/Nm^3
Air - reference	IED, OECD ESD	IED, OECD ESD	Not applicable	Not applicable	-
Water - limiting release	Not applicable	Not applicable	None	None	Chemical precipitation or sedimentation or filtration or electrolysis or reverse osmosis or ion exchange.
Water - efficiency	Not applicable	Not applicable	Not applicable	Not applicable	Removal rates up to >99%.
Water - reference	Not applicable	Not applicable	Not applicable	Not applicable	BAT/ Non Ferrous Metals Industries
Soil - limiting release	Not applicable	Not applicable	None	None	No application of sewage sludge to soil.
Soil - efficiency	Not applicable	Not applicable	Not applicable	Not applicable	-
Soil - reference	Not applicable	Not applicable	Not applicable	Not applicable	-
5 Exposure assessment					
RF - air, %	0.0097 - 2.2	0.0097 - 3.6	2.25	0.0097	0.05 (release after RMM)
/reference	/OECD ESD	/OECD ESD	/Tolls et al. 2016	/Tolls et al. 2016	/Multimetal database
RF - water, %	0.25 - 0.5	0.005 - 0.5	0.5	0.505	0.05 (release after RMM)
/reference	/OECD ESD	/OECD ESD	/Tolls et al. 2016	/Tolls et al. 2016	/Multimetal database
RF - soil, %	0	0	0	0	0.1 (non-agricultural soil)
/reference	/OECD ESD	/OECD ESD	/Tolls et al. 2016	/Tolls et al. 2016	/ERC default
RF - waste, %	0.5	0.5 - 1	0.2 - 3	0.2 - 3	1
/reference	/OECD ESD	/OECD ESD	/OECD ESD	/OECD ESD	/Multimetal database

5 Quality Criteria from the Nordic perspective for environmental exposure estimation

This SPERC evaluation project has been conducted with the funding of the NKE (Nordic Working Group for Chemicals, Environment, and Health), and one of the project targets was to consider the specific climatic and geographical conditions of Nordic countries in parallel, by assessing whether special climatic measures need to be included into SPERCs to assure that risks are properly addressed. The idea was to get a better understanding of whether the geographical conditions are a cause for concern necessitating further actions.

In a survey on the fate and effects of chemicals in the Nordic environments related to the use of biocides, the Nordic environmental circumstances were considered to represent a worst case for environmental exposure to chemicals compared to the average EU environment (9), because:

- degradation rate is lower and adsorption conditions are poorer compared to the average EU environment,
- low temperature retards both hydrolysis and microbiological degradation,
- photolysis is insignificant during the darker half of the year,
- the Nordic mineral soils are more vulnerable to contamination of groundwater because they occur more frequently in a thin, acidic layer with a coarse texture, enhancing leaching.

On the other hand, it was concluded in the survey that:

- the Nordic environment does not have such a clear influence on the environmental effects of chemicals,
- low temperature does not have a comparable influence on bioaccumulation and toxicity,
- the fate and effects of chemicals are not only modified by external conditions but depend very much on the structure of the chemical itself (polar/non-polar compounds, ionizable compounds, neutral compounds, etc.).

Within the scope of SPERCs, the temperature difference in the biological treatment of waste waters seemed to be the most relevant question. The focus was on on-site biological treatment because the release factors are to be calculated before connections to municipal sewage treatment. In the test set of SPERCs only few of the SPERCs reported on-site biological treatment.

Ambient temperatures as well as the influent temperature affect the biological treatment. Water temperature influences all biological processes in the activated sludge process. For instance, the rate of nitrogen removal and related microbiological processes (ammonification, nitrification, denitrification) are temperature sensitive (10). Nitrification reaches a maximum rate at temperatures between +30 °C and +35 °C. At temperatures of +40 °C and higher, nitrification rates fall to nearly zero. At temperatures below +20 °C, nitrification proceeds at a slower rate, but will continue at temperatures of +10 °C or lower. Denitrification can occur between +5 °C and +40 °C, and these rates increase with temperature. Hence, low temperatures slow down the biological processes, but they fall to nearly zero only in temperatures close to 0 °C.

The removal of phenols in activated sludge processes is reported to be sensitive to temperature, but a better performance is achieved in cold rather than warm weather.

Water temperature in biological treatment is a sum of many climatic/seasonal conditions and influent type and quality but also properties of the plant (size, location, efficiency requirements etc.). The first one is especially relevant in Nordic countries: outdoor air temperature may have broad variation from ca. < -30 °C up to > +30 °C. Depending on the process, the high temperature of the effluent may partly compensate the outdoor temperature. In cases of smaller installations and lower volumes of waste waters the biological aeration lagoon may be constructed indoors, which reduces the temperature effect.

Biological waste water treatment, in combination with mechanical and chemical stages, is widely applied also in the Nordic countries both for municipal and industrial waste waters, despite of temperature challenges. The obligation for efficient waste water treatment and emission limits are set in environmental permits, which are monitored and controlled by authorities. The requirement to apply best available techniques (BAT) to treat industrial effluent comes from the Industrial Emissions directive (2010/75/EU).

Technical solutions for treatment are site, process and volume specific. It can be assumed that climatic differences within the EU countries do not necessitate any specific modifications for the SPERCs.

6 Summary and discussion

Background

A number of SPERCs have been created for various industrial sectors by the sector organizations during the past decade. Validation of SPERCs in a consistent way has been considered a measure to increase confidence in the SPERCs and the outcomes of chemical safety assessment in general. To this end, the Quality Criteria Template was created in the context of the Exchange Network on Exposure Scenarios (ENES) to be used for validation, and it was issued in January 2020.

In the original project plan, the project objectives were divided to the following:

1. Getting and overview of the available SPERCs and scoping the project.
2. Assessing available SPERCs and their background documents against the newly defined criteria.
3. Highlighting areas for improvements, including specific Nordic considerations of especially climate; taking into account the long-distance transport of chemicals in the environment.

In the project, the Quality Criteria Template was applied for test evaluations of a set of representative SPERCs, to investigate how the tool is fit for purpose and to report the findings and possible suggestions for improvements. The main objective of the project was to test the functionality of the Quality Criteria Template as a tool, but at the same time, the results of the test evaluations were also summarised.

Evaluation of the SPERCs

The representative set of 27 SPERCs, covering all life cycle stages, was selected for test evaluations. The practical approach for evaluations was developed during a pilot phase. Guidance in each section of the Quality Criteria Template was formulated into questions to be answered during the course of the evaluation, in order to improve consistency and transparency of the work. The information was summarized in the 'Explanation of evaluation' and 'Remarks on improvements' in the template and compiled in a summary table (Appendix 2).

A general observation from the whole SPERC fact sheet data set was that the scopes of SPERCs were very broad in most of the cases and covered a variety of substances and processes. This reflects the purpose of SPERCs outlined in the SPERC fact sheet guidance: SPERCs strike a balance between the degree of detail needed for describing a given use situation, the generic character of a safety assessment under REACH and the scope of the coverage that is affordable. Hence, if the expected risk is low, the SPERCs are defined to cover broad use ranges, i.e. if it addresses uses of substances which do not have a critical environmental hazard profile and if emissions from a process are intrinsically low.

All evaluated SPERCs were comprised of a fact sheet and a background document. The level of detail differed between SPERCs both in fact sheets and background documents. Apparently, the expected risk was rather low in the evaluated set, judging from the broad scopes and the lack of obligatory risk management measures

in many of the SPERCs. The generic approach in creating SPERCs was compensated by conservatism of release factors. Conservatism was achieved by worst-case assumptions of use rates and release factors, and emission values from older technology, assuming technical progress, in most of the evaluated SPERCs.

The application of the validation criteria in the Quality Criteria Template for evaluation was somewhat challenging, and sometimes the line between the scores 'Good' and 'Acceptable' or 'Acceptable' and 'Insufficient' was not very clear. If the SPERC covers a wide range of substances/products and processes, what level of detail can be required for the pathways of releases, abatement methods and their efficiencies? In this evaluation, a rather generic level of RMM descriptions, focused on certain release types, was accepted as sufficient.

Most of the evaluation scores given for the contents of SPERCs and their background documents were 'Good' or 'Acceptable'. The overall score was more often 'Good' due to the rounding method applied for scoring. Only few 'Insufficient' scores were assigned, mostly because of faults in references and summaries in background information.

Quality Criteria Template

Several viewpoints were identified and considered in the test evaluations of the SPERCs. The focus was on the functionality of the tool for practical evaluation work and on the other hand on enabling consistent and transparent evaluation of the given information.

In general, the Quality Criteria Template for validation was considered a good and practical tool. The same tool offers both guidance for the evaluation and report format for the validation results, with illustrative scoring for each section and overall results. The Quality Criteria Template as a tool promotes the consistent quality of SPERCs and standardized quality criteria enable comparable evaluation.

Some suggestions for improvements to further enhance to usability of the Quality Criteria Template were identified and presented for each section. The suggestions are compiled in Table 5.

Table 5. Summary of the suggestions for improvement in the Quality Criteria Template and guidance.

Section	Suggestions for improvements
1 Title	– Using a systematic SPERC code should be made a quality criteria. – Titles of background documents should be included in the quality criteria. – Filenames of SPERCs and their background documents should also be named unambiguously.
2 Scope	– The quality evaluation could follow more precisely the information provided in each section of the SPERC FS format, i.e. the quality of scope could be evaluated as such. – The questions for evaluating the consistency of the relationship between the scope and emission points and the OCs and RMMs of the SPERC could be relocated to the end of the template. This would make the evaluation more efficient and straightforward. – The line between 'Acceptable' and Insufficient' scores could be specified: how detailed information should be required of a typically generic scope?
3 OCs	– Evaluation of the use rates might be placed in section 5 of the Quality Criteria Template, in line with its location in the fact sheet format. In many SPERCs only indicative use rates were provided and the connection to operational conditions was generally not unambiguous. – A requirement for information on proper waste handling could be added to the quality criteria more clearly.

4 RMMs	– The guidance for providing relevant information of risk management measures in the SPERC fact sheet format could be further developed. – More detailed descriptions of sources and pathways of emissions and linkage between risk management measures and substance/product and process domain and emission points should be required in the fact sheet (and/or in the background document). This would be in line with the quality criteria.
5 RFs	– The quality of use rate/daily emission data could be evaluated in this section. – Evaluation of the adequacy of each release factor (RF) in relation to the operational conditions and risk management measures could be added separately to the quality criteria. The need for describing the relations of RFs to OCs and RMMs in sufficient detail could be added to the fact sheet format guidance. – Section 5 of the Quality Criteria Template could be divided into sub-sections according to the environmental compartments that are the target for releases. – The structure based on the source of data for release factors in the Quality Criteria Template could be reconsidered - the separation to sections from a. to d. is somewhat confusing in many cases. – The evaluation criteria could be combined to form general criteria for justification of RFs, such as quality of documentation, references/sources of data, representativeness of RFs and so on.
6 Conservatism	– It was recognized during the test evaluations that exact rules for quality criteria concerning the level of conservatism of the release factors may be impossible to create. – However, any possibilities to clarify or standardize the quality criteria for conservatism could be discussed in relevant tables.
7 Overall judgement	– Some further guidance could be added to the Quality Criteria Template on the purpose and use of the overall judgement. – Rules how to create the average scoring could be developed. – Should there be a number score for calculations, along with the verbal descriptions?

Some general suggestions to enhance the usability of SPERCs and validation of them were also identified during the evaluation (Table 6).

Table 6. Other suggestions for enhancing the use and validation of SPERCs.

Background documents	– Creating a template/model for background documents could be considered.
Consistency and transparency	– It might be useful to formulate the guidance in the Quality Criteria Template into more straightforward quality questions, as a working tool, to support the consistent evaluation of validity of SPERCs in the course of time and between different evaluators.
Environmental exposure estimation	– Evaluation of the adequacy of each release factor in relation to the operational conditions and risk management measures could be pointed out more clearly in the quality criteria in addition to evaluation the quality of sources, references and methods of derivation of the RFs. – The need for describing relations of release factors to operational conditions and risk management measures could be added to the fact sheet format guidance.

Nordic perspective

One of the project targets was to consider the specific climatic and geographical conditions of Nordic countries in parallel, by assessing whether special climatic measures need to be included in SPERCs to assure that risks are properly addressed. The idea was to form a better understanding of whether the geographical conditions are a cause for concern, therefore necessitating further actions.

Within the scope of SPERCs the temperature difference in the biological treatment of waste waters seemed to be the most relevant question. The focus is on on-site biological treatment because the release factors are to be calculated prior to connections to municipal sewage treatment.

Biological waste water treatment, in combination with mechanical and chemical stages, is widely applied also in the Nordic countries both for municipal and industrial waste waters, despite of temperature challenges.

Technical solutions for treatment are site, process and volume specific. It can be assumed that climatic differences within the EU countries do not necessitate any specific modifications for the SPERCs.

APPENDICES

APPENDIX 1. The Quality Criteria Template.

APPENDIX 2. Summary of the results of the test evaluations of the SPERCs in accordance with the Quality Criteria Template, with extracts from SPERC fact sheet information.

REFERENCES

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SPERCs Quality Criteria

SPERCs describe the conditions of use and related release factors for a specific use. They do not depict emission situations at concrete sites but address generic emission situations such as related to relevant practices in industry and in particular in the downstream industries. They attempt to be applicable to compute typical emission situations during the use of a substance or mixture for environmental exposure analysis. To that end, SPERCs strike a balance between the degree of detail needed for describing a given use situation and the generic character of a safety assessment under REACH. To that end a SPERC represents the level of conservatism in the derivation of the release factors matching the scope of its coverage.

Hence, SPERCs that describe a broad range of uses must depict a larger variance of release rates, which results in less realism for each single use covered but a higher conservatism overall. On the other hand, a SPERC that describes a narrow application scope, can be more realistic towards the specific use and the release factors; the derivation of emission relevant factors therefore deserves less conservatism

Purpose

According to the 2019-2020 ENES working programme, a review of SPERCs is expected to be conducted by both industry (internal review) and by authorities (external review). To ease this review, the industry SPERC TF has developed a set of quality criteria. The purpose of the quality criteria is **to support and document a quality assessment** of the SPERC background document and, where relevant, the corresponding fact sheets by considering following topics:

- Is the scope of the SPERC clear in terms process-types and/or product-types covered?
- Are the main Conditions of Use (CoU), including Operative Conditions (OC) and risk Management Measures (RMMs) driving the environmental release clearly identified, understandable and verifiable?
- Are the factors resulting from the key drivers for environmental emissions (water, soil, air) adequately quantified, and is it sufficiently explained how the release fractions were estimated?

The quality criteria are to be seen as a mean to assess quality, not as an objective on its own.

Who are the end-users of this template?

The quality criteria, in first instance, are to be used by the SPERC developers to check the completeness and quality of their own SPERCs as a self-assessment tool. External reviewers (industry, consultants or Member States) are encouraged to use the quality criteria to provide a focussed feedback to the SPERC developers on their SPERCs.

How to use the quality criteria template?

The quality assessor is asked to answer all relevant quality criteria questions by means of a score 1 (good) to 3 (insufficient) or indicate “not applicable” (4). A justification of the selected score shall be reported in the field ‘explanation of evaluation’. Especially where the scoring is “insufficient” the assessor should provide a thorough explanation in order to enable a focussed review of potential gaps. In addition, the quality assessor is asked to provide an overall score to the SPERC. When conducting the quality assessment, information present in both the factsheets and the background documents should be considered.

Scoring - Legend:

1 - Good	No need for further improvement
2 - Acceptable	OK, but room for improvement or aspects to be verified
3 - Insufficient	Improvement is required.
4 – Not applicable	Criteria not applicable to the specific SPERC under review

Glossary:

- CoU: Condition of Use
- Key condition of use drivers: CoU that are not key drivers for release can be considered to be removed from the SPERC.
- OC: Operational Condition
- RF: Release Fraction
- RMM: Risk Management Measure
- SPERC: Specific Environmental Release Category

ASSESSOR IDENTIFICATION	
Name of the assessor	>> Name of the person or legal entity that conducted the assessment
Contact details	>> Email address and/or phone number to be used to contact the assessor in case clarifications are needed
Documents evaluated	>> Exact reference and version of the documents evaluated (BD, FS, other docs…)
Date of the evaluation	>> Date when the assessment was conducted/completed

1 – TITLE

1.1 Is the SPERCs title simple, concise, unambiguous, understandable?

The title of the SPERC is important to facilitate the selection of the most appropriate SPERC to be used to estimate environmental emissions when running a chemicals safety assessment.

EVALUATION	Assign a score
Explanation of evaluation	
Remarks on improvements	

2 –SCOPE

2.1 Is the scope of the SPERC clear, verifiable and consistent with underlying ERCs?

Is the scope of the SPERC (in factsheet and background document) clear and verifiable for a user in terms of i) process-types, ii) product-types, and iii) substance properties covered?
Are the boundaries of the scope sufficiently clear and explicit, indicating what is not covered, for example where misunderstanding may arise, or where the SPERC developer has chosen not to cover a particular use situation because it is exceptional for the sector. For example, where SpERCs relate to the scale of operation or the volatility of substances, quantitative benchmarks should be provided.

(*) The use-map developer needs to build use names and names for the contributing activities that i) correctly match the scope of the applicable SPERC and ii) are easily verifiable for the companies receiving exposure scenarios.

EVALUATION	Assign a score
Explanation of evaluation	
Remarks on improvements	

2.2 Is the scope described as substance and/or process domain consistent with the OC/RMM identified as driving the release?

The Scope section is to understand the relationship between substance type, product and process, including RMMs/abatement techniques, on the one hand and the environmental release on the other hand. Does this relationship becomes adequately clear and transparent?
For example:

- If SPERC refers to products and processes where no water is involved, absence of water contact should be made explicit in the conditions of use, and it should be made clear whether this refers to the process as such or also to cleaning operations (equipment cleaning, floor cleaning). Hence, the process domain should hint towards the relevant sections in the process (i.e. conditions of use). The scope of the SPERC is driven in this case by the process domain and to a lesser extent by the substance domain;
- If a SPERC refers to volatile substances that are used as process aids leading mainly to emissions to air, the combination of substance and process domain will equally describe the scope of the SPERC. Certain substances (e.g. defined by a boiling point threshold) will be prone to air emissions as specified within the process domain (closed or open processes). Further conditions affecting the release into the environment is given in the CoU and is not part of the scope section.

EVALUATION	Assign a score
Explanation of evaluation	
Remarks on improvements	

3 – OPERATIONAL CONDITIONS

3.1 Are the OCs clearly described and practically verifiable?

Together with the substance properties, the operational conditions determine the initial release of substances from the use-process. For example, elevated temperature (temperature benchmark needed) and abrasive processes usually increase the release of a substance to air, water contact during the process (water based process steps) or during cleaning (equipment or room cleaning) drives the presence of the substance in waste water. For the mentioned examples, it should be possible to communicate the operational conditions in a clear and verifiable way. However, it is not always possible in a generic SPERC (or in the resulting exposure scenario) to describe and communicate the (complex) operational conditions in the industrial processes of a sector driving the initial releases of the substance into exhaust air, waste water -or residue streams. In such cases, the SPERC best makes reference to a documented best/good practice or a Best Available Technique (BAT), provided such sector “standard” can be connected to (substance related) release factors. For example, generic

phrases in SPERCs factsheet such as “high degree of automation” or “efficient use of raw materials” should be referenced (or exemplified) to what this means in practice in the background document.

EVALUATION	Assign a score
Explanation of evaluation	
Remarks on improvements	

3.2 Do the OCs properly reflect the main drivers for release potential of substances into the environment?
Note - On this purpose, operational conditions mentioned shall be linked to the environmental releases covered by the SPERC. For example, if release to water is set to 0, CoU should reflect that cleaning operation needs to be performed without water and no water used in process or water is completely recycled and water containing residues (from cleaning the water-cycle) are disposed of as waste.

