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Final meeting of the Technical Working Group (TWG)

for the review of the BAT reference document

for Waste Treatment (WT BREF)

Seville, 20 – 24 March 2017 (tentative)

BACKGROUND PAPER (BP)

Purpose of this paper and of the final Technical Working Group (TWG) meeting

The objective of this background paper (BP) is to outline the main issues proposed to be discussed at the final meeting of the Technical Working Group for the review of the BAT reference document for **'Waste Treatment'** (WT BREF) under the Industrial Emissions Directive 2010/75/EU (IED).

The meeting objective is to agree on the remaining work to finalise the BREF review. In particular, it is proposed that the TWG meeting should focus on:

I. agreeing upon the text of Chapter 6 (and related items) of the WT BREF, i.e. the BAT conclusions;
II. identifying elements that should be mentioned in Chapter 8 of the WT BREF (Concluding remarks and recommendations for future work);
III. agreeing upon the remaining work needed for finalising the BREF review.

This BP includes:

- background information for the final TWG meeting;
- the issues proposed for discussion at the final TWG meeting (including a summary of relevant comments received on the first draft of the revised WT BREF and the EIPPCB assessments of those comments);
- the proposed modifications to be made to the draft BREF arising from the comments of TWG members.

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Background information

The kick-off meeting for the review of the WT BREF was held from 25 to 28 November 2013 in Seville. The data collection process was officially scheduled from June to October 2014.

The first draft of the revised WT BREF was issued on 18 December 2015 and the consultation period for TWG members ended on 18 March 2016. 3413 comments (2310 identified as major, 1100 as minor and 3 not specified) were received by the EIPPCB and were made available to the whole TWG through BATIS. Out of these 3413 comments, 1701 are addressed in this document, i.e. those considered to have a bearing on the BAT conclusions.

The distribution of the comments received on the first draft of the revised WT BREF is summarised in Table 1.

Table 1: Distribution of the total number of comments submitted on the first draft of the revised WT BREF (version of December 2015)

BREF Chapter/Section	Comments	
	Number	Percentage
Whole document	20	0.6%
Scope	27	0.8%
Chapter 1 (General information)	155	4.5%
Chapter 2 (Processes and techniques commonly used for waste treatment)	418	12.3%
Chapter 3 (Mechanical treatment of waste)	283	8.3%
Chapter 4 (Biological treatments of waste)	409	12%
Chapter 5 (Physico-chemical treatments of waste)	315	9.2%
Chapter 6 (BAT conclusions)	1721	50.4%
Chapter 7 (Emerging techniques)	46	1.4%
Chapter 8 (Concluding remarks)	8	0.2%
Chapter 9 (Annexes)	1	0%
References	1	0%
Glossary	9	0.3%
Total	3413	100%

All the comments received and the additional information have been assessed by the EIPPCB and have been used in the preparation of this BP. An updated working draft of the WT BREF will be made available to the TWG prior to the final meeting.

It is therefore recommended that TWG members print a coloured copy of this revised draft as it will help them to identify text under discussion at the final TWG meeting.

Before coming to the meeting

As a TWG member, you should read this background paper (BP) before coming to the meeting to determine your position on the identified issues. Final TWG meetings are characterised by deep technical discussions and represent the last opportunity for the TWG to discuss the contents of the BREF (and of the BAT conclusions in particular).

Whether or not your position differs from any proposal in this BP, you should come to the meeting prepared to justify your position and, **if you have a different view, to present an alternative proposal and the evidential basis for that proposal.**

IMPORTANT: Please be advised to bring at least the following documents with you to the meeting (all of these will be made available in BATIS) as the *EIPPCB will not be able to provide you with printed copies*:

- this background paper
- the revised proposal for the BAT conclusions (coloured version)
- the first draft of the revised WT BREF dated December 2015 (coloured version);
- the updated version of the sections on 'Techniques to consider in the determination of BAT' and Chapter 6 of the WT BREF (coloured version);
- the updated graphs/figures including the emission levels (and emission prevention/reduction techniques used).