EVALUATION	Assign a score
Explanation of evaluation	
Remarks on improvements	

3.3 If a use rate has been provided: Is it transparent, how the use rate has been derived and how representative it is?
Note: a use rate is generally site specific and cannot be provided as definite by a SPERC. Therefore, in general, SPERCs may provide indicative use rates that are based on conservative assumptions (i.e. high end of daily use rates) from industry use data. These use-rates are meant to serve as a starting point or benchmark for the registrant’s assessment. It is for example important to explain, whether the indicative value is based on statistical figures on daily consumption of chemicals at single sites, or whether the indicative value is extrapolated from an annual market/sector tonnage, distributed over a number of users and/or a number of use-days. In this respect it may also play a role whether the activity is carried out as i) small scale operation and ii) large scale operation, and or under optimal or suboptimal conditions and thus whether several SPERCs may be needed (with a corresponding indicative use-rate), e.g. one with onsite emission controls and the other without onsite emission controls. For uses where process waters are retained and environmental releases potentially occur discontinuously, it need to be transparently explained to what use rate the SpERC emission factors are applicable. For example, the emission factors of such a SPERC can be a reflection of the continuous flow-through situation (with daily compensation of losses) and/or a situation where the whole bath is exchanged (and fractions of it are released on a day).

EVALUATION	Assign a score
Explanation of evaluation	
Remarks on improvements	

4 – RISK MANAGEMENT

4.1 Are the RMM described in a clear manner?
Are the RMM (in factsheet and background document) described in a clear manner (required effectiveness and technical possibilities to achieve it), so that a DU or an authority could practically verify whether such techniques or equivalents are in place? In case RMMs are linked to good/best practices/techniques, have the corresponding references been provided (e.g. BAT, BREF documents)? Note, that a link to good/best practices may subsume an array of alternative techniques that lead to similar results of emission reduction.

EVALUATION	Assign a score
Explanation of evaluation	
Remarks on improvements	

4.2 Are RMMs adequate for the substance/product domain?
Is it plausible that the reported RMMs are effective to substances within the described domain and /or to the product types within the scope of the SPERC? Is this linkage adequately described in the background document? For example, mechanical oil/water separation may not effectively work where emulsions occur.

EVALUATION	Assign a score
Explanation of evaluation	
Remarks on improvements	

4.3 Are RMMs clearly linked to release sources?

Are the main sources/pathways of release from the process described in the background document, and is it clear to which of these the RMM refer? For complex air treatment systems (e.g. wet scrubbing), is it sufficiently clear, on which pathway and at which rate the substances removed from air leaves the site (for example via waste-water or waste)? In case alternative RMMs can be applied to achieve similar end-of-pipe effectiveness, are concrete examples/options provided? Note, that good/best practices may subsume an array of alternative techniques that lead to similar results of emission reduction.

EVALUATION	Assign a score
Explanation of evaluation	
Remarks on improvements	

5 – RELEASE FACTORS

5.1a MEASURED DATA - Are measured data representative and well documented?
In case a set of measured data for the process/products covered in the SPERC, and taken under the conditions of use as described in the SPERC, is the number of data points, the number of companies and the substances analysed documented or referenced? Are measured data related to reasonable and documented use rates in order to derive representative release factors? Where available, provide a data analysis (e.g. distribution %ile) to identify representativeness of the data for the respective purpose (e.g. determination of release rate).

EVALUATION	Assign a score
Explanation of evaluation	
Remarks on improvements	

5.1b MODELLED DATA - Is the documentation on the model and the modelling report available?
In case release factors are determined based on a model developed for the processes and products covered in the SPERC, is the documentation of the model and a modelling report available? Are modelled releases related to representative use rates in order to derive reasonable release factors?

EVALUATION	Assign a score
Explanation of evaluation	
Remarks on improvements	

5.1c LITERATURE DATA - Is the literature source provided and assessed to be representative/robust?
In case the release factors are extracted from published literature referring to the process/products and conditions of use covered in the SPERC, is the literature referenced and is a short summary provided in the background document? Is the number of data points, the number of companies, the conditions of use and the substances analysed clearly documented in the publication? Are the conditions of use referred to in the publication consistent with the conditions identified in the SPERC.

EVALUATION	Assign a score
Explanation of evaluation	
Remarks on improvements	

5.1d READ-ACROSS DATA – Is the read-across sufficiently robust and well explained?
In case of read-across from any of the type of sources above (to other processes, other products, other conditions of use), is the read-across sufficiently explained, for example by comparing the processes, the release driving factors and the properties of the chemicals involved. For example, releases to water from any kind of formulation processes will have very similar drivers, independent of the concrete product category: It will depend on i) dustiness or viscosity of the chemicals to be mixed, ii) whether cleaning of machinery is carried out with water, iii) whether the equipment is run continuously or in batch-mode with intermediate cleaning and iv) which techniques are used to minimise the residues in the equipment before cleaning. Thus read-across from formulation of one product category to another one may be straight forward.

EVALUATION	Assign a score
Explanation of evaluation	
Remarks on improvements	

6 – CONSERVATISM

6.1 – Is the level of conservatism appropriate?
Does the scope of the SPERC cover sufficiently all uses described by the CoU and RMMs? Is the level of conservatism, i.e. the conservative derivation of release factors, etc., sufficiently described in the background document? Is the level of conservatism balanced compared to

the scope? (i.e. broader scope requires more conservatism and vice versa). Conservatism can result from different aspects, e.g. from the mathematical analysis of data (e.g. taking a 90%ile, summing up from individuals to a category, etc.), the read across from different processes and/or a worst case approach, where assumptions were taken from the process with the worst emission aspects.

EVALUATION	Assign a score
Explanation of evaluation	
Remarks on improvements	

7 – SUMMARY and OVERALL JUDGEMENT

7.1 - Overall judgement of the reviewer
Based on the documented information, are the release factors considered representative and reliable for the conditions of use described in the SPERC and the type of substances (by chemical-physical properties) contained in products/processes covered by the SPERC?

Overall score	Assign a score

Title	**Scope**	**OCs**	**RMMs**	**RELEASE FACTORS**	**CONSERVATISM**
Assign a score	Assign a score	Assign a score	Assign a score	Assign a score	Assign a score

Overall evaluation	
Overall remarks on improvements	

APPENDIX 2

Extracts from the SPERC fact sheet (FS) information and results of the test evaluations of the SPERCs in accordance with the Quality Criteria template (QC). The applied working tool questions are below the headings.

Abbreviations: LCS (life cycle stage); ERC (environmental release category)

1 TITLE (FS / QC)

1.1 Is the SPERCs title simple, concise, unambiguous, understandable?

- Is the title
  - simple?
  - concise?
  - unambiguous?
  - understandable?

LCS	Specifi-cation(s)	ERC	Project code	1 TITLE (FS / QC)	QC Explanation of evaluation	QC Remarks for improvements	Score
M		1	1/a		The SPERC title fulfils the requirements for a simple, concise, unambiguous and understandable title.	No suggestions for improvements.	G
F	water borne	2	2/a-1		The SPERC title fulfils the requirements for a simple, concise, unambiguous and understandable title.	No suggestions for improvements.	G
		2	2/a-2		The SPERC title fulfils the requirements for a simple, concise, unambiguous and understandable title.	No suggestions for improvements.	G
		2	2/a-3		The SPERC title fulfils the requirements for a simple, concise, unambiguous and understandable title.	No suggestions for improvements.	G
		2	2/a-4		The SPERC title fulfils the requirements for a simple, concise, unambiguous and understandable title.	No suggestions for improvements.	G
		3	2/a-5		The SPERC title fulfils the requirements for a simple, concise, unambiguous and understandable title. The SPERC factsheet filename is not informative of the contents and purpose of the document. The same file consists of 9 SPERCs, which is not indicated in the filename nor in the header of the file.	It is recommended that the header of the factsheet should specify the covered SPERCs more clearly, and the filename should contain more information of the content and purpose of the file on its own.	A
F	solvent borne	2	2/b-1		The SPERC title fulfils the requirements for a simple, concise, unambiguous and understandable title.	No suggestions for improvements.	G
		2	2/b-2		The SPERC title fulfils the requirements for a simple, concise, unambiguous and understandable title.	No suggestions for improvements.	G
		2	2/b-3		The SPERC title fulfils the requirements for a simple, concise, unambiguous and understandable title.	No suggestions for improvements.	G
		2	2/b-4		The SPERC title fulfils the requirements for a simple, concise, unambiguous and understandable title.	No suggestions for improvements.	G
IS	water borne, water, soluble	4	3/a-1		The SPERC title fulfils the requirements for a simple, concise, unambiguous and understandable title, together with SPERC code.	The title of SPERC could contain somewhat more information. No suggestions for necessary improvements.	A
		4	3/a-2		The SPERC factsheet filename, separated from the directory tree on the ESIG website, is not informative of the contents and purpose of the document.	It is recommended that the title should specify covered substances more clearly, and filenames should contain more information of the content and purpose of the file on their own.	A

		4	3/a-3		The SPERC title fulfils the requirements for a simple, concise, unambiguous and understandable title.	No suggestions for improvements	G
		5	3/a-4		The SPERC title fulfils the requirements for a simple, concise, unambiguous and understandable title, together with the SPERC code.	No suggestions for improvements.	G
		5	3/a-5		The SPERC title fulfils the requirements for a simple, concise, unambiguous and understandable title, together with SPERC code. The discrepancy of using both "draft" and "final" in the FS filename should be corrected.	No other suggestions for other improvements.	G
IS	solvent borne, volatile	4, 5	3/b-1		The SPERC title fulfils the requirements for a simple, concise, unambiguous and understandable title, together with SPERC code.	No suggestions for improvements.	G
		7	3/b-2		The SPERC title fulfils the requirements for a simple, concise, unambiguous and understandable title, together with SPERC code. The factsheet filename is not informative of the purpose and scope of the document.	The factsheet filename could be more informative. No suggestions for necessary improvements.	A
		4	3/b-3		The SPERC title fulfils the requirements for a simple, concise, unambiguous and understandable title, together with SPERC code.	No suggestions for improvements	G
		5	3/b-4		Nine factsheets have been compiled to one file. The name of the file is not informative ('SPERC report'). The SPERC title fulfils the requirements for a simple, concise, unambiguous and understandable title, together with SPERC code.	It is recommended that the header of the factsheet should specify the covered SPERCs more clearly, and the filename should contain more information of the content and purpose of the file on its own.	A
PW	spraying, volatile	8a,c, d,f	4/a-1		The SPERC title fulfils the requirements for a simple, concise, unambiguous and understandable title, together with SPERC code.	No suggestions for improvements.	G
		8a	4/a-2		The SPERC title fulfils the requirements for a simple, concise, unambiguous and understandable title, together with SPERC code.	No suggestions for improvements.	G
PWC	outdoor, water release	8f	5/a-1		The SPERC title fulfils the requirements for a simple, concise, unambiguous and understandable title, together with SPERC code.	No suggestions for improvements.	G
		8c	5/a-2		The SPERC title fulfils the requirements for a simple, concise, unambiguous and understandable title, together with SPERC code.	No suggestions for improvements.	G
PWC	outdoor, water/soil release	8d	5/b-1		The SPERC title fulfils the requirements for a simple, concise, unambiguous and understandable title, together with SPERC code.	No suggestions for improvements.	G
		8e	5/b-2		The SPERC title fulfils the requirements for a simple, concise, unambiguous and understandable title.	No suggestions for improvements	G
SL	water/soil release	10a	7/a		Nine factsheets have been compiled to one file. The name of the file is not informative ('SPERC report'). The SPERC title fulfils the requirements for a simple, concise, unambiguous and understandable title, together with SPERC code.	It is recommended that the header of the factsheet should specify the covered SPERCs more clearly, and the filename should contain more information of the content and purpose of the file on its own.	A
SL	waste	11a	7/b		Nine factsheets have been compiled to one file. The name of the file is not informative ('SPERC report'). The SPERC title fulfils the requirements for a simple, concise, unambiguous and understandable title, together with SPERC code.	It is recommended that the header of the factsheet should specify the covered SPERCs more clearly, and the filename should contain more information of the content and purpose of the file on its own.	A

2 SCOPE (FS / QC)

2.1 Is the scope of the SPERC clear, verifiable and consistent with underlying ERCs?

- Is the process type clear and verifiable?

- Is the product type clear and verifiable?
- Are the covered substance properties clearly described?
- Are the boundaries of scope clear and explicit?
- Are there exceptional situations not covered?
- Are there quantitative benchmarks?
- Is the scope consistent with underlying ERC?

2.2 Is the scope described as substance and/or process domain consistent with the OC/RMM identified as driving the release?

- Is water involved
    - in the process?
    - in floor/equipment cleaning?
    - if not, is absence of water contact explicit in CoU?
- Are there references to relevant sections in the process of water contact or absence of water contact?
- Are there RMM in use for releases to water?
- Are there abatement techniques in use?
- Are volatile substances involved as process aids?
- Are there emissions to air?
- Are the emissions described in the process and substance domain (closed or open process)?
- Is there a defined boiling point threshold for substances?
- Are there RMM in use for emission to air?
- Are there abatement techniques in use?
- Is the relationship between substance type, product and process and environmental release clear and transparent?

LCS	Specifi-cation(s)	ERC	Project code	2 SCOPE (FS)	Factsheet	2 SCOPE (QC)	QC Explanation of evaluation	QC Remarks for improvements	Score
M		1	1/a	2.1 Substance/ Product domain (shortened)	Petroleum substances and petrochemicals; a variety of aliphatic and aromatic hydrocarbons, ketones, alcohols, acetates, glycols, glycol ethers, and glycol ether acetates	2.1 Is the scope of the SPERC clear, verifiable and consistent …?	The substance/product domain covers a wide range of petroleum substances and petrochemicals, which leaves the substance/product domain quite generic. The scope is clear and verifiable covering the manufacture of a large group of organic solvents. The SPERC comprises 30 sub-SPERCs with combinations of water solubility and vapour pressure. Release factors are given for each sub-SPERC. If the product category "PC0 - other" is selected, the type of product should be specified. If possible, a code (and the corresponding phrasing) from the Nordic system of Categories (UCN) should be selected to describe such a product (ECHA GD R.12). However, the manufacture of petroleum substances serves a vast amount of products for which specific coding may not be relevant in this connection.	No suggestions for necessary improvements.	G
				2.2 Process domain (shortened)	Production of solvents and other large volume VOCs; Recycling/recovery, material transfer, storage, maintenance, loading, sampling, and laboratory activities	2.2 Is the scope as substance and/or process domain consistent…?	The scope and related OC/RMM are consistent. Environmental releases and general source types are described. Water is not used in the process but is used for cleaning purposes. Oil-separation and biological wastewater treatment for water releases are obligatory RMMs. There are no obligatory RMMs for air releases, but optional techniques with efficiencies are described. No application of wastewater sludge to agricultural soil or arable land is allowed. Any residual waste of organic solvents needs to be treated as hazardous. The SPERC covers a wide range of processes and substances. Therefore the information is rather generic.	No suggestions for improvements.	G
				2.3 Use descriptors	LCS: M SU: 8 PC: 0				
F	**water borne**	2	2/a-1	2.1 Substance/ Product domain (shortened)	Volatile organic compounds Particulates Volatile and non-volatile compounds in liquid mixtures, Solids in polymeric liquids Intended compounds not classified as PBT or vPvB Volatile compounds rapidly degradable Water-borne mixtures may contain biocidal agents of product type 2, 6 or 7 Water borne coatings and inks: may contain solvent up to 25 % volatile content.	2.1 Is the scope of the SPERC clear, verifiable and consistent …?	The process and product types are clear and verifiable on generic level. The SPERC covers formulation of a wide range of coating and ink products, which are not described in detail. SU code 'n/a' is given: maybe SU0 should be given and described.	No suggestions for necessary improvements.	G
				2.2 Process domain (shortened)	Whole process of formulation/ manufacture of water borne liquid coatings and inks.	2.2 Is the scope as substance and/or process domain consistent…?	The process domain with different routes for formulation and main emission points are described. The alternative RMMs are consistent with the releases, focus being in air emissions. Waste water emissions and abatement methods are described only superficially. In the FS RMM limiting release to water 'Not applicable' is given although water is used in process and in cleaning.	No suggestions for necessary improvements.	A

				2.3 Use descriptors	LCS: F SU: n/a PC: 9a, 9b, 9c, 18				
		2	2/a-2	2.1 Substance/ Product domain (shortened)	Volatile organic compounds Particulates Volatile and non-volatile compounds in liquid mixtures, solids in polymeric liquids Non-volatile compounds in solid Intended compounds not classified as PBT or vPvB Volatile compounds rapidly degradable	2.1 Is the scope of the SPERC clear, verifiable and consistent …?	The SPERC covers a wide range of formulations for which specific formulation is not known and where more precise SPERCs cannot be applied giving an impression of a left-over SPERC, which cannot be described very clearly or explicitly. SU code 'n/a' is given: maybe SU0 should be given and described.	The applicability of the very wide product and substance domain could be reconsidered.	A
				2.2 Process domain (shortened)	Organic solvent borne coatings and inks: - solvent-borne up to 95 % volatile content, - liquid solvent-free coatings close to 100 % non-volatile content Water borne coatings and inks: may contain solvent up to 25 % volatile content.	2.2 Is the scope as substance and/or process domain consistent…?	The SPERC covers the whole process of formulation/manufacture of organic solvent and water borne liquid coatings and inks. The main emission points are described with generic terms applicable also to other set of SPERCs. The alternative RMMs are consistent with the releases, focus being in air emissions. Waste water emissions and abatement methods are described only superficially. In the FS RMM limiting release to water 'Not applicable' is given although water is used in process and in cleaning.	It is suggested that the discrepancy in emissions to water could be corrected.	A
				2.3 Use descriptors	LCS: F SU: n/a PC: 9a, 9b, 9c, 18				
		2	2/a-3	2.1 Substance/ Product domain (shortened)	Volatile substances which evaporate to a significant extent upon curing of the adhesives. Volatile ingredients are defined by a boiling point threshold of <250°C.	2.1 Is the scope of the SPERC clear, verifiable and consistent …?	The scope of formulation processes of adhesives, sealants and construction chemicals is well defined and consistent with the ERC.	No suggestions for improvements.	G
				2.2 Process domain (shortened)	Storing, mixing, packaging, filling of substances (as part of preparations) and equipment cleaning, maintenance and associated laboratory activities	2.2 Is the scope as substance and/or process domain consistent…?	The scope described as substance and process domain is consistent with the OCs and with the identified main emission points. Overview of the processing steps involved in industrial manufacturing of adhesives/sealants and construction chemical products, and their relevance with regard to the emission estimation and derivation of release factors is given in a clear tabular form.	No suggestions for improvements.	G
				2.3 Use descriptors	LCS: F SU: 0 PC: 1, 9a, 9b				
		2	2/a-4	2.1 Substance/ Product domain (shortened)	Substances which do not evaporate to a significant extent during formulation of the adhesive. Non-volatile ingredients are defined by a boiling point threshold of >250°C.	2.1 Is the scope of the SPERC clear, verifiable and consistent …?	The scope of formulation processes of adhesives, sealants and construction chemicals is well defined and consistent with the ERC.	No suggestions for improvements.	G

				2.2 Process domain (shortened)	Storing, mixing, packaging, filling of substances (as part of preparations) and equipment cleaning, maintenance and associated laboratory activities	2.2 Is the scope as substance and/or process domain consistent…?	The scope described as substance and process domain is consistent with the OCs and with the identified main emission points. Water is involved especially in the cleaning steps, but not considered in the RMM/abatement methods. Fugitive losses of volatile chemicals to air during mixing operations are reported (BD Table 4), but the ingredients are non-volatile in the SPERC involved. Some clarifications in OCs (FS 3) and RMMs (FS 4) are suggested.	Some clarifications in emissions and RMMs are suggested.	A
				2.3 Use descriptors	LCS: F SU: 0 PC: 1, 9a, 9b				
		3	2/a-5	2.1 Substance/ Product domain (shortened)	Alkali metals, alkaline earth metals, transition metals, post-transition metals, metalloids and their compounds but excludes non-metals, halogens, noble gases and metallo-organic compounds. SPERC valid for metals with solid water partition coefficient for suspended matter between 2,500 L/kg and 400,000 L/kg. Types of products: Metal (massive and/or powder)	2.1 Is the scope of the SPERC clear, verifiable and consistent …?	The range of processes and substances is wide: a significant number of installations produce or use a number of metals and metal salts from different groups or may have associated processes integrated with them. Therefore the SPERC is rather generic and suitable for use in standardized, lower tier REACH assessments.	No suggestions for improvements.	G
				2.2 Process domain (shortened)	Alloying of massive metal or metal powder into alloys (special preparations). PROCs are integrated in the release fractions from raw materials handling to cleaning and maintenance.	2.2 Is the scope as substance and/or process domain consistent…?	The connection between the substance and process domain and the OC/RMM driving the releases is not clearly described in the FS or in the BD, but reference is given to the sector specific BAT/BREF document for relevant activities leading to emissions. No summary of relevant activities in BAT/BREF document is compiled.	It is suggested that the activities leading to emissions should be summarized in the FS and/or BD.	I
				2.3 Use descriptors	LCS: F PC: 7 SU: 14				
F	**solvent borne**	2	2/b-1	2.1 Substance/ Product domain (shortened)	Volatile organic compounds Particulates Volatile and non-volatile compounds in liquid mixtures, solids in polymeric liquids Non-volatile compounds in solid Intended compounds not classified as PBT or vPvB Volatile compounds rapidly degradable Organic solvent borne coatings and inks: solvent-borne up to 95 % volatile content; liquid solvent-free coatings close to 100 % non-volatile content	2.1 Is the scope of the SPERC clear, verifiable and consistent …?	The SPERC covers a variety of formulating processes of the same type of product groups and a wide range of volatile, non-volatile and particulate substances. Therefore description of detailed boundaries and benchmarks may not be applicable. SU code 'n/a' is given: maybe SU0 should be given and described.	No suggestions for necessary improvements.	G
				2.2 Process domain (shortened)	Whole process of formulation/manufacture of organic solvent borne liquid coatings and inks.	2.2 Is the scope as substance and/or process domain consistent…?	The SPERC covers the whole process of formulation/manufacture of organic solvent borne liquid coatings and inks. A wide variety of manufacturing routes and process steps are used in the formulation, which are described in the BD as well as the main emission points. The scope described as substance and process domain is consistent with the OCs and with the identified main emission points.	No suggestions for improvements.	G
				2.3 Use descriptors	LCS: F SU: n/a PC: 9a, 9b, 18				

		2	2/b-2	2.1 Substance/ Product domain (shortened)	Substances other than solvents which do not evaporate to a significant extent during formulation of the adhesive. Non-volatile ingredients are defined by a boiling point threshold of >250°C.	2.1 Is the scope of the SPERC clear, verifiable and consistent …?	The scope of formulation processes of adhesives, sealants and construction chemicals is well defined and consistent with the ERC.	No suggestions for improvements.	G
				2.2 Process domain (shortened)	Storing, mixing, packaging, filling of substances (as part of preparations) and equipment cleaning, maintenance and associated laboratory activities	2.2 Is the scope as substance and/or process domain consistent…?	The scope described as substance and process domain is consistent with the OCs and with the identified main emission points. Water is not involved in the process. Fugitive losses of volatile chemicals (solvents) to air during mixing and cleaning operations are mentioned (Table 4), but the main ingredients are non-volatile in the SPERC involved. The role of volatile components/process aids remains somewhat unclear.	Some clarifications on the role of volatile components are suggested.	A
				2.3 Use descriptors	LCS: F SU: 0 PC: 1, 9a, 9b				
		2	2/b-3	2.1 Substance/ Product domain (shortened)	Substances which do not evaporate to a significant extent during formulation of the construction chemical. Non-volatile ingredients are defined by a boiling point threshold of >250°C.	2.1 Is the scope of the SPERC clear, verifiable and consistent …?	The scope of formulation processes of adhesives, sealants and construction chemicals is well defined and consistent with the ERC.	No suggestions for improvements.	G
				2.2 Process domain (shortened)	Storing, mixing, packaging, filling of substances (as part of preparations) and equipment cleaning, maintenance and associated laboratory activities	2.2 Is the scope as substance and/or process domain consistent…?	The scope described as substance and process domain is consistent with the OCs and with the identified main emission points. Water is not involved in the process. Dust emissions to air are controlled by closed batch mixers with pneumatic transfer of raw materials and semi-closed transfer systems.	No suggestions for improvements.	G
				2.3 Use descriptors	LCS: F SU: 0 PC: 1, 9b, 0				
		2	2/b-4	2.1 Substance/ Product domain (shortened)	Applicable to petroleum substances and petrochemicals. Includes a variety of aliphatic and aromatic hydrocarbons, ketones, alcohols, acetates, glycols, glycol ethers, and glycol ether acetates.	2.1 Is the scope of the SPERC clear, verifiable and consistent …?	The substance/product domain covers a wide range of petroleum substances and petrochemicals, which leaves the substance/product domain quite generic. The scope is clear and verifiable covering the formulation of a large group of organic solvents. The SPERC comprises 20 sub-SPERCs with combinations of water solubility and vapour pressure. Release factors are given for each sub-SPERC. If the product category “PC0 - other” is selected, the type of product should be specified. If possible, a code (and the corresponding phrasing) from the Nordic system of Categories (UCN) should be selected to describe such a product (ECHA GD R.12). However, the manufacture of petroleum substances serves a vast amount of products for which specific coding may not be relevant in this connection.	No suggestions for necessary improvements.	G

				2.2 Process domain (shortened)	Formulation, packing and re-packing of the substance and its mixtures in batch or continuous operations, including storage, materials transfers, mixing, tableting, compression, pelletisation, extrusion, large and small-scale packing, sampling, maintenance and associated laboratory activities.	2.2 Is the scope as substance and/or process domain consistent…?	The substance and process domain is consistent with the OCs and RMMs identified. Environmental releases and general source types are described. Water is not used in the process but is used for cleaning purposes. Oil-separation and biological wastewater treatment for water releases are obligatory RMMs. There are no RMMs obligatory for air emissions. The optional RMMs for air emissions may be applicable to some or all of the SpERCs. Seven treatment technologies have been cited in the BD. Any residual waste of organic solvents needs to be treated as hazardous.	No suggestions for improvements.	G
				2.3 Use descriptors	LCS: F SU: 8 PC: 0				
IS	**water borne, water soluble**	4	3/a-1	2.1 Substance/ Product domain (shortened)	Applicable to petroleum substances and petrochemicals. Includes a variety of aliphatic and aromatic hydrocarbons, ketones, alcohols, acetates, glycols, glycol ethers, and glycol ether acetates.	2.1 Is the scope of the SPERC clear, verifiable and consistent …?	The SPERC covers a wide range of substances, products and uses. The scope is rather generic, but consistent with the ERC.	No suggestions for improvements.	A
				2.2 Process domain (shortened)	Use in coatings (paints, inks, adhesives, etc.) including exposures during use (materials receipt, storage, preparation and transfer from bulk and semi-bulk, application by spray, roller, spreader, dip, flow, fluidized bed on production lines and film formation) and equipment cleaning, maintenance and associated laboratory activities.	2.2 Is the scope as substance and/or process domain consistent…?	The substance and process domain are consistent with the OCs identified as driving the release. The main emission points are described in generic terms as the SPERC covers a wide range of industrial uses of solvent-borne adhesives and sealants. The optional and required RMM/abatement techniques are in line with the releases.	No suggestions for improvements.	G
				2.3 Use descriptors	LCS: IS SU: 0 PC: 9a				
		4	3/a-2	2.1 Substance/ Product domain (shortened)	Applicable to petroleum substances and petrochemicals. Includes a variety of aliphatic and aromatic hydrocarbons, ketones, alcohols, acetates, glycols, glycol ethers, and glycol ether acetates.	2.1 Is the scope of the SPERC clear, verifiable and consistent …?	The SPERC covers a wide range of substances, products and uses. The scope is rather generic, but consistent with the ERC. Verbal description of processes and descriptor codes LCS and SU are given, but inconsistence between SU in FS (SU15) and in BD (SU9 other); in the code system SU0 is 'other'.	It is suggested that the SU codes are clarified. No other suggestions for improvements.	A
				2.2 Process domain (shortened)	Use in formulated metal working fluids/rolling oils including transfer operations, rolling and annealing activities, cutting/machining activities, automated and manual application of corrosion protections (brushing, dipping and spraying), equipment maintenance, draining and the disposal of waste oils.	2.2 Is the scope as substance and/or process domain consistent…?	The substance and process domain are consistent with the OCs identified as driving the release. The main emission points are described in generic terms as the SPERC covers a wide range of industrial uses of aliphatic and aromatic hydrocarbons, ketones, alcohols, acetates, glycols, glycol ethers, and glycol ether acetates. The optional and required RMM/abatement techniques are in line with the releases.	No suggestions for improvements.	G
				2.3 Use descriptors	LCS: IS SU: 15 PC: 25				

		4	3/a-3	2.1 Substance/ Product domain (shortened)	Volatile substances in water borne-adhesives. Volatile ingredients are defined by a boiling point threshold of <250°C. Products applied in roll coating and curtain-coating, dip-coating, syringe-, bead-application and spraying.	2.1 Is the scope of the SPERC clear, verifiable and consistent …?	The scope of the SPERC is clear and covers a wide range of industrial use of adhesives and sealants through various application methods. The boundaries of the scope are defined for substance type: volatile substances in water-borne adhesives and sealants (volatile substances are defined by boiling point threshold <250 °C).	No suggestions for improvements.	G
				2.2 Process domain (shortened)	Charging equipment, application of adhesive / sealant, curing, equipment cleaning, maintenance.	2.2 Is the scope as substance and/or process domain consistent…?	The substance and process domain are consistent with the OCs identified as driving the release. The main emission points are described in generic terms as the SPERC covers a wide range of industrial uses of volatile substances in water-borne adhesives. The process steps and emission points are summarized in a clear tabular form in the BD. The RMM/abatement techniques (none obligatory) are in line with the releases.	No suggestions for improvements.	G
				2.3 Use descriptors	LCS: IS SU: 0 PC: 1, 9a, 9b				
		5	3/a-4	2.1 Substance/ Product domain (shortened)	Non-volatile substances are defined by a boiling point threshold of >250°C. Water borne adhesives / sealants applied in roll coating and curtain-coating, dip-coating, syringe-, bead-application and spraying.	2.1 Is the scope of the SPERC clear, verifiable and consistent …?	The scope of the SPERC is clear and covers a wide range of industrial use of adhesives and sealants through various application methods. The boundaries of scope are defined for substance type: non-volatile substances in water-borne adhesives and sealants (non-volatile substances are defined by boiling point threshold >250 °C).	No suggestions for improvements.	G
				2.2 Process domain (shortened)	Charging equipment, application of adhesive / sealant, curing, equipment cleaning, maintenance. Upon curing, substances are included into matrix without intended release to the environment.	2.2 Is the scope as substance and/or process domain consistent…?	The substance and process domain are consistent with the OCs identified as driving the release. The main emission points are described in generic terms as the SPERC covers a wide range of industrial uses of non-volatile substances in water-borne adhesives and sealants. The RMM/abatement techniques (none obligatory) are in line with the releases.	No suggestions for improvements.	G
				2.3 Use descriptors	LCS: IS SU: 0 PC: 1, 9a, 9b				
		5	3/a-5	2.1 Substance/ Product domain (shortened)	Nickel-salts in metal surface coating applications. Broad range of specific water-based applications, e.g. surface treatment, metal treatment, conversion coating, surface finishing, corrosion inhibition etc.	2.1 Is the scope of the SPERC clear, verifiable and consistent …?	The scope of the SPERC clear, verifiable and consistent with underlying ERCs. The descriptions of substance, product and process domains are clear and precise.	No suggestions for improvements.	G
				2.2 Process domain (shortened)	Treating metal and/or plastic surfaces (e.g. Phosphating, Electroplating, Cold sealing, Autocatalytic plating), processes required to support the core process (storing, mixing, equipment cleaning, maintenance and associated laboratory activities). The treatment of the metal parts by dipping, rolling or by spraying. Product	2.2 Is the scope as substance and/or process domain consistent…?	The relationship between substance types (water-soluble nickel salts), products (metal surface treatment products) and processes (conversion and autocatalytic coating) and and their environmental emissions are transparent. The related RMMs/abatement techniques are clearly described.	No suggestions for improvements.	G

					applied in aqueous process solution with negligible volatilization. Spent fluid discharged to wastewater.				
				2.3 Use descriptors	LCS: IS SU: 0 PC: 14				
IS	**solvent borne, volatile**	4, 5	3/b-1	2.1 Substance/ Product domain (shortened)	Volatile and non-volatile compounds in liquid mixtures, solids in polymeric liquids, Non-volatile compounds in solid, Intended compounds not classified as carcinogenic or mutagenic, PBT or vPvB, Volatile compounds rapidly degradable, Water-borne mixtures may contain biocidal agents of product type 2, 6 or 7 Liquid spray coatings: - solvent-borne up to 95 % volatile content, - water-borne coatings, - liquid solvent-free coatings close to 100 % non-volatile content Powder coatings 100% non-volatile	2.1 Is the scope of the SPERC clear, verifiable and consistent …?	The scope of the SPERC is clear and covers a wide range of industrial coatings through different spraying methods. The substance domain includes liquid, solid and powder coating materials with volatile and non-volatile ingredients. The materials can be organic solvent-borne, solvent-free or water-borne.	No suggestions for improvements.	G
				2.2 Process domain (shortened)	Application of organic solvent borne, water borne liquid and powder coatings by industrial users by spraying. Application of coatings by spray, cleaning of equipment, waste management of coatings	2.2 Is the scope as substance and/or process domain consistent…?	The substance and process domain are consistent with the OCs identified as driving the release. The main emission points are described in generic terms as the SPERC covers a wide range of industrial uses and different types of coating materials (volatile/non-volatile, liquid, solid, powder etc). The RMM/abatement techniques (none obligatory) are in line with the releases. Emission relevance of operational conditions (BD 2.3) might be somewhat more detailed, especially concerning releases to water.	No suggestions for necessary improvements.	G
				2.3 Use descriptors	LCS: IS SU: 7, 11, 12, 15, 16, 17, 18, 19 PC: 9a, 9b, 18				
		7	3/b-2	2.1 Substance/ Product domain (shortened)	Applicable to petroleum substances and petrochemicals. Includes a variety of aliphatic and aromatic hydrocarbons, ketones, alcohols, acetates, glycols, glycol ethers, and glycol ether acetates.	2.1 Is the scope of the SPERC clear, verifiable and consistent …?	The SPERC covers a wide range of substances, products and uses. The scope is rather generic, but consistent with the ERC.	No suggestions for improvements.	G
				2.2 Process domain (shortened)	Use as a fuel (or fuel additive) and includes activities associated with its transfer, use, equipment maintenance and handling of waste.	2.2 Is the scope as substance and/or process domain consistent…?	The substance and process domain are consistent with the OCs identified as driving the release. The main emission points are described in generic terms as the SPERC covers a wide range of industrial uses of solvent-borne fuels. The optional and required RMM/abatement techniques are in line with the releases.	No suggestions for improvements.	G
				2.3 Use descriptors	LCS: IS SU: 8 PC: 13				

		4	3/b-3	2.1 Substance/ Product domain (shortened)	Volatile substances which evaporate to a significant extent upon curing of the adhesives. Volatile ingredients are defined by a boiling point threshold of <250°C. Solvent-borne products applied in roll coating and curtain-coating, dip-coating, syringe- bead-application and spraying.	2.1 Is the scope of the SPERC clear, verifiable and consistent …?	The scope of the SPERC is clear and covers a wide range of industrial use of adhesives and sealants through various application methods. The boundaries of scope are defined for substance type: volatile substances which evaporate to a significant extent upon curing of the adhesives (volatile substances are defined by boiling point threshold <250 °C).	No suggestions for improvements.	G
				2.2 Process domain (shortened)	Charging equipment, application of adhesive / sealant, curing, equipment cleaning, maintenance.	2.2 Is the scope as substance and/or process domain consistent…?	The substance and process domain are consistent with the OCs identified as driving the release. The main emission points are described in generic terms as the SPERC covers a wide range of industrial uses of water-borne adhesives and sealants. The process steps and emission points are summarized in a clear tabular form in the BD. The RMM/abatement techniques (none obligatory) are in line with the releases.	No suggestions for improvements.	G
				2.3 Use descriptors	LCS: IS SU: 0 PC: 1, 9a, 9b				
		5	3/b-4	2.1 Substance/ Product domain (shortened)	Alkali metals, alkaline earth metals, transition metals, post-transition metals, metalloids and their compounds but excludes non-metals, halogens, noble gases and metallo-organic compounds. Valid for metals with solid water partition coefficient for suspended matter between 25,000 L/kg and 400,000 L/kg.	2.1 Is the scope of the SPERC clear, verifiable and consistent …?	The SPERC covers industrial use of metals and metal compounds in plating and galvanising. The range of processes coating processes consist of release fractions from raw materials handling to cleaning and maintenance. The substance domain is also rather wide. Therefore the SPERC is rather generic and suitable for use in standardized, lower tier REACH assessments. The scope of the SPERC is clear and consistent with the ERC. Product category is not selected.	Product category should be selected.	A
				2.2 Process domain (shortened)	PROCs integrated in release fractions from raw materials handling to cleaning and maintenance. Hot dip batch process, continuous hot dip process, continuous electroplating process that uses electrical current to reduce cations of a desired material from a solution and coat a conductive object. Mechanical milling to remove oxide layers. Pickling. Chemical treatment or blasting of internal tube surfaces. Cleaning and stain removal. Polishing. Pre-patination. Raw materials handling and storing.	2.2 Is the scope as substance and/or process domain consistent…?	The connection between the substance and process domain and the OC driving the releases is not clearly described in the FS or in the BD, but reference is given to the sector specific BAT/BREF document for relevant activities leading to emissions. No summary of relevant activities in BAT/BREF document is compiled.	It is suggested that the activities leading to emissions should be summarized in the FS and/or BD.	I
				2.3 Use descriptors	LCS: IS SU: 14 PC: -				
PW	**spraying, volatile**	8a,c, d,f	4/a-1	2.1 Substance/ Product domain (shortened)	Volatile and non-volatile compounds in liquid mixtures, solids in polymeric liquids Intended compounds not classified as carcinogenic or mutagenic, PBT or vPvB, Volatile compounds rapidly degradable, Water-borne mixtures may contain biocidal agents of product type 2, 6 or 7 Liquid spray coatings: - solvent-borne up to 95 % volatile content,	2.1 Is the scope of the SPERC clear, verifiable and consistent …?	The scope of the SPERC is clear and covers a wide range of coatings used in professional spraying. The substance domain includes many types of liquid mixtures including volatile and non-volatile ingredients. The substance domain is rather generic, but RFs are defined separately for four different types of coatings.	No suggestions for improvements.	G

					- liquid solvent-free coatings close to 100 % non-volatile content				
				2.2 Process domain (shortened)	Whole process of application of organic solvent borne and water borne liquid coatings and inks by professional users by spraying. Application of coatings by spray, cleaning of equipment, waste management of coatings	2.2 Is the scope as substance and/or process domain consistent…?	The substance and process domain are consistent with the OCs identified as driving the release. Emission relevance of operational conditions is considered minor as there are very limited activities involving professional and consumer spraying. No emissions to air are relevant as for a coating film to form, the volatile phase of organic solvent-borne and water-borne coatings must evaporate into the atmosphere. No releases to wastewater are applicable.	No suggestions for improvements.	A
				2.3 Use descriptors	LCS: PW SU: 17, 18, 19 PC: 9a, 9b				
		8a	4/a-2	2.1 Substance/ Product domain (shortened)	Applicable to petroleum substances and petrochemicals. Includes a variety of aliphatic and aromatic hydrocarbons, ketones, alcohols, acetates, glycols, glycol ethers, and glycol ether acetates.	2.1 Is the scope of the SPERC clear, verifiable and consistent …?	The scope of SPERC is clear and covers a wide range of petrochemical substances used for ice prevention and de-icing of vehicle, aircraft and other equipment by spraying.	No suggestions for improvements.	G
				2.2 Process domain (shortened)	Covers use for ice prevention and de-icing of vehicle, aircraft and other equipment by spraying.	2.2 Is the scope as substance and/or process domain consistent…?	Professional operations strive for minimizing waste generation and thus aim at reducing environmental releases. The measures include regular training sessions that focus on waste reduction, recycling, and reuse. Other management practices include the creation of standard operating procedures for the labelling, collection, storage and disposal of unused or spent products.	No suggestions for improvements.	G
				2.3 Use descriptors	LCS: PW SU: 0 PC: 4				
PWC	**outdoor, water release**	8f	5/a-1	2.1 Substance/ Product domain (shortened)	All ingredients which do not evaporate to a significant extent upon curing of the product. Non-volatile substances are defined by a boiling point threshold of >250°C. Application of adhesives, sealants and construction chemical products for a wide range of purposes uses.	2.1 Is the scope of the SPERC clear, verifiable and consistent …?	The scope of the SPERC is clear and covers a wide range of professional and consumer outdoor use of adhesives and sealants through various application methods. The boundaries of scope are defined for substance type: non-volatile substances in by boiling point threshold >250 °C.	No suggestions for improvements.	G
				2.2 Process domain (shortened)	Adhesives and sealants are applied between two substrates. Curing via a chemical reaction or via evaporation of a solvent. Construction chemical products cover the uses applied to buildings, their trim and fittings and construction purposes. Transfer of substance or preparation from/to vessels/large containers at dedicated facilities. Roller application or brushing, spraying, extrusion from a cartridge, dipping and pouring of articles.	2.2 Is the scope as substance and/or process domain consistent…?	The substance and process domain are consistent with the OCs identified as driving the release. The main emission points are described in generic terms as the SPERC covers a wide range of professional and consumer outdoor uses of non-volatile adhesives and sealants. The process steps and emission points are summarized in a clear tabular form in the BD. The RMM/abatement techniques (none obligatory) are in line with the releases.	No suggestions for improvements.	G
				2.3 Use descriptors	LCS: PW+C SU: 19 PC: 1, 9a, 9b				