Aim and structure of this background paper

The aim of this background paper is to structure and enable efficient discussions at the final TWG meeting. Some items relevant to the BAT conclusions are proposed for discussion at the final TWG meeting (i.e. items under Section 1 of this BP) while other items are proposed to be discussed only if requested in advance of the meeting (i.e. items listed in Section 2 of this BP). This is because, from an assessment of the TWG comments, some of the BAT conclusions are not considered to be controversial, and therefore do not appear to require further discussion. Please note that the order of the discussion items in this background paper will not necessarily be the order of the discussion at the meeting.

TWG members are requested to contact the EIPPCB at least ten working days before the TWG final meeting **(i.e. by Friday, 3 March 2017)** if they wish **to request any other items from Chapter 6 (i.e. BAT conclusions) for discussion at the meeting or to propose additional agenda items** for the meeting. Please note that the possibility of including additional items in the meeting agenda is extremely limited due to time restrictions.

Each item is presented in this background paper according to the following structure (see also below):

- the location in the first draft (D1) of the WT BREF (December 2015) where the issue is presented;
- the text in the first draft (D1) of the WT BREF (December 2015) that the issue relates to;
- a summary of the comments on the issue, made by TWG members;
- the EIPPCB assessment of the comments;
- the EIPPCB proposal to resolve the issues.

Location in D1	Section and page number in the first draft (D1) of the WT BREF (December 2015); BAT conclusion number, if applicable
Current text in D1	Text of the sections from the first draft (D1) of the WT BREF (December 2015) using the same colours (see , e.g. all BAT conclusions are in green)
Summary of comments	Individual comments or a summary of the main comments related to the item. This is done in the following format: (Origin of the comment Number) Example: (EEB 168) The comments are ordered according to the text passage they refer to (e.g. comments on the introductory sentence of a BAT conclusion come first, then comments on individual techniques in order of appearance and finally comments on performance levels). The numbering of the comments corresponds to the numbering in the Excel spreadsheet that compiles all comments from all TWG members
EIPPCB assessment	EIPPCB assessment related to the item to be discussed
EIPPCB proposal	EIPPCB proposal. Note that the numbers of the BAT conclusions may differ from those in the first draft (D1) of the WT BREF (December 2015)

The acronym 'D1' is used only for the purposes of this BP and will not appear in the final BREF or the BAT conclusions.

Working plan

After this final TWG meeting, the revised draft of the WT BREF will be completed by the EIPPCB including the addition of Chapter 8 (Concluding remarks and recommendations for future work). Afterwards, the TWG will be given another commenting period of about four weeks that should focus on the changes made as a result of the conclusions of the final meeting. The EIPPCB will then take these comments into account to produce the final draft (FD) that will be submitted for opinion to the Article 13 Forum. In the final step, the BAT conclusions will be submitted for formal approval to the Article 75 Committee.

Abbreviations frequently used in this background paper

Abbreviation	Meaning
AOX	Adsorbable organically bound halogens
AT	Austria
AD	Anaerobic digestion
BAT	Best Available Techniques (as defined in Article 3(10) of the IED)
BAT-AEL	Emission levels associated with the BAT (as defined in Article 3(13) of the IED)
BAT-AEPL	Environmental performance level associated with the BAT: BAT-AELs are a subset of BAT-AEPLs (see also Commission Implementing Decision 2012/119/EU laying down rules concerning guidance on the collection of data and on the drawing up of BREFs and on their quality assurance)
BATIS	BAT Information System
BE	Belgium
BP	Background paper
BREF	BAT reference document (as defined in Article 3(11) of the IED)
CEFIC	Conseil Européen de l'Industrie Chimique (European Chemical Industry Council)
CEPI	Confederation of European Paper Industries
COD	Chemical oxygen demand
CWW BREF	BAT reference document on Common Waste Water and Waste Gas Treatment/Management Systems in the Chemical Sector
CZ	Czech Republic
D1	First draft of the WT BREF from December 2015
DE	Germany
DK	Denmark
dl-PCB	Dioxin like PCB
EBA	European Biogas Association
ECN	European Compost Network
EEB	European Environmental Bureau
EERA	European Electronics Recyclers Association
EFR	European Ferrous Recovery and Recycling Federation
EFS BREF	BAT reference document on Emissions from Storage
EIPPCB	European IPPC Bureau
EMS	Environmental Management System
EN	European Standard adopted by CEN (European Committee for Standardisation, from its French name Comité Européen de Normalisation)
EoLV	End-of-life vehicle
ERFO	European Recovered Fuel Organisation
ES	Spain
ESRG	European Solvent Recycler Group
EUCOPRO	European Association for Co-processing
EURITS	European Union for Responsible Incineration and Treatment of Special Waste
FEAD	European Federation of Waste Management and Environmental Services
FI	Finland
FR	France
GEIR	Groupement Européen de l'Industrie de la Régénération (European Regeneration Industry Association)
GLS BREF	BAT reference document for the Manufacture of Glass
HCFC	Hydrochlorofluorocarbon
HFC	Hydrofluorocarbon
HOI	Hydrocarbon oil index
HWE	Hazardous Waste Europe
IE	Ireland
IED	Industrial Emissions Directive (2010/75/EU)
IS BREF	BAT reference document on Iron and Steel Production
ISO	International Organisation for Standardisation. Also international standard adopted by this organisation
IT	Italy
LCP BREF	BAT reference document on Large Combustion Plants
LVOC BREF	BAT reference document on Large Volume Organic Chemicals