		8c	5/a-2	2.1 Substance/ Product domain (shortened)	All ingredients which do not evaporate to a significant extent upon curing of the product. Non-volatile substances are defined by a boiling point threshold of >250°C. Adhesives and sealants for a wide range of purposes. Upon application curing takes place and non-solvent ingredients form a matrix. No distinction is made between water-borne and solvent borne adhesives and sealants.	2.1 Is the scope of the SPERC clear, verifiable and consistent …?	The scope of the SPERC is clear and covers a wide range of professional and consumer indoor use of adhesives and sealants through various application methods. The boundaries of scope are defined for substance type: non-volatile substances in by boiling point threshold >250 °C.	No suggestions for improvements.	G
				2.2 Process domain (shortened)	Adhesive and sealant application techniques such as brushing or rolling, spraying, dipping, bead application, extrusion from a cartridge.	2.2 Is the scope as substance and/or process domain consistent…?	The substance and process domain are consistent with the OCs identified as driving the release. The main emission points are described in generic terms as the SPERC covers a wide range of professional and consumer indoor uses of non-volatile adhesives and sealants. The process steps and emission points are summarized in a clear tabular form in the BD. The RMM/abatement techniques (none obligatory) are in line with the releases.	No suggestions for improvements.	G
				2.3 Use descriptors	LCS: PW+C SU: 0 PC: 1				
PWC	**outdoor, water, soil release**	8d	5/b-1	2.1 Substance/ Product domain (shortened)	Solid and liquid substances used as co-formulants. Products (substances or mixtures) applied as a liquid spray.	2.1 Is the scope of the SPERC clear, verifiable and consistent …?	The scope of the SPERC is clear but generic and covers a wide range of professional and consumer outdoor use of co-formulants in PPP products.	No suggestions for improvements.	G
				2.2 Process domain (shortened)	Mixing and loading of plant protection products into delivery equipment. Spray application of plant protection products. Cleaning and maintenance of equipment is included.	2.2 Is the scope as substance and/or process domain consistent…?	The substance and process domain are consistent with the OCs identified as driving the release. The main emission points are described in generic terms as the SPERC covers a wide range of products (substances or mixtures) applied as a liquid spray. No RMM/abatement techniques are applicable. No BD is available (under development).	No suggestions for improvements.	A
				2.3 Use descriptors	LCS: PW+C SU: 1 PC: 27				
		8e	5/b-2	2.1 Substance/ Product domain (shortened)	Fertilizers applied in liquid form containing environmentally hazardous components (e.g. manganese, copper and zinc substances; both organic and inorganic substances are covered). Fertilizers for outdoor use (in i.e. agriculture, forestry, horticulture, gardens, golf courses). High-tech greenhouse structures not covered.	2.1 Is the scope of the SPERC clear, verifiable and consistent …?	The process domain and substance/product domain are described clearly in sufficient detail.	No suggestions for improvements.	G

				2.2 Process domain (shortened)	Local scale, outdoor use of fertilizers in liquid form on agricultural soil by surface spreading, sprinkler, pivot, foliar spray and slurry. Application stage, mixing and loading step and the cleaning of equipment of the fertilizer uses. Application methods, substance properties, crop types, timing of application and yield scenarios are important to estimate environmental exposure.	2.2 Is the scope as substance and/or process domain consistent…?	The described substance and process domains are mainly consistent with the OC/RMM identified. Treatment of water releases from mixing, loading and cleaning stages is not described.	Treatment of water releases from mixing, loading and cleaning stages could be described. No other suggestions for improvements.	A
				2.3 Use descriptors	LCS: PW+C SU: 1 PC: 12				
SL	**water, soil release**	10a	7/a	2.1 Substance/ Product domain (shortened)	Alkali metals, alkaline earth metals, transition metals, post-transition metals, metalloids but excludes non-metals, halogens, noble gases and metallo-organic compounds. This SPERC is valid for metallic metal, alloys or metallic coating.	2.1 Is the scope of the SPERC clear, verifiable and consistent …?	The description of substance and process domain is very generic and covers emissions of a broad application area.	Descriptions and examples of application areas with related substance domains would be useful. No suggestions for necessary improvements.	A
				2.2 Process domain (shortened)	Service life of outdoor buildings and constructions	2.2 Is the scope as substance and/or process domain consistent…?	OCs driving the releases of the life cycle stage 'service life' are not described except for run-off from metallic roofs, which covers partly the substance domain. The emissions are related to weathering in outdoor contact. No RMM/abatement techniques are applicable, except for dedicated recollection infrastructure for waste.	The OCs related to the substance and process domain might be more wide-ranging. No suggestions for necessary improvements.	G
				2.3 Use descriptors	LCS: SL (consumers)				
SL	**waste**	11a	7/b	2.1 Substance/ Product domain (shortened)	Alkali metals, alkaline earth metals, transition metals, post-transition metals, metalloids but excludes non-metals, halogens, noble gases and metallo-organic compounds. Products are metallic articles with no contact to water: electronic and electric devices such as screens, monitors, IT and telecommunication equipment (e.g. mobile phone), large household appliances, small household appliances, photovoltaic cells, outdoor air conditioning, vehicles, etc.	2.1 Is the scope of the SPERC clear, verifiable and consistent …?	The description of substance and process domain is scarce.	Description of the service life of substances in articles should be provided.	A
				2.2 Process domain (shortened)	Service life of batteries, indoor/outdoor	2.2 Is the scope as substance and/or process domain consistent…?	The substance and process domain are consistent with the OCs identified as driving the release. The emission points during service life are considered negligible. No RMM/abatement techniques are applicable, except for dedicated recollection infrastructure for waste.	No suggestions for improvements.	G
				2.3 Use descriptors	LCS: SL (consumers)				

3 OPERATIONAL CONDITIONS (FS / QC)

3.1 Are the OCs clearly described and practically verifiable?

- Are OCs clearly described concerning
  - substance properties together with initial release of substances from the use-processes?
  - elevated temperatures/temperature benchmarks - releases to air?
  - abrasive processes - releases to air?
  - water based process steps or cleaning steps - releases to water?
  - other conditions that have impact on releases?
- Are there references to BAT or other specific guidance?
  - concerning relevant sector?
- Are there generic phrases in use such as
  - high degree of automation?
  - efficient use of raw materials?
- Are there proper references to background documents to explain what the phrases mean in practise?

3.2 Do the OCs properly reflect the main drivers for release potential of substances into the environment?

- What are the compartments for environmental releases covered by the SPERC?
- Do the OCs reflect consistently the release potential to the environment?
- Are there releases to water
  - consistent with OC?
- Are there releases to air
  - consistent with OC?
- Are there other releases to environment
  - consistent with OC?
- Is waste generated
  - consistent with OC?

3.3 If a use rate has been provided: Is it transparent, how the use rate has been derived and how representative it is?

- Are there indicative use rates given as starting point for site specific assessments
  - for small scale operation?
  - for large scale operation?
  - under optimal conditions?
  - under suboptimal conditions?
  - with onsite emission controls?
  - without onsite emission controls?
  - where process waters are retained and environmental releases occur discontinuously?

- in continuous flow-through situation exists (daily compensation of losses)?
- in batch process (fractions during batch change are released)?

– Are the indicative use rates
  - statistical figures on daily consumption of chemicals at single sites?
  - extrapolated from an annual market/sector tonnage, distributed over a number of users and/or a number of use-days?

– Are the use rates given for
  - individual substances?
  - formulated or used products?

LCS	Specifi-cation(s)	ERC	Project code	3 OC (FS)	Factsheet text (shortened)	3 OC (QC)	QC Explanation of evaluation	QC Remarks for improvements	Score
M		1	1/a	3.1 Conditions of use	Location / indoor Water contact / yes Connection to STP / no - site specific biological STP Volatile compounds subject to air emission controls. Wastewater from equipment cleaning with water.	3.1 Are the OCs clearly described and practically verifiable?	The OCs are described by giving some general details that can be used to characterize the various production activities. A set of procedures and use conditions that limit the potential for environmental release are given. These system-related constraints are typically optimized to minimize emissions and maximize product yield within a particular manufacturing facility, but the set of OCs applicable to a particular process are stated to be highly site specific.	No suggestions for necessary improvements.	A
				3.2 Waste handling and disposal	Recycling of residual raw materials, Wastewater from cleaning to WWTP. Scrubbers, thermal oxidizers, solid adsorbents, membrane separators, biofilters, and/or cold oxidizers for air emissions. Unrecovered waste handled as industrial waste	3.2 Do the OCs properly reflect the main drivers for release potential …?	The OCs reflect the main drivers for release potential of substances into the environment in a generic sense, but clear links between OCs and environmental releases are not described. Air, water, soil and waste releases are covered. Slight discrepancies between releases, RMMs and release factors.	No suggestions for necessary improvements.	A
						3.3 If a use rate has been provided: Is it transparent, … and representative?	The estimated use rate for manufacturing is based on professional judgement and take into consideration the number of tanker trucks that a facility is typically capable of handling each day. The fraction of EU tonnage used in region and the fraction of regional tonnage used locally are given in the FS although they relevant for wide spread use only. This might be corrected.	No suggestions for necessary improvements.	A
F	**water borne**	2	2/a-1	3.1 Conditions of use	Location / indoor Water contact / yes Connection to STP / yes Maximise the efficiency of use of input raw materials through the highest conversion into formulated products.	3.1 Are the OCs clearly described and practically verifiable?	Main process stages and emission points are described in the BD, but OC descriptions are rather generic, based on sector specific OECD ES document. Links between OCs and specific environmental releases are not very clear.	No suggestions for necessary improvements.	A
				3.2 Waste handling and disposal	Process waste may be recycled or incinerated by waste disposal company.	3.2 Do the OCs properly reflect the main drivers for release potential …?	Emission points in the process steps and potential environmental releases to air, water and waste are described. Corresponding generic OCs are given.	No suggestions for improvements.	G

						3.3 If a use rate has been provided: Is it transparent, … and representative?	The use rates are split to small scale and large scale operation in sub-SPERCs. Typical maximum daily usage, for any one substance at any one location, is based on sector knowledge. Estimated daily use rates for substances with different function are given for pigment/extender/filler, binder, water, organic solvent/coalescent, additives. No further specifications for use rates are given.	No suggestions for improvements.	G
		2	2/a-2	3.1 Conditions of use	Location / indoor Water contact / yes Connection to STP / yes Maximise the efficiency of use of input raw materials through the highest conversion into formulated products.	3.1 Are the OCs clearly described and practically verifiable?	Main process stages and emission points are described in the BD, but OC descriptions are rather generic, based on sector specific OECD ES document. Links between OCs and specific environmental releases are not very clear.	No suggestions for necessary improvements.	A
				3.2 Waste handling and disposal	Process waste may be recycled or incinerated by waste disposal company	3.2 Do the OCs properly reflect the main drivers for release potential …?	Emission points in the process steps and potential environmental releases to air, water and waste are described. Corresponding generic OCs are given.	No suggestions for improvements.	G
						3.3 If a use rate has been provided: Is it transparent, … and representative?	The use rates are split to small scale and large scale operation in sub-SPERCs. Typical maximum daily usage, for any one substance at any one location, is based on sector knowledge. Estimated daily use rates for substances with different function are given for pigment/extender/filler, binder, water, organic solvent/coalescent, additives. No further specifications for use rates are given.	No suggestions for improvements.	G
		2	2/a-3	3.1 Conditions of use	Location / indoor Water contact / yes Connection to STP / yes Typically a batch process. High degree of automation in adhesive / sealant formulation. Maximum efficiency of use of input raw materials through the highest conversion into formulated products. Use of closed or covered manufacturing equipment to minimise evaporative losses of VOCs.	3.1 Are the OCs clearly described and practically verifiable?	The process type (batch, high degree of automation) and main process steps are clearly described and provided in a tabular form. The SPERC covers a variety of substances, processes and product types. Therefore description of OCs for releases of initial substances may not be applicable. References to BAT could be further elaborated.	No suggestions for improvements.	G
				3.2 Waste handling and disposal	Equipment cleaned with water, washing disposed of with wastewater.	3.2 Do the OCs properly reflect the main drivers for release potential …?	The OCs in respect to potential emissions to the environment are well described. The relationship is also provided in a clear tabular form. Reference to OECD ESD relevant to the sector is given.	No suggestions for improvements.	G
						3.3 If a use rate has been provided: Is it transparent, … and representative?	The use rates are provided to several ingredient types separately for large-scale and small-scale formulation. The use rates are based on a wide literature survey (Tolls et al. 2016).	No suggestions for improvements.	G

		2	2/a-4	3.1 Conditions of use	Location / indoor Water contact / yes Connection to STP / yes High degree of automation in adhesive / sealant formulation. Typically a batch process. Maximum efficiency of use of input raw materials through the highest conversion into formulated products. Use of closed or covered manufacturing equipment to minimise evaporative losses of solids below respective OELs. Use of general and manufacturing plant extraction. Dust filters during transfer and formulation of powder raw materials with efficiencies of 99%.	3.1 Are the OCs clearly described and practically verifiable?	The process type (batch, high degree of automation) and main process steps are clearly described and provided in a tabular form. The SPERC covers a variety of substances, processes and product types. Therefore description of OCs for releases of initial substances may not be applicable. References to BAT could be further elaborated.	No suggestions for improvements.	G
				3.2 Waste handling and disposal	Equipment cleaned with water, washing disposed of with wastewater.	3.2 Do the OCs properly reflect the main drivers for release potential …?	The OCs in respect to potential emissions to the environment is well described. The relationship is also provided in a clear tabular form. Reference to OECD ESD relevant to the sector is given.	No suggestions for improvements.	G
						3.3 If a use rate has been provided: Is it transparent, … and representative?	The use rates are provided to several ingredient types separately to large-scale and small-scale formulation. The use rates are based on a wide literature survey (Tolls et al. 2016).	No suggestions for improvements.	G
		3	2/a-5	3.1 Conditions of use	Biological STP : Site specific Discharge rate of domestic STP >= 2E3 m3/day (no FS format used)	3.1 Are the OCs clearly described and practically verifiable?	The OCs are not described in the FS or BD but reference is given to the sector specific BAT/BREF document. To find information of OCs for practical verification of them necessitates the user to study the BAT/BREF document.	It is recommended that the descriptions of relevant OCs should be summarized in the FS and/or BD, in addition to giving reference to the BAT/BREF document.	I
				3.2 Waste handling and disposal	Dispose of waste product or used containers according to local regulations.	3.2 Do the OCs properly reflect the main drivers for release potential …?	The OCs and drivers of release potential are not described in the FS or BD but reference is given to the sector specific BAT/BREF document. To find links between OCs and specific environmental releases necessitates the user to study the BAT/BREF document.	It is recommended that the OCs leading to emissions should be summarized in the FS and/or BD, in addition to giving reference to the BAT/BREF document.	I
						3.3 If a use rate has been provided: Is it transparent, … and representative?	Default use rates and emission days are not given in the FS or BD, except for defaults set by ERC2 (not given in the FS or BD). The SPERC FS recommends the users to apply realistic site specific substance use rates.	No suggestions for necessary improvements.	A

F	**solvent borne**	2	2/b-1	3.1 Conditions of use	Location / indoor Water contact / yes Connection to STP / yes Maximum efficiency of use of input raw materials through the highest conversion into formulated products.	3.1 Are the OCs clearly described and practically verifiable?	Formulation processes and other conditions that have impact on releases, including main emission points, are described in the BD. Reference is given to sector specific OECD ES document. The SPERC covers a wide range of substances, processes and product types. Therefore links between OCs and releases of initial substances may not be applicable. Water contact and releases to water should be made clear in the OC.	No suggestions for necessary improvements.	A
				3.2 Waste handling and disposal	Process waste may be recycled or incinerated by waste disposal company.	3.2 Do the OCs properly reflect the main drivers for release potential …?	In the BD it is stated that the composition of products and the overall process are such that there are no discharges of raw materials or products to waste-water from the manufacturing plant. However, in the FS water contact during use accepted and connection to a standard municipal biological STP is assumed and the RF for one out of three sub-SPERCs is > 0.	Discrepancies concerning releases to water should be revamped	A
						3.3 If a use rate has been provided: Is it transparent, … and representative?	The use rates are split to small scale and large scale operation in sub-SPERCs. Typical maximum daily usage, for any one substance at any one location, is based on sector knowledge. Estimated daily use rates for substances with different function are given for pigment/extender/filler, binder, water, organic solvent/coalescent, additives. No further specifications for use rates are given.	No suggestions for improvements.	G
		2	2/b-2	3.1 Conditions of use	Location / indoor Water contact / no Connection to STP / yes High degree of automation in adhesive / sealant formulation. Multi-stage batch process. Maximum efficiency of use of input raw materials, through the highest conversion into formulated products. Use of closed or covered manufacturing equipment to minimise evaporative losses. Use of general and manufacturing plant extraction. Air extraction systems with dust filters.	3.1 Are the OCs clearly described and practically verifiable?	The process type (batch, high degree of automation) and main process steps are clearly described and provided in a tabular form. The SPERC covers a variety of substances, processes and product types. Therefore description of OCs for releases of initial substances may not be applicable. References to BAT could be further elaborated.	No suggestions for improvements.	G
				3.2 Waste handling and disposal)	Equipment cleaned with organic solvent, washings are collected and disposed of as solvent waste.	3.2 Do the OCs properly reflect the main drivers for release potential …?	The OCs in respect to potential emissions to the environment are well described. The relationship is also provided in a clear tabular form. Reference is given to the OECD ESD for Coating industry and the relevance to the sector is justified.	No suggestions for improvements.	G
						3.3 If a use rate has been provided: Is it transparent, … and representative?	The use rates are provided to several ingredient types separately to large-scale and small-scale formulation. The use rates are based on a wide literature survey (Tolls et al. 2016).	No suggestions for improvements.	G

		2	2/b-3	3.1 Conditions of use	Location / indoor Water contact / no Connection to STP / yes Multi-stage batch process. Maximum efficiency of use of input raw materials, through the highest conversion into formulated products. Closed batch system / Semi-closed transfer system / Reduced number of transfer and cleaning operations. General good practice: trained staff, spill protection including waste reuse.	3.1 Are the OCs clearly described and practically verifiable?	The process type (batch, high degree of automation) and main process steps are clearly described and provided in a tabular form. The SPERC covers a variety of substances, processes and product types. Therefore description of OCs for releases of initial substances may not be applicable. References to BAT could be further elaborated.	No suggestions for improvements.	G
				3.2 Waste handling and disposal	Equipment dry cleaned (sweeping, vacuum cleaning, etc.). Solid waste recovered in production wherever possible.	3.2 Do the OCs properly reflect the main drivers for release potential …?	The OCs in respect to potential emissions to the environment are well described. The relationship is also provided in a clear tabular form. Reference is given to the OECD ESD for Coating industry and the relevance to the sector is justified.	No suggestions for improvements.	G
						3.3 If a use rate has been provided: Is it transparent, … and representative?	The use rates are provided to several ingredient types separately to large-scale and small-scale formulation. The use rates are based on on EFCC expert assessment.	No suggestions for improvements.	G
		2	2/b-4	3.1 Conditions of use	Location / indoor Water contact / no Connection to STP / no Site specific biological STP. Volatile compounds subject to air emission controls. Wastewater emissions generated from equipment cleaning with water. The sludge generated from wastewater treatment is not applied to agricultural soil.	3.1 Are the OCs clearly described and practically verifiable?	The OCs are described by giving some general details that can be used to characterize the various production activities. A set of procedures and use conditions that limit the potential for environmental release are given. These system-related constraints are typically optimized to minimize emissions and maximize product yield within a particular manufacturing facility, but the set of OCs applicable to a particular process are highly specific. The OC descriptions are very generic - they are difficult to be linked to specific environmental releases.	No suggestions for necessary improvements.	A
				3.2 Waste handling and disposal	Residual raw materials in some cases recycled and fed back into the process. In other cases, residues and by-products are used as raw materials. Wastewater from cleaning and maintenance operations to WWTP. Wet scrubbers, thermal oxidizers, solid adsorbents, membrane separators, biofilters, and/or cold oxidizers for trapping residual vapours. Unrecovered waste handled as an industrial waste.	3.2 Do the OCs properly reflect the main drivers for release potential …?	The SPERC relies on the principle that although the set of operating conditions applicable to a particular process are highly specific, some general details can be used to characterize the various production activities. Therefore the sources of releases are not specified and the information on OCs and their connection to releases are rather generic. Clear links between OCs and environmental releases are not described.	No suggestions for necessary improvements.	A

						3.3 If a use rate has been provided: Is it transparent, … and representative?	The maximum site tonnages have been established using expert sector knowledge along with published information that provides representative nameplate capacities at typical site operations. The stated values provide a realistic worst-case estimate of the usage per day and may be modified if i) more realistic data is available; ii) the use amount needs to be limited to manage the environmental risk; and iii) the number of emission days is less than the default value of 300.	No suggestions for improvements.	G
IS	**water borne, water, soluble**	4	3/a-1	3.1 Conditions of use	Location / indoor Water contact / yes Connection to STP / no Site specific biological STP. Volatile compounds subject to air emission controls. Wastewater emissions generated from equipment cleaning with water. WTP sludge is not applied to agricultural soil.	3.1 Are the OCs clearly described and practically verifiable?	The OCs cover very a wide process, product and substance domain and the descriptions of OCs are rather generic. The connection to individual processes is not straightforward.	No suggestions for necessary improvements.	A
				3.2 Waste handling and disposal	Residual raw materials in some cases recycled and fed back into the process reactor to improve efficiencies. In other cases, residues and by-products are used as raw materials. Wastewater from cleaning and maintenance operations to WWTP. Wet scrubbers, thermal oxidizers, solid adsorbents, membrane separators, biofilters, and/or cold oxidizers for trapping residual vapours. Solvent-containing liquid coating wastes handled as hazardous waste incineration (Waste Framework Directive).	3.2 Do the OCs properly reflect the main drivers for release potential …?	The OCs reflect the main drivers for release potential of substances into the environment in rather generic level. Releases to air, water and waste are covered. Releases to soil are not expected. Links between OCs and environmental releases are rather generic.	No suggestions for necessary improvements.	A
						3.3 If a use rate has been provided: Is it transparent, … and representative?	The method to estimate local substance use rates is described in the BD. It seems unclear whether the use rate reflects individual substances or the sum of them. The FS guidance allows use rates for individual substances or e.g. mixture amounts with explanations. The reported values provide a realistic worst-case estimate of the usage per day and may be modified if more realistic data is available.	No suggestions for necessary improvements.	A
		4	3/a-2	3.1 Conditions of use	Location / indoor Water contact / yes Connection to STP / yes Volatile compounds subject to air emission controls. Wastewater emissions generated from equipment cleaning with water. WTP sludge is not applied to agricultural soil.	3.1 Are the OCs clearly described and practically verifiable?	The OCs cover very a wide process, product and substance domain and the descriptions of OCs are rather generic. The connection to individual processes is not straightforward.	No suggestions for necessary improvements.	A

				3.2 Waste handling and disposal	Residual raw materials in some cases recycled and fed back into the process reactor to improve efficiencies. In other cases, residues and by-products are used as raw materials. Wastewater from cleaning and maintenance operations to WWTP. Wet scrubbers, thermal oxidizers, solid adsorbents, membrane separators, biofilters, and/or cold oxidizers for trapping residual vapours. Solvent-containing liquid coating wastes handled as hazardous waste incineration (Waste Framework Directive).	3.2 Do the OCs properly reflect the main drivers for release potential …?	The OCs reflect the main drivers for release potential of substances into the environment in rather generic level. Releases to air, water and waste are covered. Releases to soil are not expected. Links between OCs and environmental releases are rather generic.	No suggestions for necessary improvements.	A
						3.3 If a use rate has been provided: Is it transparent, … and representative?	The method to estimate local substance use rates is described in the BD. It seems unclear whether the use rate reflects individual substances or the sum of them. The FS guidance allows use rates for individual substances or e.g. mixture amounts with explanations. The reported values provide a realistic worst-case estimate of the usage per day and may be modified if more realistic data is available.	No suggestions for necessary improvements.	A
		4	3/a-3	3.1 Conditions of use	Location / indoor Water contact / yes Connection to STP / yes High degree of automation in adhesive / sealant application. Equipment cleaning with water, additional wastewater controls not applicable as releases to wastewater are small. Targeted application of adhesive / sealant to substrate. Upon curing, substances are included into matrix without intended release to the environment. Solvents evaporate to a significant extent upon curing of the adhesives.	3.1 Are the OCs clearly described and practically verifiable?	The SPERC covers a wide range of industrial uses of water-borne adhesives and sealants. The OCs reflect the main drivers for release potential of substances into the environment in rather generic level. Releases to air, water and waste are covered. Releases to soil are not expected. Links between OCs and environmental releases are rather generic, but on the other hand all the releases are considered small.	No suggestions for improvements.	G
				3.2 Waste handling and disposal	Equipment cleaned with water, washing disposed of with wastewater. Low amount of solid waste (mats used for scavenging overspray) is disposed as external waste (no wet-scrubbing).	3.2 Do the OCs properly reflect the main drivers for release potential …?	An overview of the process steps involved in industrial application of adhesives/sealants and their relevance with regard to the emission estimation and derivation of release factors is presented in tabular form in the BD. The main drivers for release potential of substances into the environment from each processing step is presented.	No suggestions for improvements.	G

						3.3 If a use rate has been provided: Is it transparent, … and representative?	The individual company members were asked to provide their estimates of typical ingredient concentrations, as well as daily consumptions in large adhesive/sealant application machines. Professional judgement was used for estimates. The indicative ingredient use rates are estimated in a conservative manner. These are obtained by multiplying the indicative ingredient concentrations with estimated rates of manufacturing or use of adhesives/sealants.	No suggestions for improvements.	G
		5	3/a-4	3.1 Conditions of use	Location / indoor Water contact / no Connection to STP / yes Automation in raw materials handling (manual / automatic dosing): High degree of automation in adhesive / sealant application. Equipment cleaning: with water, additional wastewater emission controls are not applicable as releases to wastewater are small. Measures to achieve efficient use of chemicals: Targeted application of adhesive / sealant to substrate, Upon curing, substances are included into matrix without intended release to the environment.	3.1 Are the OCs clearly described and practically verifiable?	The SPERC covers a wide range of industrial uses of non-volatile substances in water-borne adhesives and sealants which results in rather generic OC descriptions. They are not clearly linked to specific environmental releases, but on the other hand all the releases are considered small. Water contact during use in reported as 'no' but cleaning with water and emissions to water is considered as a significant process step in the BD and accounted for in release factor.	Discrepancy in water contact in the FS and BD should be corrected. No other suggestions for improvements.	A
				3.2 Waste handling and disposal	Equipment cleaned with water, washing disposed of with wastewater. Low amount of solid waste (mats used for scavenging overspray) is disposed as external waste (no wet-scrubbing).	3.2 Do the OCs properly reflect the main drivers for release potential …?	An overview of the process steps involved in industrial application of adhesives/sealants and their relevance with regard to the emission estimation and derivation of release factors is reported in tabular form in the BD. The main drivers for release potential of substances into the environment from each processing step is presented, except for air emission points for non-volatile water-borne substances, yet a release factor for air emission is given ≠ 0, which is a discrepancy.	The source of air emissions is unclear, yet a release factor to air emissions is given. No other suggestions for improvements.	A
						3.3 If a use rate has been provided: Is it transparent, … and representative?	The individual company members were asked to provide their estimates of typical ingredient concentrations, as well as daily consumptions in large adhesive/sealant application machines. Professional judgement was used for estimates. The indicative ingredient use rates are estimated in a conservative manner. These are obtained by multiplying the indicative ingredient concentrations with estimated rates of manufacturing or use of adhesives/sealants.	No suggestions for improvements.	G

		5	3/a-5	3.1 Conditions of use	Location / indoor Water contact / yes Connection to STP / yes Metal salts are dissolved in a water-borne application fluid in a reservoir or treatment baths. It is pumped to dedicated machine(s) in order to be applied to the substrate or it is kept in a bath. With each piece of substrate a fraction of the application fluid is carried-over from the treatment bath. Via a sequence of rinsing steps this fraction of the application fluid is continuously emitted to the wastewater. Spray applications are housed-in. Re-use of rinsing water. Periodically, the reservoirs are emptied of the spent reservoir fluid and refilled with fresh reservoir fluid.	3.1 Are the OCs clearly described and practically verifiable?	The OCs are clearly described with short descriptions of surface treatment processes with regard to the most relevant emission sources of heavy metals. Continuous emissions, recovery points and discontinuous emissions are identified.	No suggestions for improvements.	G
				3.2 Waste handling and disposal	Spill protection including waste reuse. Treatment of the spent process fluids by pH-adjustment and/or subsequent filtration/ sedimentation results in slurries or solid waste which is treated off-site.	3.2 Do the OCs properly reflect the main drivers for release potential …?	The OCs are clearly described and reflect the main drivers for release potential of substances into the environment.	No suggestions for improvements.	G
						3.3 If a use rate has been provided: Is it transparent, … and representative?	The release and emission rates are focused on large-scale operations, assuming for the highest absolute emissions and therefore worst-case estimations. The indicative worst case substance use rates (MSPERC) of several ingredient types have been estimated on the basis of information in the BREF document. The indicative use rates were reported for 7 different process types.	No suggestions for improvements.	G
IS	**solvent borne, volatile**	4, 5	3/b-1	3.1 Conditions of use	Location / indoor Water contact / yes Connection to STP / no	3.1 Are the OCs clearly described and practically verifiable?	The SPERC covers a wide range of industrial spraying applications with a variety of coating materials with different chemical characteristics. The OC are clearly described but rather generic.	No suggestions for necessary improvements.	G
				3.2 Waste handling and disposal	Process waste may be recycled or incinerated by waste disposal company	3.2 Do the OCs properly reflect the main drivers for release potential …?	Volatile compounds are considered to be released to air in the vast majority of cases. Abatement for oven exhaust air only captures between 5 and 30 % of releases. Abatement for spray booth exhaust air is rarely used. Transfer of volatiles to waste and transfer to water only have minor relevance.	No suggestions for improvements.	G
						3.3 If a use rate has been provided: Is it transparent, … and representative?	Typical maximum daily usage, for any one substance at any one location, is based on sector knowledge. Estimated daily use rates for substances with different function are given for pigment/extender/filler, binder, water, organic solvent/coalescent, additives. No further specifications for use rates are given. Larger users (see IED) require abatement or use of solvent management plan.	No suggestions for improvements.	G

		7	3/b-2	3.1 Conditions of use	Location / indoor Water contact / yes Connection to STP / no Site specific biological STP. Volatile compounds subject to air emission controls. Wastewater emissions generated from equipment cleaning with water.	3.1 Are the OCs clearly described and practically verifiable?	The OCs cover a very wide process, product and substance domain and the descriptions of OCs are generic. The connection to individual processes is not straightforward.	No suggestions for necessary improvements.	A
				3.2 Waste handling and disposal	Residual raw materials are in some cases recycled and fed back into the process reactor. In other cases, residues and by-products are used as raw materials. Wastewater generated during cleaning and maintenance operations directed to a WWTP. Wet scrubbers, thermal oxidizers, solid adsorbents, membrane separators, biofilters, and/or cold oxidizers for trapping residual vapours. All unrecovered waste is handled as an industrial waste that can be incinerated. WTP sludge is not applied to arable land.	3.2 Do the OCs properly reflect the main drivers for release potential …?	The OCs reflect the main drivers for release potential of substances into the environment in a rather generic level. Links between OCs and environmental releases are rather generic. Releases to air, water and waste are covered. Releases to soil are not expected.	No suggestions for necessary improvements.	A
						3.3 If a use rate has been provided: Is it transparent, … and representative?	The method to estimate local substance use rates is described in the BD. The maximum use estimate is based on a published survey of the yearly yet fuel usage some at airports and on professional judgement. The covered subtance domain seems rather narrow. The stated values provide a realistic worst-case estimate of the usage per day and may be modified if more realistic data is available.	No suggestions for necessary improvements.	A
		4	3/b-3	3.1 Conditions of use	Location / indoor Water contact / no Connection to STP / yes High degree of automation in adhesive / sealant application.	3.1 Are the OCs clearly described and practically verifiable?	The SPERC covers a wide range of industrial uses of solvent-borne and solvent-less adhesives and sealants. Releases to air and waste are covered. Releases to water or soil are not expected. Links between OCs and environmental releases are rather generic, but on the other hand all the releases are considered small.	No suggestions for improvements.	G
				3.2 Waste handling and disposal	Equipment cleaned with organic solvent, washings are collected and disposed of as external solvent waste. Mats used for scavenging overspray are disposed as external waste (no wet-scrubbing).	3.2 Do the OCs properly reflect the main drivers for release potential …?	An overview of the process steps involved in industrial application of adhesives/sealants and their relevance with regard to the emission estimation and derivation of release factors is shown in the BD Table 1. The main drivers for release potential of substances into the environment from each processing step are presented.	No suggestions for improvements.	G
						3.3 If a use rate has been provided: Is it transparent, … and representative?	The individual company members were asked to provide their estimates of typical ingredient concentrations, as well as daily consumptions in large adhesive/sealant application machines. Professional judgement was used for estimates. The indicative ingredient use rates are estimated in a conservative manner. These are obtained by multiplying the indicative ingredient concentrations with estimated rates of manufacturing or use of adhesives/sealants.	No suggestions for improvements.	G

		5	3/b-4	3.1 Conditions of use	Since metal SPERCs are based on measured data at end-of-pipe on-site, all indicated PROCs are integrated in the release fractions from raw materials handling to cleaning and maintenance. (no FS format used)	3.1 Are the OCs clearly described and practically verifiable?	The OCs are not described in the FS or BD but reference is given to the sector specific BAT/BREF document. A summary is not provided in the FS or BD. To find information of OCs for practical verification of them necessitates the user to study the BAT/BREF document.	It is recommended that the descriptions of relevant OCs should be summarized in the FS and/or BD, in addition to giving reference to the BAT/BREF document.	I
				3.2 Waste handling and disposal	Dispose of waste product or used containers according to local regulations. If the metal content of the waste is elevated enough, internal or external recovery/ recycling is considered.	3.2 Do the OCs properly reflect the main drivers for release potential …?	The OCs and drivers of release potential are not described in the FS or BD but reference is given to sector specific BAT/BREF document. To find links between OCs and specific environmental releases necessitates the user to study the BAT/BREF document.	It is recommended that the OCs leading to emissions should be summarized in the FS and/or BD, in addition to giving reference to the BAT/BREF document.	I
						3.3 If a use rate has been provided: Is it transparent, … and representative?	Default use rates and emission days are not given, except for reference to defaults set by ERC (not given in the FS or BD). The SPERC FS recommends the users to apply realistic site specific substance use rates.	No suggestions for necessary improvements.	A
PW	**spraying, volatile**	8a,c, d,f	4/a-1	3.1 Conditions of use	Location / indoor and outdoor Water contact / yes Connection to STP / yes	3.1 Are the OCs clearly described and practically verifiable?	OC descriptions are very generic - they are difficult to be linked to specific environmental releases.	No suggestions for necessary improvements.	A
				3.2 Waste handling and disposal	Waste water from equipment cleaning discharged to standard municipal STP	3.2 Do the OCs properly reflect the main drivers for release potential …?	Release potential is described separately to 4 sub-SPERCs.	No suggestions for improvements.	G
						3.3 If a use rate has been provided: Is it transparent, … and representative?	Substance use rates are estimated for different substance groups based on sector knowledge.	No suggestions for improvements.	G
		8a	4/a-2	3.1 Conditions of use	Location / outdoor Water contact / yes Connection to STP / yes Volatile compounds prone to atmospheric release. Wastewater emissions generated from equipment cleaning with water.	3.1 Are the OCs clearly described and practically verifiable?	The professional use of solvent-containing products in small businesses are not associated with a specific group of mandatory requirements to minimize potential environmental releases. There are recommended procedures that are typically implemented as standards of practice to reduce the potential for air, water, and soil release.	No suggestions for improvements.	G
				3.2 Waste handling and disposal	Unused and spent products and solutions labelled and stored for recovery or disposal as hazardous waste in a suitable container. The containers must be solvent compatible, leakproof, and free of any defects. Contaminated debris (paper towels, brushes, rollers, masks, transfer vessels, and wipes) need to be handled as hazardous waste and properly disposed. Direct disposal of waste into a municipal sewer system needs to conform with all applicable laws and regulations. A spill plan needs to be available.	3.2 Do the OCs properly reflect the main drivers for release potential …?	Professional use of a product in a widespread manner is characterized by several use conditions, which are described in generic sense in the BD.	No suggestions for improvements.	A