MBT	Mechanical biological treatment
MWE	Municipal Waste Europe
NL	The Netherlands
NMVOC	Non-methane volatile organic compound
OFC BREF	BAT reference document on the production of Organic Fine Chemicals
PCDD	Polychlorinated dibenzo-*p*-dioxin(s)
PCDF	Polychlorinated dibenzofuran(s)
PCT	Physico-chemical treatment
PL	Poland
REACH	Regulation EC/1907/2006 on the Registration, Evaluation and Authorisation of Chemicals
SE	Sweden
SF BEF	BAT reference document on Smitheries and Foundries
SI	Slovenia
TOC	Total organic carbon
TVOC	Total volatile organic compound
TWG	Technical Working Group
UK	United Kingdom
VFC	Volatile fluorocarbon
VHC	Volatile hydrocarbon
VOC	Volatile organic compound
WBLW	Water-based liquid waste
WEEE	Waste electrical and electronic equipment (as defined in Article 3(1) of Directive 2012/19/EU)
WI BREF	BAT reference document on Waste Incineration
WT	Waste treatment
WT BREF	BAT reference document on Waste Treatment

1 ITEMS PROPOSED FOR DISCUSSION AT THE FINAL WT TWG MEETING

1.1 Scope

Location in D1	Scope – pages 1-8 Chapter 6 – pages 875-876 (Scope)
Current text in D1	These BAT conclusions concern the following activities specified in Annex I to Directive 2010/75/EU, namely: • *5.1. Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving one or more of the following activities:* *(a) biological treatment;* *(b) physico-chemical treatment;* *(c) blending or mixing prior to submission to any of the other activities listed in points 5.1 and 5.2* [of Annex I to Directive 2010/75/EU]*;* *(d) repackaging prior to submission to any of the other activities listed in points 5.1 and 5.2* [of Annex I to Directive 2010/75/EU]*;* *(e) solvent reclamation/regeneration;* *(f) recycling/reclamation of inorganic materials other than metals or metal compounds;* *(g) regeneration of acids or bases;* *(h) recovery of components used for pollution abatement;* *(i) recovery of components from catalysts;* *(j) oil re-refining or other reuses of oil;* • *5.3* *(a) Disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day involving one or more of the following activities, and excluding activities covered by Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment:* *(i) biological treatment;* *(ii) physico-chemical treatment;* *(iii) pre-treatment of waste for incineration or co-incineration;* *(iv) treatment of* […] *ashes;* *(v) treatment in shredders of metal waste, including waste electrical and electronic equipment and end-of-life vehicles and their components.* *(b) Recovery, or a mix of recovery and disposal, of non-hazardous waste with a capacity exceeding 75 tonnes per day involving one or more of the following activities, and excluding activities covered by Directive 91/271/EEC:* *(i) biological treatment;* *(ii) pre-treatment of waste for incineration or co-incineration;* *(iii) treatment of* […] *ashes;* *(iv) treatment in shredders of metal waste, including waste electrical and electronic equipment and end-of-life vehicles and their components.* *When the only waste treatment activity carried out is anaerobic digestion, the capacity threshold for this activity shall be 100 tonnes per day.* • *5.5. Temporary storage of hazardous waste not covered under point 5.4* [of Annex I to Directive 2010/75/EU] *pending any of the activities listed in points 5.1, 5.2, 5.4 and 5.6* [of Annex I to Directive 2010/75/EU] *with a total capacity exceeding 50 tonnes, excluding temporary storage, pending collection, on the site where the waste is generated.* • 6.11 *Independently operated treatment of waste water not covered by Directive 91/271/EEC and discharged by an installation* [undertaking activities covered