						3.3 If a use rate has been provided: Is it transparent, … and representative?	Registrants using these professional SPERCs are in the best position to define the regional use rate based on detailed knowledge of their product portfolio, product compositions, and penetration.	No suggestions for improvements.	A
PWC	**outdoor, water release**	8f	5/a-1	3.1 Conditions of use	Location / outdoor Water contact / yes+no Connection to STP / yes Manual handling. Information on proper dosing on packaging. Equipment cleaned with solvent (organic or water), washing disposed of with wastewater. Use with limited or no technical control of emission, without intended release to the environment.	3.1 Are the OCs clearly described and practically verifiable?	The SPERC covers a wide range of professional and consumer outdoor uses of non-volatile adhesives and sealants which results in rather generic OC descriptions. They are not clearly linked to specific environmental releases, but on the other hand all the releases are considered small.	No suggestions for improvements.	G
				3.2 Waste handling and disposal	Residues of products must be cured in the container before discarded via household waste. Larger solvent washing volumes are collected and disposed of as solvent waste.	3.2 Do the OCs properly reflect the main drivers for release potential …?	An overview of the process steps involved in widespread use of adhesives/sealants and their relevance with regard to the emission estimation and derivation of release factors is shown in the BD Table 1. The main drivers for release potential of substances into the environment from each processing step is presented.	No suggestions for improvements.	G
						3.3 If a use rate has been provided: Is it transparent, … and representative?	The use rates are based on confidential market data. Emission days is a reasonable worst case assumption for widespread use, operating at 365 days a year.	No suggestions for improvements.	G
		8c	5/a-2	3.1 Conditions of use	Location / indoor Water contact / yes+no Connection to STP / yes Manual handling. Information on proper dosing on packaging. Equipment cleaned with solvent (organic or water), washing disposed of with wastewater. Use with limited or no technical control of emission, without intended release to the environment.	3.1 Are the OCs clearly described and practically verifiable?	The SPERC covers a wide range of professional and consumer outdoor uses of non-volatile adhesives and sealants which results in rather generic OC descriptions. They are not clearly linked to specific environmental releases, but on the other hand all the releases are considered small.	No suggestions for improvements.	G
				3.2 Waste handling and disposal	Residues of products must be cured in the container before discarded via household waste. Larger solvent washing volumes are collected and disposed of as solvent waste.	3.2 Do the OCs properly reflect the main drivers for release potential …?	An overview of the process steps involved in widespread use of adhesives/sealants and their relevance with regard to the emission estimation and derivation of release factors is shown in the BD Table 1. The main drivers for release potential of substances into the environment from each processing step is presented.	No suggestions for improvements.	G
						3.3 If a use rate has been provided: Is it transparent, … and representative?	The use rates are based on confidential market data. Emission days is a reasonable worst case assumption for widespread use, operating at 365 days a year.	No suggestions for improvements.	G
PWC	**outdoor, water/soil release**	8d	5/b-1	3.1 Conditions of use	Location / indoor and outdoor Water contact / yes Connection to STP / no PPP approvals include specific labelling instructions to prevent emission to surface water / waste water. No intentional emission	3.1 Are the OCs clearly described and practically verifiable?	The SPERC covers a wide range of professional and consumer outdoor uses of co-formulants in PPP products. They are not clearly linked to specific environmental releases, but on the other hand all the releases are considered small. No intentional emissions are allowed to water. Emission to soil is not applicable.	No suggestions for improvements.	A

					to surface water or waste water is permitted. Controlled application to agricultural crops in accordance with the product label and Good Agricultural Practice is required.				
				3.2 Waste handling and disposal	Used packaging disposed of in accordance with the product labelling. It is recommended that PPP containers are triple or pressure rinsed or rinsed with a system that is an integral part of the sprayer. Rinse water should be added to the sprayer at time of filling. Properly rinsed containers may be disposed of as non-hazardous waste.	3.2 Do the OCs properly reflect the main drivers for release potential …?	The main drivers for release potential of substances into the environment from each process step is presented.	No suggestions for improvements.	G
						3.3 If a use rate has been provided: Is it transparent, … and representative?	Regional use rates are based on mass balance models. Plant protection products may be used during the whole year so that emission days are 365.	No suggestions for improvements.	G
		8e	5/b-2	3.1 Conditions of use	Location / outdoor Water contact / yes Connection to STP / no Outdoor use [OOC01] Controlled application to agricultural soil [OOC25]	3.1 Are the OCs clearly described and practically verifiable?	The OCs are clearly described in the FS and in the BD and cover the process steps involved in fertilizers use.	No suggestions for improvements.	G
				3.2 Waste handling and disposal	Dispose of waste product or used containers according to local regulations. Service life is not applicable to fertilizers.	3.2 Do the OCs properly reflect the main drivers for release potential …?	The given OCs, together with the information given for release factors, properly reflect the main drivers for release potential of substances into the environment.	No suggestions for improvements.	G
						3.3 If a use rate has been provided: Is it transparent, … and representative?	Indicative use rates are not applicable for fertilizers as the application rates can vary considerably depending on the fertilizers applied, soil characteristics, climatic conditions and cultivated crops. Yearly 1-5 applications are assumed. The sector organization has developed a fertilizer environmental exposure (FEE) tool for environmental fate modelling and quantitative risk assessment of fertilizer substances and soil improvers.	No suggestions for improvements.	G
SL	**water/soil release**	10a	7/a	3.1 Conditions of use	Location / outdoor Water contact / yes Connection to STP / yes (assumed)	3.1 Are the OCs clearly described and practically verifiable?	The OC concept is not straight applicable to service life use of articles. The SPERC covers constructions of massive metal, alloys or metallic coating. The OCs driving the release of the life cycle stage 'service life' are not described except for run-off from metallic roofs.	No suggestions for improvements.	A
				3.2 Waste handling and disposal	Dedicated recollection infrastructure required for waste. 90% recycling rate from buildings, leaving 10% available for release to waste.	3.2 Do the OCs properly reflect the main drivers for release potential …?	The OC concept is not straight applicable to service life use of articles. The main driver for release potential of substances into the environment is related to weathering in outdoor contact. Dedicated recollection infrastructure required for waste.	No suggestions for improvements.	A
						3.3 If a use rate has been provided: Is it transparent, … and representative?	The OC concept is not straight applicable to service life use of articles. A local daily fraction of regional tonnage for the use (widespread) has been estimated (5.5E-6 t/d). Realistic worst-case value based a literature study	Some specifications of the estimated tonnage could be given.	A

							with runoff data and emission rates from metallic roofs of Cu, Zn, Pb, Cr, Al, Ni (in steel). A service life of 25 years was assumed.		
SL	**waste**	11a	7/b	3.1 Conditions of use	Location / indoor Water contact / no Connection to STP / yes (assumed)	3.1 Are the OCs clearly described and practically verifiable?	The OC concept is not straight applicable to service life use of articles. The SPERC covers the service life of batteries in indoor/outdoor use. Reference to the EU battery directive is given.	No suggestions for improvements.	A
				3.2 Waste handling and disposal	Dedicated recollection infrastructure required for waste	3.2 Do the OCs properly reflect the main drivers for release potential …?	The OC concept is not straight applicable to service life use of articles. No main drivers for release potential of substances into the environment are identified. Dedicated recollection infrastructure is required for waste.	No suggestions for improvements.	A
						3.3 If a use rate has been provided: Is it transparent, … and representative?	The OC concept is not straight applicable to service life use of articles. A local daily fraction of regional tonnage for the use (widespread) has been estimated (5.5E-6 t/d). No further specifications of ingredients are given.	Some specifications of the estimated tonnage could be given.	A

4 OBLIGATORY RMMs ONSITE (FS) / RISK MANAGEMENT (QC)

4.1 Are the RMM described in a clear manner?

- Do the description of RMMs include
  - required effectiveness to air?
  - required effectiveness to water?
  - required effectiveness to soil?
  - required effectiveness to waste?
  - technical possibilities to achieve?
- Are there links to BAT, BREF or other reference information?
- Are there alternative techniques to achieve similar results?

4.2 Are RMMs adequate for the substance/product domain?

- Are the RMMs effective
  - within the described domain of SPERC?
  - to the product types within the scope of SPERC?
- Is the linkage adequately described in the BD?

4.3 Are RMMs clearly linked to release sources?

- Are the main sources/pathways of release from the process described in the BD
  - to air?
  - to water?
  - to soil?
  - to waste?
- Are there links to RMM
  - of releases to air?
  - of releases to water?
  - of releases to soil?
  - of disposal as waste?
- End-of-pipe effectiveness of RMMs
  - rate?
  - examples?
  - options?
- References to good/best practices or other guidance?

* RMM efficiency or reference for RMM efficiency (if given in the FS) not listed here

LCS	Specifi-cation(s)	ERC	Project code	4 RMM (FS)	Factsheet text (shortened*)	4 RMM (QC)	QC Explanation of evaluation	QC Remarks for improvements	Score
M		1	1/a	RMM air	None obligatory	4.1 Are the RMM described in a clear manner?	Oil separation from waste water and biological waste water treatment are obligatory RMMs. Optional techniques and efficiencies are described. No obligatory RMMs are set for air releases, but optional techniques and efficiencies are described. No spreading of WTP sludge to agricultural or arable land is allowed. Residual solvent waste shall be treated as hazardous and may be disposed by incineration.	No suggestions for improvements.	G
				RMM water	Oil-water separation	4.2 Are RMMs adequate for the substance/product domain?	Both optional and obligatory alternative RMMs are given with estimated efficiency based on literature values. Abatement methods are site and substance specific and efficiency can be optimized onsite. The linkage between RMM technique and substance/product domain is not specified in detail.	No suggestions for necessary improvements.	A
				RMM soil	The STP sludge is not applied to agricultural soil.	4.3 Are RMMs clearly linked to release sources?	No exact sources of emission are specified, and no pathways are described. Generic applicable RMMs and abatement techniques are given for air and water emissions. The SPERC covers a wide range of operations and presumably variable sources and pathways of releases, and many of the RMMs are optional.	No suggestions for necessary improvements.	A
F	**water borne**	2	2/a-1	RMM air	Controlled under IED– abatement or use of solvent management plan.	4.1 Are the RMM described in a clear manner?	Alternative RMMs for air emissions are described. RMMs for water releases are considered not applicable, but connection municipal STP is presumed. Emissions to soil are not expected.	No suggestions for improvements.	G
				RMM water	n/a	4.2 Are RMMs adequate for the substance/product domain?	The SPERC covers a wide range of operations and alternative RMMs are listed, focus on minimizing air emissions. Little information is given in the FS, but selection of alternatives are listed in the BD. RMMs seem adequate for the substance/product domain. Reference is given to sector specific OECD ESD.	Information taken from the OECD ESD report could be summarized more comprehensively in the BD.	A
				RMM soil	n/a	4.3 Are RMMs clearly linked to release sources?	RMMs for air emissions are linked to different process stages and are more like best practices (using closed systems) than specific treatment methods. Link to main air emission points is not clarified. The only RMM for water releases in connection to municipal STP.	More detailed links of RMM to potential sources of releases would be beneficial to the SPERC user.	A
		2	2/a-2	RMM air	Controlled under IED– abatement or use of solvent management plan.	4.1 Are the RMM described in a clear manner?	The SPERC covers a wide range of operations and many of the RMMs are optional. Alternative RMMs for air emissions are described. RMMs for water releases are considered not applicable, but connection municipal STP is presumed. The role of water releases is unclear. Emissions to soil are not expected.	The role of water releases could be clarified.	A
				RMM water	n/a	4.2 Are RMMs adequate for the substance/product domain?	The SPERC covers a wide range of operations and alternative RMMs are listed, focus on minimizing air emissions. Little information is given in the FS, but selection of alternatives are listed in the BD. RMMs seem adequate for the substance/product domain. Reference is given to sector specific OECD ESD.	Information taken from the OECD ESD report could be summarized more comprehensively in the BD.	A
				RMM soil	n/a	4.3 Are RMMs clearly linked to release sources?	RMMs for air emissions are linked to different process stages and are more like best practices (using closed systems) than specific treatment methods. Link to main air emission points is not clarified. The only RMM for water releases in connection to municipal STP.	More detailed links of RMM to potential sources of releases would be beneficial to the SPERC user.	A
		2	2/a-3	RMM air	None obligatory	4.1 Are the RMM described in a clear manner?	There are no obligatory RMMs for the formulation processes. Nonetheless, good practices are provided such as air extraction systems	No suggestions for improvements	G

							with dust filters and local exhaust ventilation systems. Connection to municipal STP is set as default.		
				RMM water	None obligatory	4.2 Are RMMs adequate for the substance/product domain?	No obligatory RMMs onsite, which is justified in the BD.	No suggestions for improvements.	G
				RMM soil	None obligatory	4.3 Are RMMs clearly linked to release sources?	No obligatory RMMs onsite, which is justified in the BD.	No suggestions for improvements.	G
		2	2/a-4	RMM air	None obligatory	4.1 Are the RMM described in a clear manner?	There are no obligatory RMMs for the formulation processes. Nonetheless, some good practices are provided such as air extraction systems with dust filters and local exhaust ventilation systems. Connection to municipal STP is set as default.	No suggestions for improvements.	G
				RMM water	None obligatory	4.2 Are RMMs adequate for the substance/product domain?	No obligatory RMMs onsite, which is justified in the BD.	No suggestions for improvements.	G
				RMM soil	None obligatory	4.3 Are RMMs clearly linked to release sources?	No obligatory RMMs onsite, which is justified in the BD. Several good practices to minimize potential emissions are recommended.	No suggestions for improvements.	G
		3	2/a-5	RMM air	(Wet) electrostatic precipitators or cyclones or fabric/bag filter or ceramic/metal mesh filter.	4.1 Are the RMM described in a clear manner?	Alternative technical solutions for RMMs for air and water emissions are given in the BD with statistical achievable efficiencies.	No suggestions for improvements.	G
				RMM water	Chemical precipitation or sedimentation or filtration or electrolysis or RO or IE.	4.2 Are RMMs adequate for the substance/product domain?	Alternative RMMs are given with reported site-specific efficiency values, but it is stated that RMM techniques are site and substance specific and efficiency shall be optimized onsite.	No suggestions for improvements.	G
				RMM soil	No application of sewage sludge to soil.	4.3 Are RMMs clearly linked to release sources?	The sources/pathways of releases from the processes to different environmental compartments are not described in the FS or in the BD. The SPERC covers a wide range of operations and presumably variable sources and pathways of releases. Reference to sector specific BAT/BREF is given.	A generic description of potential sources of releases in the FS and/or BD would be beneficial to the SPERC user, in addition to reference to BAT/BREF.	A
F	**solvent borne**	2	2/b-1	RMM air	Controlled under IED– abatement or use of solvent management plan	4.1 Are the RMM described in a clear manner?	RMM efficiency ranges for VOC could be referenced and justified in more detail in the the BD. There is no mention of the IED and the meaning of it in the BD.	No suggestions for necessary improvements.	A
				RMM water	n/a	4.2 Are RMMs adequate for the substance/product domain?	The effectiveness and linkages of RMMs within the domain of SPERC are adequately described.	No suggestions for improvements.	G
				RMM soil	n/a	4.3 Are RMMs clearly linked to release sources?	In one sub-SPERC RF to water is given: 0.005%, but no description of the emission source in the BD is given.	Discrepancy in release to water should be revamped.	A
		2	2/b-2	RMM air	None obligatory	4.1 Are the RMM described in a clear manner?	There are no obligatory RMMs for the formulation processes. Nonetheless, some good practices are provided such as air extraction systems with dust filters and local exhaust ventilation systems. Connection to municipal STP is set as default.	No suggestions for improvements.	G

				RMM water	None obligatory	4.2 Are RMMs adequate for the substance/product domain?	No obligatory RMMs onsite, which is justified in the BD.	No suggestions for improvements.	G
				RMM soil	None obligatory	4.3 Are RMMs clearly linked to release sources?	No obligatory RMMs onsite, which is justified in the BD. Several good practices to minimize potential emissions are recommended.	No suggestions for improvements.	G
		2	2/b-3	RMM air	Dust filters during transfer and formulation of powder raw materials and products (e.g. cyclones, fabric filter, wet scrubber, electrostatic precipitators (ESP)).	4.1 Are the RMM described in a clear manner?	Air emission control is an obligatory RMM for the formulation processes of cementous substances, such as air extraction systems with dust filters. Connection to municipal STP is set as default although no releases to water are assumed.	No suggestions for improvements.	G
				RMM water	None obligatory	4.2 Are RMMs adequate for the substance/product domain?	There are obligatory RMMs to control air emissions of cementous products, which is justified in the BD.	No suggestions for improvements.	G
				RMM soil	None obligatory	4.3 Are RMMs clearly linked to release sources?	There are obligatory RMMs to control air emissions of cementous products, which is justified in the BD.	No suggestions for improvements.	G
		2	2/b-4	RMM air	None obligatory	4.1 Are the RMM described in a clear manner?	The RMMs are described in a clear manner. There are several optional RMM measures for air emissions and obligatory measures for waste water releases (oil separation, biological waste water treatment). Good housekeeping is assumed and waste is recycled or incinerated. Reported abatement efficiency ranges in % are listed.	No suggestions for improvements.	G
				RMM water	Oil-water separation (e.g. via oil water separators, oil skimmers, or dissolved air flotation) required.	4.2 Are RMMs adequate for the substance/product domain?	Both optional and obligatory alternative RMMs are given with estimated efficiency rates based on literature values. Abatement methods are site and substance specific and efficiency can be optimized onsite. The linkage between RMM technique and substance/product domain is not specified in detail.	No suggestions for necessary improvements.	A
				RMM soil	The sludge generated from wastewater treatment is not applied to agricultural soil.	4.3 Are RMMs clearly linked to release sources?	RMMs are not clearly linked to release sources, but are alternative technologies for abatement of releases to environment. Literature values for abatement efficiency rates for different abatement technologies are reported. In general the efficiency of RMM varies depending on the treatment technology and the emission source.	More detailed links to potential sources of releases would be beneficial to the SPERC user.	A
IS	**water borne, water, soluble**	4	3/a-1	RMM air	None obligatory	4.1 Are the RMM described in a clear manner?	RMMs to reduce air emissions are optional, but several applicable abatement techniques and related efficiencies are reported in the BD. RMMs to reduce emissions to water are obligatory including removal of immiscible liquids prior to biological treatment for which alternative techniques are described. Waste is treated as hazardous waste and incinerated. No emission to soil are expected.	No suggestions for improvements.	G
				RMM water	Oil-water separation (e.g. via oil water separators, oil skimmers, or dissolved air flotation) required.	4.2 Are RMMs adequate for the substance/product domain?	The SPERC covers a wide range of operations and substances. Various RMMs for the substance/product domain are described, both optional and obligatory. The RMMs seem adequate for the substance/product domain, but selection and optimization are site-specific.	No suggestions for improvements.	G
				RMM soil	The sludge generated from wastewater treatment is not applied to agricultural soil.	4.3 Are RMMs clearly linked to release sources?	The SPERC covers a wide range of operations and presumably variable sources and pathways of releases. Both optional and obligatory RMMs are provided. The links of RMMs to release sources are only generic.	More detailed descriptions of potential sources of releases with	A

								related RMMs could be beneficial to the SPERC user.	
		4	3/a-2	RMM air	None obligatory	4.1 Are the RMM described in a clear manner?	RMMs to reduce air emissions are optional, but several applicable abatement techniques and related efficiencies are reported in the BD. RMMs to reduce emissions to water are obligatory including removal of immiscible liquids prior to biological treatment for which alternative techniques are described. Waste is treated as hazardous waste and incinerated. No emission to soil are expected.	No suggestions for improvements.	G
				RMM water	Oil-water separation (e.g. via oil water separators, oil skimmers, or dissolved air flotation) required.	4.2 Are RMMs adequate for the substance/product domain?	The SPERC covers a wide range of operations and substances. Various RMMs for the substance/product domain are described, both optional and obligatory. The RMMs seem adequate for the substance/product domain, but selection and optimization are site-specific.	No suggestions for improvements.	G
				RMM soil	The sludge generated from wastewater treatment is not applied to agricultural soil.	4.3 Are RMMs clearly linked to release sources?	The SPERC covers a wide range of operations and presumably variable sources and pathways of releases. Both optional and obligatory RMMs are provided. The links of RMMs to release sources are only generic.	More detailed descriptions of potential sources of releases with related RMMs could be beneficial to the SPERC user.	A
		4	3/a-3	RMM air	None obligatory	4.1 Are the RMM described in a clear manner?	There are no obligatory RMMs required for water-borne adhesives and sealants, which is justified in the BD.	No suggestions for improvements.	G
				RMM water	None obligatory	4.2 Are RMMs adequate for the substance/product domain?	Overview of the process steps involved in industrial application of adhesives/ sealants and their relevance with regard to the emission estimation and derivation of release factors is reported in the BD. No obligatory RMMs are required, which is justified in the BD.	No suggestions for improvements.	G
				RMM soil	None obligatory	4.3 Are RMMs clearly linked to release sources?	There are no obligatory RMMs required due to small emissions. Connection to municipal biological STP is assumed.	No suggestions for improvements.	G
		5	3/a-4	RMM air	None obligatory	4.1 Are the RMM described in a clear manner?	There are no obligatory RMMs required for industrial use of non-volatile substances in water-borne adhesives and sealants.	No suggestions for improvements.	G
				RMM water	None obligatory	4.2 Are RMMs adequate for the substance/product domain?	Overview of the process steps involved in industrial application of adhesives/ sealants and their relevance with regard to the emission estimation and derivation of release factors is given in the BD. The origin of air emissions is somewhat unclear.	No suggestions for necessary improvements.	G
				RMM soil	None obligatory	4.3 Are RMMs clearly linked to release sources?	There are no obligatory RMMs required due to small emissions. Connection to municipal biological STP is assumed.	No suggestions for improvements.	G
		5	3/a-5	RMM air	None obligatory	4.1 Are the RMM described in a clear manner?	RMMs consisting of primary, secondary and tertiary pre-treatment of process fluids are described precisely and in detail. Waste waters are treated off-site biologically in municipal STP. The fate of excess sludge, containing metals, from biological treatment is not discussed. Possible application to agricultural soil is not commented. In general, metals in the process sludges may be recovered off-site, but required effectiveness to sludge treatment is not given. Air emissions are considered negligible and no RMM is required. BAT/BREF for waste treatment is given as reference or any further details on waste management.	RMMs for pre-treatment of process fluids is described in detail, but the fate of metal containing sludges is less discussed. The fate of sludges from pre-treatment and off-site treatment from the environmental releases point of view might be added.	A

				RMM water	pH adjustment and/or precipitation e.g. by air flotation and/or filtration and other suitable techniques. Sites are operated to meet the local requirements for emissions of metals.	4.2 Are RMMs adequate for the substance/product domain?	The described alternative RMMs are adequate for the substance/product domain.	No suggestions for improvements.	G
				RMM soil	None obligatory	4.3 Are RMMs clearly linked to release sources?	The RMMs are clearly linked to release sources in the processes.	No suggestions for improvements.	G
IS	**solvent borne, volatile**	4, 5	3/b-1	RMM air	Smaller users / none, Larger users / abatement or use of solvent management plan; Filter and cyclone	4.1 Are the RMM described in a clear manner?	There are no obligatory RMMs required for smaller scale uses of solvent-borne and water-borne liquid and powder coatings by spraying, but for larger scale uses abatement for air emissions or use of solvent management plan is required, according to IED. For powder use filter and cyclone is required to capture air emissions.	No suggestions for improvements.	G
				RMM water	n/a	4.2 Are RMMs adequate for the substance/product domain?	Overview of the process steps involved in industrial spraying of coatings and the typical efficiencies of RMMs are given in the BD. Obligatory RMMs are required for air emissions only for larger scale uses and powder coating uses.	No suggestions for improvements.	G
				RMM soil	n/a	4.3 Are RMMs clearly linked to release sources?	There are no obligatory RMMs required for small scale uses of volatile substances. IED requirements are applied for larger scale emissions of volatiles. Required RMMs for powder coating spraying applications are described in the BD.	No suggestions for improvements.	G
		7	3/b-2	RMM air	None obligatory	4.1 Are the RMM described in a clear manner?	RMMs to reduce air emissions are optional, but several applicable abatement techniques and related efficiencies are given in the BD. RMMs to reduce emissions to water are obligatory including removal of immiscible liquids prior to biological treatment for which alternative techniques are described. Unrecovered waste is handled as an industrial waste that can be incinerated. No emission to soil are expected.	No suggestions for improvements.	G
				RMM water	Oil-water separation (e.g. via oil water separators, oil skimmers, or dissolved air flotation) required.	4.2 Are RMMs adequate for the substance/product domain?	The SPERC covers a wide range of operations and substances. Various RMMs for the substance/product domain are described, both optional and obligatory. The RMMs seem adequate for the substance/product domain, but selection and optimization are site-specific.	No suggestions for improvements.	G
				RMM soil	The sludge generated from wastewater treatment is not applied to agricultural soil.	4.3 Are RMMs clearly linked to release sources?	The SPERC covers a wide range of operations and presumably variable sources and pathways of releases. Both optional and obligatory RMMs are provided. The links of RMMs to release sources are only generic.	More detailed descriptions of potential sources of releases with related RMMs could be beneficial to the SPERC user.	A
		4	3/b-3	RMM air	None obligatory	4.1 Are the RMM described in a clear manner?	There are no obligatory RMMs required for solvent-borne or solvent-less adhesives and sealants, which is justified in the BD.	No suggestions for improvements.	G
				RMM water	None obligatory	4.2 Are RMMs adequate for the substance/product domain?	Overview of the process steps involved in industrial application of adhesives/sealants and their relevance with regard to the emission estimation and derivation of release factors is given in the BD. No obligatory RMMs are required, which is justified in the BD.	No suggestions for improvements.	G
				RMM soil	None obligatory	4.3 Are RMMs clearly linked to release sources?	There are no obligatory RMMs required due to small emissions. Solvent evaporation is the primary emission pathway during the curing stage of the adhesive/sealant application. The equipment is cleaned with solvent	No suggestions for improvements.	G

							washings, which are collected and disposed of as chemical waste. The emissions of volatiles to water are negligible and the corresponding release factors are zero. Connection to municipal biological STP is assumed.		
		5	3/b-4	RMM air	Electrostatic precipitators or wet electrostatic precipitators or cyclones or fabric/bag filter or ceramic/metal mesh filter	4.1 Are the RMM described in a clear manner?	Alternative technical solutions for RMMs for air and water emissions are given with statistical achievable efficiencies.	No suggestions for improvements.	G
				RMM water	Chemical precipitation or sedimentation or filtration or electrolysis or reverse osmosis or ion exchange Site specific WWTP, Assumed domestic STP	4.2 Are RMMs adequate for the substance/product domain?	Alternative RMMs are given with reported site-specific efficiency values, but RMM techniques are site and substance specific and efficiency can be optimized onsite.	No suggestions for improvements.	G
				RMM soil	No application of sewage sludge to soil	4.3 Are RMMs clearly linked to release sources?	The sources/pathways of releases from the processes to different environmental compartments are not described in the FS or in the BD. Instead, reference to sector specific BAT/BREF is given.	Generic descriptions of potential sources of releases in the FS and/or BD would be beneficial to the SPERC user.	A
PW	**spraying, volatile**	8a,c, d,f	4/a-1	RMM air	n/a	4.1 Are the RMM described in a clear manner?	The SPERC covers a wide range of professional spraying. Abatement is not considered as an obligatory RMM in the SPERC, as in practice the range of site specific requirements varies between no abatement and full abatement of exhaust air from spray-booths and ovens in larger users. Reference is given to general best practices in BREF for spraying.	No suggestions for necessary improvements.	A
				RMM water	n/a	4.2 Are RMMs adequate for the substance/product domain?	For a coating film to form, the volatile phase of organic solvent-borne and water-borne coatings must evaporate into the atmosphere. The solid phase is not emitted to air. Waste water in considered not applicable. Where practicable, physical methods, such as impervious sheeting should be applied.	No suggestions for necessary improvements.	A
				RMM soil	n/a	4.3 Are RMMs clearly linked to release sources?	The SPERC covers a wide range of spraying operations and presumably variable operational conditions and sources and pathways of releases.	No suggestions for necessary improvements.	A
		8a	4/a-2	RMM air	None obligatory. Use in accordance with the manufacturers' instructions.	4.1 Are the RMM described in a clear manner?	There are few obligatory RMMs associated with the widespread professional use of a solvent-containing product, but there are a number of voluntary initiatives that may be undertaken to control environmental releases during the professional use of a product, which are described in the BD.	No suggestions for improvements.	G
				RMM water	By default, standard municipal STP with an effluent flow rate of 2,000 m3/day.	4.2 Are RMMs adequate for the substance/product domain?	There are few obligatory RMMs associated with the widespread professional use of a solvent-containing product, but there are a number of voluntary initiatives that may be undertaken to control environmental releases during the professional use of a product, which are described in the BD.	No suggestions for necessary improvements.	A
				RMM soil	None obligatory. Use in accordance with the manufacturers' instructions.	4.3 Are RMMs clearly linked to release sources?	There are few obligatory RMMs associated with the widespread professional use of a solvent-containing product, but there are a number of voluntary initiatives that may be undertaken to control environmental releases during the professional use of a product, which are described in the BD.	No suggestions fornecessary improvements.	A

PWC	**outdoor, water release**	8f	5/a-1	RMM air	None obligatory	4.1 Are the RMM described in a clear manner?	It is stated in the BD that due to the type application, i.e. widespread use, risk reduction measures are neither necessary nor possible.	No suggestions for improvements.	G
				RMM water	None obligatory	4.2 Are RMMs adequate for the substance/product domain?	It is stated in the BD that due to the type application, i.e. widespread use, risk reduction measures are neither necessary nor possible.	No suggestions for improvements.	G
				RMM soil	None obligatory	4.3 Are RMMs clearly linked to release sources?	There are no obligatory RMMs required due to small emissions. Connection to municipal biological STP is assumed.	No suggestions for improvements.	G
		8c	5/a-2	RMM air	None obligatory	4.1 Are the RMM described in a clear manner?	It is stated in the BD that due to the type application, i.e. widespread use, risk reduction measures are neither necessary nor possible.	No suggestions for improvements.	G
				RMM water	None obligatory	4.2 Are RMMs adequate for the substance/product domain?	It is stated in the BD that due to the type application, i.e. widespread use, risk reduction measures are neither necessary nor possible.	No suggestions for improvements.	G
				RMM soil	None obligatory	4.3 Are RMMs clearly linked to release sources?	There are no obligatory RMMs required due to small emissions. Connection to municipal biological STP is assumed.	No suggestions for improvements.	G
PWC	**outdoor, water/soil release**	8d	5/b-1	RMM air	None obligatory	4.1 Are the RMM described in a clear manner?	Due to the of type application, i.e. application of plant protections products, containing co-formulants, risk reduction measures are neither necessary nor possible.	No suggestions for improvements.	G
				RMM water	None obligatory	4.2 Are RMMs adequate for the substance/product domain?	Due to the of type application, i.e. application of plant protections products, containing co-formulants, risk reduction measures are neither necessary nor possible.	No suggestions for improvements.	G
				RMM soil	None obligatory	4.3 Are RMMs clearly linked to release sources?	There are no obligatory RMMs required due to the type of use: widespread outdoor use. There is no summary available of the literature survey that serves as the BD document.	No suggestions for necessary improvements.	A
		8e	5/b-2	RMM air	None obligatory	4.1 Are the RMM described in a clear manner?	The reasoning for RMMs or no need for them is clear. Outdoor intentional application of fertilizers is not a typical RMM target.	No suggestions for improvements.	G
				RMM water	It is assumed that operators comply with requirements specified under Cross Compliance of the Common Agricultural Policy of the EU	4.2 Are RMMs adequate for the substance/product domain?	The SPERC covers a wide range of fertilizer uses for which the RMMs are optional or not needed. Therefore description of detailed RMMs and their adequacy may not be applicable.	No suggestions for necessary improvements.	A
				RMM soil	None, intentionally released to agricultural soil.	4.3 Are RMMs clearly linked to release sources?	The RMMs are linked to release sources, especially for those related to water releases. Refinement of the default values can be made in the FEE tool.	No suggestions for improvements.	G
SL	**water/soil release**	10a	7/a	RMM air	Metals and metal compounds do not volatilise. Due to the massive physical state in service life, there is no dust formation that can become air-borne.	4.1 Are the RMM described in a clear manner?	The OC concept is not straight applicable to service life use of articles. There are no obligatory RMMs. The BAT/BREF document for non-ferrous metal industries is referred to, but not cited for information concerning service life stage.	No suggestions for necessary improvements.	A

				RMM water	Runoff data and emission rates from metallic roofs of Cu, Zn, Pb, Cr, Al, Ni (in steel).	4.2 Are RMMs adequate for the substance/product domain?	The OC concept is not straight applicable to service life use of articles. There are no RMMs identified for outdoor service life of constructions of massive metal, alloys or metallic coating.	No suggestions for necessary improvements.	A
				RMM soil	Runoff data and emission rates from metallic roofs of Cu, Zn, Pb, Cr, Al, Ni (in steel.	4.3 Are RMMs clearly linked to release sources?	The OC concept is not straight applicable to service life use of articles. There are no RMMs identified except for waste collection and recycling.	No suggestions for necessary improvements.	A
SL	**waste**	11a	7/b	RMM air	Metals and metal compounds do not volatilise.	4.1 Are the RMM described in a clear manner?	The OC concept is not straight applicable to service life use of articles. There are no obligatory RMMs except the recovery obligation stated in the EU Batteries Directive.	No suggestions for improvements.	G
				RMM water	Metal in either encapsulated / there is a mechanical barrier (to avoid direct contact with water).	4.2 Are RMMs adequate for the substance/product domain?	The OC concept is not straight applicable to service life use of articles. Obligatory waste recovery is the RMM.	No suggestions for necessary improvements.	A
				RMM soil	Not applicable	4.3 Are RMMs clearly linked to release sources?	The OC concept is not straight applicable to service life use of articles. The link of RMM to release sources is not relevant.	No suggestions for necessary improvements.	A

5 EXPOSURE ASSESSMENT (FS) / RELEASE FACTORS (QC)

5.1a MEASURED DATA - Are measured data representative and well documented?

- Are there measured data available?
  - under which CoU taken?
  - number of data points?
  - number of companies?
  - number of substances analysed?
- Are measured data related to reasonable and documented use rates?
  - is it possible to derive representative RFs?
  - is there data analysis available (distribution-%) for representativeness for the respective purpose?

5.1b MODELLED DATA - Is the documentation on the model and the modelling report available?

- Has a model been developed for the process and products?
  - is the model and modelling report available?
  - are modelled releases related to representative use rates?
  - is it possible to derive reasonable release factors?

5.1c LITERATURE DATA - Is the literature source provided and assessed to be representative/robust?

- Are the RFs extracted from published literature?
  - do they refer to process/product and CoU covered in the SPERC?
  - are the literature sources properly referenced?
  - is there a short summary provided in the BD?
- Is there a clear documentation in the publication of
  - the number of data points?
  - the number of companies?
  - consistence the CoUs in the publication(s) with the conditions in the SPERC?
  - the substances analysed?

5.1d READ-ACROSS DATA – Is the read-across sufficiently robust and well explained?

- Is read-across applied to
  - other processes?
  - other products?
  - other CoUs?
- Is read-across
  - sufficiently explained?
  - comparison of processes?

- release driving factors?
- properties of chemicals involved?

– Examples of similar drivers independent of product category:
  - dustiness or viscosity of chemicals to be mixed
  - cleaning of machinery without water
  - equipment run in continuous or batch mode with intermediate cleaning
  - which techniques are used to minimise the residues in the equipment before cleaning

* Use rates and days emitting not presented in this table; RF = release factor

				5 Exposure assessment (FS) (shortened *)				5 RF (QC)			
LCS	**Specifi-cation(s)**	**ERC**	**Project code**	**RF - air, %**	**RF - water, %**	**RF - soil, %**	**RF - waste, %**		**QC Explanation of evaluation**	**QC Remarks for improvements**	**Score**
M		1	1/a	0.001 - 5	0.001 - 1	0.01	0.2	5.1c	The RFs are given separately to 20 sub-SPERCs with different water solubility/vapour pressure combinations. The sources of information and the calculation methods and categories for sub-SPERCs are well documented in the BD. The RF values for water releases provide conservative worst case approximations as a function of water solubility. The RFs for air emissions have not been adjusted for the potential use of emission abatement device. The RFs to soil are conservative ECHA estimated assuming some spillage during operations.	No suggestions for improvements.	G
F	**water borne**	2	2/a-1	0.0097 - 2.2	0.25 - 0.5	0	0.5	5.1c	RF values obtained from the sector specific OECD ESD (2009) and have been confirmed by expert sector knowledge. RFs are given separately for 3 sub-SPERCs, divided by solvent use amount and volatiles and solids. No summary of justification of release factors is provided in the BD.	RF values are obtained from the sector specific OECD ESD (2009), but their justifications are not summarized in the BD. A summary of justification of release factors should be provided in the BD.	I
		2	2/a-2	0.0097 - 3.6	0.005 - 0.5	0	0.5 - 1	5.1c	RF values obtained from the sector specific OECD ESD (2009) and have been confirmed by expert sector knowledge. RFs are given separately for 3 sub-SPERCs for formulation of organic solvent or water-borne coatings and inks, divided by solvent use amount and volatiles and solids. No summary of justification of release factors is provided in the BD.	RF values are obtained from the sector specific OECD ESD (2009), but their justifications are not summarized in the BD. A summary of justification of release factors should be provided in the BD.	I
		2	2/a-3	2.25	0.5	0	0.2 - 3	5.1c / 5.1d	RFs have been collected and justified in a sector specific literature survey (Tolls et al. 2016). Read-across of RFs has been applied from the OECD Emission scenario document (2009) for coating industry with similar type of formulation process and chemical ingredients. The RMMs are not considered in the derivation of RFs and they can be considered to be conservative and to overestimate the actual emissions. RFs' justifications are summarized in the BD.	No suggestions for improvements.	G

		2	2/a-4	0.0097	0.505	0	0.2 - 3	5.1c / 5.1d	RFs have been collected and justified in a sector specific literature survey (Tolls et al. 2016). Read-across of RFs has been applied from the OECD Emission scenario document (2009) for coating industry with similar type of formulation process and chemical ingredients. The RMMs are not considered in the derivation of RFs and they can be considered to be conservative and to overestimate the actual emissions. RFs' justifications are summarized in the BD.	No suggestions for improvements.	G
		3	2/a-5	0.005	0.005 (water contact: unclear)	0.1 (non-agric.)	1	5.1a/ 5.1c	Measured data collected from a multi-metal background database of site-specific release factors has been used for derivation of SPERC RFs. Data and methods have been introduced in a published research article.	No suggestions for improvements.	G
F	**solvent borne**	2	2/b-1	0.0095 - 3.6	0.0 - 0.005	0	0.75 - 1	5.1c	Exact references to Tables in the ESD from which the RFs have been extracted are partly missing. The literature referenced covers the whole coatings industry and a wide range of cases. However, no summary and reasoning are provided in the background document.	There should be a short summary and reasoning provided in the background document of the RFs used in these particular SPERC facts sheets. The references to the Tables in the ESD should be completed.	I
		2	2/b-2	0.08	0.02 (water contact: no)	0	0.2 - 3	5.1c/ 5.1d	RFs have been collected and justified in a sector specific literature survey (Tolls et al. 2016). Read-across of RFs has been applied from the OECD Emission scenario document (2009) for coating industry with similar type of formulation process and chemical ingredients. RFs' justifications are summarized in the BD. The RMMs are not considered in the derivation of RFs and they can be considered to be conservative and to overestimate the actual emissions. No water contact is reported, but RF>0 is given, which is justified with conservatism in read-across.	Some clarifications suggested to give more background information of RFs. No further suggestions for improvements.	G
		2	2/b-3	0.005	0 (water contact: no)	0	0 - 1	5.1c/ 5.1d	RFs for the production of cementitious construction chemical products is taken as read across from the production of Cement (BREF, 2013). The RMMs are not considered in the derivation of RFs (except for implementation of air extration in large scale production) and they can be considered to be conservative and to overestimate the actual emissions. RFs' justifications are summarized in the BD. Somewhat more detailed summary of the BREF of cement production related to release factors could be useful for the user of SPERC FS.	Some clarifications suggested to give more background information of RFs. No further suggestions for improvements.	A
		2	2/b-4	0.25 - 2.5	0.0005 - 0.5	0.01	4	5.1c	The RFs are given separately to 20 sub-SPERCs with different water solubility/vapour pressure combinations. The sources of information and the calculation methods and categories for sub-SPERCs are well documented in the BD. The RF values for water releases provide conservative worst case approximations as a function of water solubility. The RFs for air emissions have not been adjusted for the potential use of emission abatement device. The RFs to soil are conservative ECHA estimated assuming some spillage during operations.	No suggestions for improvements.	G

IS	**water borne, water, soluble**	4	3/a-1	98	0.002 - 2	0	0.1 - 5	5.1c	The scope of the SPERC is very wide considering process, product and substance domain. The release factors base on literature values considered representative enough for the range of conditions covered in the SPERC. To take into account the variability in operations, uncertainty factors have been applied. Due to the wide scope the RFs are rather generic in nature. The release factors are generic estimates and justified as such.	No suggestions for necessary improvements.	A
		4	3/a-2	5	0.0001 - 0.1	0	10	5.1c	Reference to OECD ESD 2004. No 6. is given in the factsheet for release factor - water, but it is not referenced in the BD document nor in the reference list. No justification is given why read-across to rubber industry additives is used. The release factors are generic estimates and justified as such.	The reference for RF water should be corrected in the BD.	I
		4	3/a-3	98.5	0.3	0	0 - 6	5.1c/ 5.1d	The justification method applied for deriving the release factors is read-across. The read-across of the release factors is based on the similarities in the chemical ingredients and in the application process of coatings and paints, for which explicit OECD scenarios exist. The release factors of the SPERC for adhesives/sealants have been selected as worst-case values in the course of reading across from emission scenarios to SPERCs. The RMMs are not considered in the derivation of RFs and they can be considered to be conservative and to overestimate the actual emissions. The details of the justification and the read-across are provided in Tolls et al. (2016) and summarized in the BD.	No suggestions for improvements.	G
		5	3/a-4	1.7	0.3 (water contact: no)	0	0 - 6		The justification method applied for deriving the release factors is read-across. The read-across of the release factors is based on the similarities in the chemical ingredients and in the application process of coatings and paints, for which explicit OECD scenarios exist. The release factors of the SPERC for adhesives/sealants have been selected as worst-case values in the course of reading across from emission scenarios to SPERCs. The RMMs are not considered in the derivation of RFs and they can be considered to be conservative and to overestimate the actual emissions. The details of the justification and the read-across are provided in Tolls et al. (2016) and summarized in the BD. No water contact is reported, but RF>0 is given.	Some clarifications suggested to give more background information of RFs. No further suggestions for improvements.	G
		5	3/a-5	0	5	0	5 - 90	5.1c	The RFs are derived using sector specific BREF document (2006) and OECD ESD (2004) and expert judgement. The derived RFs are justified and summarized in the BD.	No suggestions for improvements.	G
IS	**solvent borne, volatile**	4, 5	3/b-1	1.5 - 95	0 - 1	0	3 - 52	5.1c	Release factors for application of water- and solvent-borne coatings and inks are derived from the sector specific OECD ES document and confirmed by expert sector knowledge. No summary of the justification of release factors is provided in the BD.	A summary of the justification of release factors should be provided in the BD.	I