	under points 5.1, 5.3 and 5.5 above]. These BAT conclusions do not address the following: • surface impoundment of waste; • disposal or recycling of animal carcases or animal waste; • direct recovery (i.e. without pretreatment) of waste as a substitute for raw materials in installations performing activities covered in other BAT conclusions, i.e. direct recovery of lead batteries, zinc or aluminium salts or recovery of the metals from catalysts covered in the BAT conclusions for the non-ferrous metals industries; paper waste recycling covered in the BAT conclusions for the production of pulp, paper and board; use of waste as raw material in cement kiln covered in the BAT conclusions for the production of cement, lime and magnesium oxide; • waste incineration, co-incineration, pyrolysis and gasification; • landfill of waste; • in situ remediation of contaminated soil (i.e. unexcavated); • treatment of slags and bottom ash.

Summary of comments	<u>Clarification on activities covered by the Scope</u>
	(UK 4, 217, FEAD 171, NL 1, 2, CEFIC 1, CEFIC 49, EFR 99, EFR 100, EURITS 14, HWE 2)
	• Clarify that temporary storage is part of waste treatment activity.
	• Clarify that the WT BAT conclusions apply to both stand-alone waste management facilities and to the management of waste on installations that carry out other IED activities.
	• Clarify that only plants whose main activity is waste treatment are covered by the BAT conclusions. In the chemical industry, some production plants are approved and permitted accordingly to use waste as secondary raw material. The activity of those plants is nevertheless still covered by other BREFs, e.g. LVOC.
	• Clarify the scope on thermal processes (e.g. thermal drying) in order to avoid overlaps or gaps between the WT and WI BREFs.
	• Clarify whether digestion of manure is included or not.
	• Clarify that only non-hazardous waste (depolluted waste electrical and electronic equipment and end-of-life vehicles and their components) are treated in shredders of metal waste.
	• Clarify to which activity each BAT corresponds (with cross-references).
	
	<u>Clarification on exclusions from the Scope</u>
	(EUROMETAUX 1, 3, 5, DK 133, FR 301, 148, ES_A 57, 60, SE 196, 197, EUROFER 3, 7, AT 1, 3, 4, IT 34)
	• Clarify the exclusions from the scope of e.g.:
	  ○ smelting of scrap metals and its directly associated activities;
	  ○ backfilling;
	  ○ installations/plants covered by the CWW BREF or by other BREFs covering Activity 6.11 of Annex I to the IED;
	  ○ activities covered by the LCP, GLS, IS, WI and SF BREFs.
	• Report in the BREF and in the BAT conclusions the text that was agreed at the kick-off meeting.
	• (FR 9) *In situ* remediation of contaminated soil may also encompass on-site treatment of excavated soil.
	• (AT 3) Add: "*in situ* remediation of abandoned (contaminated) sites".
	
	<u>To include in the Scope</u>
	(CEFIC 60, EEB 271)
	• Treatment of hydrocarbons generated by maritime pollution (MARPOL).
	• In situ remediation of contaminated soil.
	• (EEB 143) Biogas combustion should not be excluded because the Medium-sized Combustion Plants (MCP) Directive is not appropriate to regulate such activity: for instance, installations < 15MWth are not specifically covered, and some pollutants associated with the combustion of biogas are not covered. With regard to BAT performance, a better reference would be the LCP BREF.

	<u>To exclude from the Scope</u> (HWE 1, FR 298, 147, SE 115, 185, 197, 200, 202, 203 CEFIC 2, DE 238, CEPI 2, 4, ECN 1, EBA 54, FEAD 275) • Underground permanent/long-term storage and underground recovery of waste. • Activity 6.11 of Annex I to the IED. • Treatment of fly and bottom ashes. • Treatment of manure. • Treatment of waste defined as biomass as per IED Article 3.31(b) (i) to (v). • Materials (liquids or solids) that are ready for further internal use without leaving the installation. • Activities directly associated with landfilling of waste, e.g. management of leachate and biogas. • (SE 174, SE 186) Exclude waste water mixed with leachate from landfill from the BAT conclusions and BAT-AELs. <u>Reference and interface with other BREFs</u> (SE 202, EUROMETAUX 6, 7, 8, EUCOPRO 1, FR 11, EURELECTRIC 2, 4) • Clarify the interface with other BREFs, e.g. in relation to pretreatment of waste. • Complete and clarify the reference to other BREFs, e.g. to the NFM, LCP and WI BREFs. • Delete the reference to the EFS BREF, or add a comment indicating the need to adapt storage requirements to the specifics of the waste considered, as the EFS BREF concerns only products and substances. • Delete the reference to the CWW BREF or specify that the BAT conclusions for CWW do not apply to waste treatment installations.
EIPPCB assessment	<u>Clarification on activities covered by the Scope</u> • Temporary storage of waste is explicitly included in the Scope for hazardous wastes. • The BAT conclusions apply to the plants performing the activities listed in the Scope, regardless of any other activity that may also be performed. Further elaboration does not seem to be necessary. • Waste incineration, co-incineration, pyrolysis and gasification are explicitly excluded from the scope. • According to the IED, waste incineration is "the thermal treatment of waste, with or without recovery of the combustion heat generated, through the incineration by oxidation of waste as well as other thermal treatment processes, such as pyrolysis, gasification or plasma process, if the substances resulting from the treatment are subsequently incinerated". Waste incineration is excluded from the Scope. If a waste thermal treatment does not correspond to waste incineration, it may be included in the Scope but no further clarification seems to be needed. • The BREF does not aim at providing legal interpretation of the type of waste that can or cannot be treated in shredders. • The text proposed through the working document dated July 2014 (available in BATIS) has been largely incorporated in D1. Note that the blue text in the working document was not meant to be included in D1. • The section headings of the BAT conclusions clearly indicate which type of activities are covered in a given section. • A table linking the BAT conclusions to the waste treatment processes concerned may be useful but does not correspond to the BAT conclusions template. <u>Clarification on exclusions from the Scope</u> • The exclusion regarding the smelting of scrap could indeed be clarified by adding a cross reference to the relevant BREFs. • Backfilling is not an IED activity and is therefore not covered *per se*. Further elaboration does not seem to be necessary. • As mentioned in the Scope, installations carrying out activities specified in Activity 6.11 of Annex I to the IED are covered as long as they also undertake activities covered under points 5.1, 5.3 and 5.5. No further elaboration seems to be needed.