		7	3/b-2	0.6 - 5	0.001	0	2	5.1c	The scope of the SPERC is very wide considering process, product and substance domain. The release factors base on literature values considered representative enough for the range of conditions covered in the SPERC. The RF values are based on rather limited process and substance domains when compared to the coverage of the SPERC. To take into account the variability in operations, uncertainty factors have been applied.	The release factors are generic estimates and RF values base on rather limited process and substance domains when compared to the coverage of the SPERC. This could be better justified.	A
		4	3/b-3	98.5	0.3 (water contact: no)	0	0 - 6	5.1d	The justification method applied for deriving the release factors is read-across. The read-across of the release factors is based on the similarities in the chemical ingredients and in the application process of coatings and paints, for which explicit OECD scenarios exist. The release factors of the SPERC for adhesives/sealants have been selected as worst-case values in the course of reading across from emission scenarios to SPERCs. The RMMs are not considered in the derivation of RFs and they can be considered to be conservative and to overestimate the actual emissions. The details of the justification and the read-across are provided in Tolls et al. (2016) and summarized in the BD. No water contact is reported, but RF>0 is given.	Some clarifications suggested to give more background information of RFs. No further suggestions for improvements.	G
		5	3/b-4	0.2	0.5	1 (non-agric.)	1	5.1a	Measured data collected from a multi-metal background database of site-specific release factors has been used for derivation of SPERC RFs. Data and methods have been introduced in a published research article.	No suggestions for improvements.	G
PW	**spraying, volatile**	8a,c,d, f	4/a-1	0 - 98	0.0 - 2	0 - 2	0 - 60	5.1c	RFs are derived separately to indoor and outdoor use and volatiles and non-volatiles. They are based on industry data.	No suggestions for improvements.	G
		8a	4/a-2	95	1	4	10	5.1c	The values were assigned using a mass balance approach that takes advantage of the sector knowledge and professional judgement possessed by members the expert group responsible for creating the SpERC factsheets.	No suggestions for improvements.	G
PWC	**outdoor, water release**	8f	5/a-1	0	1.5	0	4 - 25	5.1d	The release factors for the general public and the professional use of adhesive and sealants as well as for construction chemical products were taken in analogy to the releases from coatings and paints (OECD ES document 2009). The release factors are summarized in a clear way in Table 2 in the BD.	No suggestions for improvements.	G
		8c	5/a-2	0	1.5	0	4 - 25	5.1d	The release factors for the general public and the professional use of adhesive and sealants as well as for construction chemical products were taken in analogy to the releases from coatings and paints (OECD ES document 2009). The release factors are summarized in a clear way in Table 2 in the BD.	No suggestions for improvements.	G
PWC	**outdoor, water/soil release**	8d	5/b-1	0.8 - 99.8 *	0.2 *	0 - 99 *	0.01*	5.1c	The calculation and justification of release factors is presented in the FS. It is unclear whether the numeric values of RFs are in % or %/100.	A short summary of the literature survey used as BD should be provided. No other suggestions for improvements.	A
		8e	5/b-2	0	1.57	100	0.01	5.1c/ 5.1d	The release factors to water are based on on published literature sources. The applied drift values are defined for plant protection products. Air emissions are not considered relevant as such but are covered by the release factors to soil due to aerial depositions. Soil release is intentional application of fertilizers.	The applied drift values for release factors to water are defined for plant protection products. No comparison	A

										between substances and their drifting properties is made.	
SL	**water/soil release**	10a	7/a	0	1.25	1.25 (non-agric.)	10	5.1c	A literature study was conducted to collect run-off data and emission rates from metallic roofs of Cu, Zn, Pb, Cr, Al, Ni (in steel). RF values to water or soil compartment were estimated from run-off releases from roofs. The worst-case release fraction to water (after service-life) is estimated to be 1.25%.	The relevance of run-off metals from roofs to emissions and release factors from other construction service life cases could be commented. No suggestions for necessary improvements.	A
SL	**waste**	11a	7/b	0	0 (water contact: n/a)	0	54	5.1c	No RF values are applicable for air, water or soil compartment. The justification of the RF to waste are based on 'Eurobat', 'ILA', 'ACEA', 'EPBA', but no proper references are given.	Proper references to the justification of the RF to waste should be given.	I

* number format unclear in the SPERC factsheet: here changed to assumed percentage

6 CONSERVATISM (QC)

6.1 – Is the level of conservatism appropriate?

- Are all uses described by the CoU and RMMs covered in the scope of SPERC?
- Is the conservative derivation of RFs sufficiently described in the BD?
- Is conservatism in balance with scope (broader scope requires more conservatism)?
- Is mathematical analysis of data used (e.g. taking a 90%ile, summing up from individuals to a category etc.)?
- Are worst case assumptions applied?

LCS	Specifi-cation(s)	ERC	Project code	6 CONSERVA-TISM (QC)	QC Explanation of evaluation	QC Remarks for improvements	Score
M		1	1/a		Safety factors and worst case assumptions are applied in derivation of RFs. The applied methods are described in the BD.	No suggestions for improvements.	G
F	**water borne**	2	2/a-1		Worst case assumptions and emissions values from older technology are used for derivation of RFs. Reference to sector specific OECD ESD (2009) is given, but summary in the BD is scarce.	No suggestions for improvements.	G
		2	2/a-2		Worst case assumptions and emissions values from older technology are used for derivation of RFs. Reference to sector specific OECD ESD (2009) is given, but summary in the BD is scarce.	No suggestions for improvements.	G
		2	2/a-3		Conservatism is warranted by assuming worst cases in the use rates and the RFs. RFs reflect technology from 10 years back, and technical progress is assumed since RFs have been created.	No suggestions for improvements.	G
		2	2/a-4		Conservatism is warranted by assuming worst cases in the use rates and the RFs. RFs reflect technology from 10 years back, and technical progress is assumed since RFs have been created.	No suggestions for improvements.	G
		3	2/a-5		Conservatism is implemented in the derivation of the RFs from (measured) company data via several approaches: use of 90th percentiles of reported release factors, integration of all on-site processes resulting in coverage of all related processing steps of the use, inclusion of older data in the data base, coverage of multiple substance speciation and linking best case OC/RMMs (from BREF) with worst-case RF (from database).	No suggestions for improvements.	G
F	**solvent borne**	2	2/b-1		Worst case scenarios are applied and technical progress is assumed since RFs have been created. Maximum values of the estimated ranges in the OECD reference document are applied.	No suggestions for improvements.	G

		2	2/b-2		Conservatism is warranted by assuming worst cases in the use rates and the RFs. RFs reflect technology from 10 years back, and technical progress is assumed since release factors have been created.	No suggestions for improvements.	G
		2	2/b-3		Conservatism is warranted by assuming worst cases in the use rates and the RFs. RFs reflect technology from 10 years back, and technical progress is assumed since release factors have been created.	No suggestions for improvements.	G
		2	2/b-4		Safety factors and worst case assumptions are applied in derivation of RFs. The applied methods are described in the BD.	No suggestions for improvements.	G
IS	**water borne, water, soluble**	4	3/a-1		Worst case default estimates were applied when reliable information was not available. Adjustment factors were applied to guarantee that adequate margins of protection were built into determinations.	No suggestions for improvements.	G
		4	3/a-2		Worst case default estimates were applied when reliable information was not available. Adjustment factors were applied to guarantee that adequate margins of protection were built into determinations.	No suggestions for improvements.	G
		4	3/a-3		The conservatism in the emission estimation of the SPERCs for the industrial use of adhesives and sealants is warranted by assuming worst cases in both the RFs and the use rates. The RFs used in the SPERCs for the industrial use of adhesives and sealants reflect technology that is more than ten year old. It is fair to assume that adhesive and sealant application processes have become more efficient.	No suggestions for improvements.	G
		5	3/a-4		The conservatism in the emission estimation of the SPERCs for the industrial use of adhesives and sealants is warranted by assuming worst cases in both the RFs and the use rates. The RFs used in the SPERCs for the industrial use of adhesives and sealants reflect technology that is more than ten year old. It is fair to assume that adhesive and sealant application processes have become more efficient.	No suggestions for improvements.	G
		5	3/a-5		The conservatism in the emission estimation of the SPERCs for the industrial use of metals in coating applications is warranted by assuming worst cases in both, the RFs and the use rates. The release factors used in the SPERC reflect technologies that is more than ten years old and are most likely improved with regard to environmental burden today.	No suggestions for improvements.	G
IS	**solvent borne, volatile**	4, 5	3/b-1		The conservatism in the emission estimation of the SPERCs is ensured by assuming a worst case RFs. The RFs used in the SPERCs for the application of coatings reflect technology that is more than ten years old.	No suggestions for improvements.	G
		7	3/b-2		Worst case default estimates were applied when reliable information was not available. Upward rounding were applied to guarantee that adequate margins of protection were built into determinations.	No suggestions for improvements.	G
		4	3/b-3		The conservatism in the emission estimation of the SPERCs for the industrial use of adhesives and sealants is warranted by assuming worst cases in both the RFs and the use rates. The RFs used in the SPERCs for the industrial use of adhesives and sealants reflect technology that is more than ten year old. It is fair to assume that adhesive and sealant application processes have become more efficient.	No suggestions for improvements.	G
		5	3/b-4		Conservatism is implemented in the derivation of the RFs from (measured) company data via several approaches: use of 90th percentiles of reported RFs, integration of all on-site processes resulting in coverage of all related processing steps of the use, inclusion of older data in the data base, coverage of multiple substance speciation and linking best case OC/RMMs (from BREF) with worst-case RF (from database).	No suggestions for improvements.	G
PW	**spraying, volatile**	8a,c,d, f	4/a-1		It is unclear in the BD how the conservatism has been assumed in professional spraying.	Conservatism of RFs should be explained. No suggestions for other improvements.	A
		8a	4/a-2		It is described in the BD that better accounting of the relative release proportions to the air, water, and soil compartments ensured that a mass balance was maintained while preserving the conservatism that is built into the generically-defined ERCs.	No suggestions for improvements.	A
PWC	**outdoor, water release**	8f	5/a-1		The conservatism in the emission estimation of the SPERCs for the widespread use of adhesives/sealants and construction chemical products is warranted by assuming worst cases in both, the RFs and the use rates.	No suggestions for improvements.	G
		8c	5/a-2		The conservatism in the emission estimation of the SPERCs for the widespread use of adhesives/sealants and construction chemical products is warranted by assuming worst cases in both, the RFs and the use rates.	No suggestions for improvements.	G
	outdoor, water/soil release	8d	5/b-1		In general the ECPA SpERCs have traded uncertainty for conservatism by selecting the worst-case values.	No suggestions for improvements.	G
		8e	5/b-2		Conservatism is warranted by using realistic worst-case estimates for both the use rates and the RFs.	No suggestions for improvements.	G

SL	**water/soil release**	10a	7/a		Conservatism of RFs for service life articles has not been discussed. The worst-case release factor to represent the process and substance domain of service life has been chosen from one application.	The justification for the level of conservatism is rather generic and base on one application only.	A
	waste	11a	7/b		Conservatism of RFs for service life articles has not been discussed. Recycling rate has been estimated, but base on generic assumptions.	The justification for the level of conservatism is rather generic and scarce.	A

7 SUMMARY and OVERALL JUDGEMENT

7.1 - Overall judgement of the reviewer

- Are RFs considered representative and reliable?

LCS	Specifi-cation(s)	ERC	Project code	7 SUMMARY (QC)	QC Explanation of evaluation	QC Remarks for improvements	Over-all score
M		1	1/a		The RFs are considered representative and reliable. The specificity of the release factors is enhanced by applying 30 sub-SPERCs categorized according to vapour pressure and water solubility.	More detailed descriptions of potential sources and pathways of releases would be beneficial to the SPERC user.	G
F	**water borne**	2	2/a-1		The RFs are considered representative and reliable. The RFs are sector specific generic estimates and justified as such.	Waste water emissions, RMM and abatement methods described only superficially. In the FS "not applicable" is given although water used in process and in cleaning. Discrepancy could be corrected. More detailed links of RMM to potential sources of releases would be beneficial to the SPERC user. RF values base on sector specific OECD ESD (2009), but their justifications are not summarized in the BD. A summary of justification of release factors should be provided in the BD. There is no reference to the BD in the FS. This should be added.	G
		2	2/a-2		The RFs are considered representative and reliable. The RFs are sector specific generic estimates and justified as such.	Waste water emissions, RMM and abatement methods described only superficially. In the FS "not applicable" is given although water used in process and in cleaning. Discrepancy could be corrected. More detailed links of RMM to potential sources of releases would be beneficial to the SPERC user. RF values base on sector specific OECD ESD (2009), but their justifications are not summarized in the BD. A summary of justification of release factors should be provided in the BD. There is no reference to the BD in the FS. This should be added.	A
		2	2/a-3		The SPERC covers a variety of substances, processes and product types, and RFs are read-across from another but similar type of sector. Therefore the RFs may be rather generic for some parts. The background document is clear and well structured. The literature cited is rather comprehensive.	No significant suggestions for improvements.	G
		2	2/a-4		The SPERC covers a variety of substances, processes and product types, and RFs are read-across from another but similar type of sector. Therefore the RFs	No significant suggestions for improvements.	G

					may be rather generic for some parts. The background document is clear and well structured. The literature cited is rather comprehensive.		
		3	2/a-5		The derivation of RFs base on measured wide data collected form a multi-metal background database of site-specific release factors. Data and methods have been introduced in detail in a published research article	It is recommended that the header of the factsheet should specify the covered SPERCs more clearly, and the filename should contain more information of the content and purpose of the file on its own. It is recommended that the operational conditions and activities leading to emissions could be summarized in the FS and/or BD, in addition to giving reference to BAT/BREF document..	G
F	**solvent borne**	2	2/b-1		The SPERC covers a wide range of substances, processes and product types, which leaves the SPERC rather generic for some parts.	The literature referenced covers the whole coatings industry and a wide range of cases. There should be a short summary and reasoning provided in the background document of the RFs used in these particular SPERC facts sheets Water use and water contact and releases to water should be made clear for this SPERC in question. There is no reference to the BD in the FS. This should be added.	A
		2	2/b-2		The SPERC covers a variety of substances, processes and product types, and RFs are read-across from another but similar type of sector. Therefore the RFs may be rather generic for some parts. The background document is clear and well structured. The literature cited is rather comprehensive.	No significant suggestions for improvements.	G
		2	2/b-3		The SPERC covers a variety of substances, processes and product types, and RFs are read-across from another but similar type of sector. Therefore the RFs may be rather generic for some parts. The background document is clear and well structured. The literature cited is rather comprehensive.	No significant suggestions for improvements.	G
		2	2/b-4		The specificity of the RFs is enhanced by applying 20 sub-SPERCs categorized according to vapour pressure and water solubility	More detailed descriptions of potential sources and pathways of releases would be beneficial to the SPERC user.	G
IS	**water borne, water, soluble**	4	3/a-1		The RFs are generic estimates and justified as such. RFs are estimated separately for 5 water solubility ranges due to the wide substance domain.	More detailed descriptions of potential sources and pathways of releases would be beneficial to the SPERC user.	G
		4	3/a-2		The RFs are generic estimates and justified as such. RFs are estimated separately for 5 water solubility ranges due to the wide substance domain.	It is recommended that the title should specify covered substances more clearly, and filenames should contain more information of the content and purpose of the file on their own. The inconsistency in SU code should be corrected. More detailed descriptions of potential sources of releases would be beneficial to the SPERC user. Reference to OECD 2004. No 6. is given in the factsheet for release factor - water, but it is not referenced in the BD document nor in the reference list.	A
		4	3/a-3		The RFs are read-across from the application process of coatings and paints, for which explicit OECD scenarios exist. The RFs of the SPERC for adhesives/sealants have been selected as worst-case values in the course of reading across.	No suggestions for improvements.	G
		5	3/a-4		The RFs are read-across from the application process of coatings and paints, for which explicit OECD scenarios exist. The release factors of the SPERC for adhesives/sealants have been selected as worst-case values in the course of reading across.	No suggestions for improvements.	G
		5	3/a-5		The RFs are considered representative and reliable. The release factors are based on sector specific documented literature values and expert judgement.	The filename of SPERC could be updated: now "draft" and "final".	G

						The fate of sludges from pre-treatment and off-site treatment from the environmental releases point of view might be added.	
IS	**solvent borne, volatile**	4, 5	3/b-1		The RFs are derived from sector specific literature, but the justification of selected RFs is not summarized in the BD.	The BD should be supplemented with the justification of the release factors. There is no reference to the BD in the FS. This should be added.	G
		7	3/b-2		The RFs are generic values estimated from representative uses of fuels. RFs are estimated separately for two vapour pressure ranges due to the wide substance domain.	OC descriptions are very generic - they are difficult to be linked to specific environmental releases. More detailed descriptions of potential sources of releases would be beneficial to the SPERC user. RF values are based on rather limited process and substance domains when compared to the coverage of the SPERC.	G
		4	3/b-3		The RFs are read-across from the application process of coatings and paints, for which explicit OECD scenarios exist. The RFs of the SPERC for adhesives/sealants have been selected as worst-case values in the course of reading across.	No suggestions for improvements.	G
		5	3/b-4		The derivation of RFs base on measured wide data collected form a multi-metal background database of site-specific release factors. Data and methods have been introduced in detail in a published research article.	It is recommended that the header of the factsheet should specify the covered SPERCs more clearly, and the filename should contain more information of the content and purpose of the file on its own. Product category should be selected. It is recommended that the operational conditions and activities leading to emissions could be summarized in the FS and/or BD, in addition to giving reference to BAT/BREF document.	G
PW	**spraying, volatile**	8a,c, d,f	4/a-1		The RFs are generic estimates and justified as such.	Professional wide spread use is for some parts difficult to describe with the terms in the QC. Conservatism of the RFs should be explained. There is no reference to the BD in the FS. This should be added.	G
		8a	4/a-2		The RFs are generic estimates.	Professional wide spread use is for some parts difficult to describe with the terms in the QC.	G
PW C	**outdoor, water release**	8f	5/a-1		The RFs are read-across from the application process of coatings and paints, for which explicit OECD scenarios exist The RFs of the SPERC for adhesives/sealants have been selected as worst-case values in the course of reading across	No suggestions for improvements.	G
		8c	5/a-2		The RFs are read-across from the application process of coatings and paints, for which explicit OECD scenarios exist The RFs of the SPERC for adhesives/sealants have been selected as worst-case values in the course of reading across	No suggestions for improvements.	G
	outdoor, water/soil release	8d	5/b-1		The RFs are worst-case estimates and justified as such.	It is recommended that a summary of the literature survey (Dobe et al. 2020) that serves as a BD would be provided.	G
		8e	5/b-2		The RFs are generic estimates and justified as such.	Treatment of water releases from mixing, loading and cleaning stages could be described. The application of drift values of plant protection products for release factors to water for fertilizers could be justified in more detail regarding substance properties.	G
SL	**water/soil release**	10a	7/a		The worst-case RF to represent the process and substance domain of the whole service life stage covered by the SPERC has been chosen from one application. The representativeness for other applications has not been discussed.	OC concept is not straight applicable to service life use of articles, which may cause difficulties in some definitions required for SPERCs. It is recommended that the factsheet filename should contain more information of the content and purpose of the file. Descriptions and examples of application areas with related substance domains would be useful.	A

						The OCs related to the substance and process domain might be more wide-ranging. The relevance of run-off metals from roofs to emissions and release factors from other construction service life cases could be commented. The background document is more focused on the industrial life cycle SPERCs and the discussion concerning service life SPERCs is could be more comprehensive.	
	waste	11a	7/b		The RF values are not applicable for air, water or soil compartment. The justification of the RF to waste base on rather generic assumptions and unspecified references.	It is recommended that the factsheet filename should contain more information of the content and purpose of the file. If a substance ends up in articles, the description of the service life of the substance in articles should be provided. Some specifications of the estimated tonnage could be given. The justification of the RF to waste are based on 'Eurobat', 'ILA', 'ACEA', 'EPBA', but no proper references are given.	A