	• As concluded in the kick-off meeting, the WT BREF will avoid duplications or overlaps with other existing BREFs. However, as far as the Scope is concerned, all non-listed IED activities are excluded from the scope and further references to other BREFs does not seem necessary. • Concerning *in situ* remediation of contaminated soil, the KoM report explicitly refers to unexcavated soil. The *in situ* treatment of excavated soil was not explicitly addressed at the KoM and treatment techniques may be similar to the *ex situ* treatment of excavated soil. Whether or not *in situ* treatment of excavated soil is considered a waste treatment activity and whether or not the site is abandoned are, in fact, implementation issues. <u>To include in the Scope</u> • Treatment of hydrocarbons generated by maritime pollution (MARPOL) is covered by Activity 5.1 of Annex I to the IED and it is not clear why it should be specifically mentioned. • *In situ* remediation of contaminated soil was explicitly excluded from the Scope at the kick-off meeting. No information has been collected on this activity for the WT BREF review. • The MCP Directive covers combustion plants with a total rated thermal input equal to or greater than 1 MW and less than 50 MW, including plants combusting biogas as gaseous fuels, and lays down rules to control emissions of SO_2, NO_X and dust into the air. However, it should be reflected in the scope that the reason for the exclusion is because the flue-gas of the combustion process is not in direct contact with the waste. • Treatment of biogas (e.g. desulphurisation and drying) may be considered part of the anaerobic waste treatment process and as such is described in the "applied processes and techniques" section of the BREF (Section 4.3.1). As is also the case for the other waste treatment processes, the BAT conclusions do not seek to define how to best treat waste but how to prevent the emissions/consumption of waste treatments. However, the proposed new BAT 2c1 about the implementation of an output quality management system (see further below) should ensure that the output (i.e. biogas) fulfils the expectations (e.g. specifications). <u>To exclude from the Scope</u> • Underground permanent/long-term storage is covered by the Landfill Directive 1999/31/EC and landfill of both hazardous and non-hazardous waste is excluded from the Scope as per KoM conclusion 1.2. It is therefore excluded from the Scope. However, an explicit reference to it could bring clarity. As for underground recovery (i.e. backfilling), it is not an IED activity. • Regarding Activity 6.11 of Annex I to the IED, and as mentioned above, installations carrying out such activities are covered as long as they also undertake activities covered under Activities 5.1, 5.3 and/or 5.5 of Annex I to the IED. • The treatment of slag and bottom ashes was excluded from the Scope of the BREF and the BAT conclusions at the kick-off meeting (KoM), but not the treatment of fly ash (see conclusion 1.5 of the KoM). The WT TWG cannot take decisions on matters that affect other BREFs (in this case the WI BREF). • Biological treatment of manure is not excluded from the Scope and is mentioned as possible waste treatment in Chapter 4 of the BREF. It is not clear why it should be excluded. • It is not clear either why treatment of biomass should be excluded from the Scope. • Direct recovery (i.e. without pretreatment) is explicitly excluded from the Scope, in line with the conclusions of the kick-off meeting. • Landfilling was explicitly excluded from the WT BREF Scope at the kick-off meeting. Following the webinars, and after further investigations, plants treating leachates have been included in the data assessment of physico-chemical and/or biological treatment of water-based liquid waste. Whether or not plants treating leachate from landfills are included in the scope of the BREF is instead an implementation issue: a plant could be located on a landfill site and treat only leachates from this landfill, a plant could be located on a landfill site and treat leachate from this landfill but also waste water from WT plants located on the same site (e.g. Plant 487) or a plant may be located outside a landfill site but still treat leachate from landfills (brought by tanks, for example).

	<u>Reference and interface with other BREFs</u> • Additional indications on interfaces with other BREFs and other BAT conclusions may help the understanding of the WT BREF and BAT conclusions. • The wording "other reference documents which could be relevant for the activities covered by this BREF" is a standard text used in all recently adopted BREFs, meaning that useful information can be found therein. For instance, the CWW BREF is mentioned, just as it is mentioned in the LCP BAT conclusions, because it contains information on emissions to water. The EFS BREF is also mentioned together with the CLM, ECM, ENE and ROM (B)REFs because they contain information which may be relevant for all sectorial BREFs.
EIPPCB proposal	• To exclude the smelting of scrap metals from the Scope. • To exclude the landfilling of waste and the underground permanent/long-term storage of waste from the Scope. • To add information on interfaces between the WT BREF and other BREFs • To make minor editorial changes (mainly by replacing "i.e." with "e.g." in two places). • To explain which type of combustion is excluded from the Scope.

1.2 General considerations

<table>
<tr><td>Location in D1</td><td>Chapter 6 – pages 880-881 (in PDF version)</td></tr>
<tr><td>Current text in D1</td><td>

Best Available Techniques

The techniques listed and described in these BAT conclusions are neither prescriptive nor exhaustive. Other techniques may be used that ensure at least an equivalent level of environmental protection.

Unless otherwise stated, the BAT conclusions are generally applicable.

Emission levels associated with the best available techniques (BAT-AELs) for emissions to air

Unless stated otherwise, emission levels associated with the best available techniques (BAT-AELs) for emissions to air given in these BAT conclusions refer to concentrations (mass of emitted substance per volume of waste gas) under the following standard conditions: dry gas at a temperature of 273.15 K and a pressure of 101.3 kPa, without correction for O_2, and expressed in µg/Nm^3 or mg/Nm^3.

For averaging periods of BAT-AELs for emissions to air, the following **definition** applies:

<table>
<tr><th>Averaging period</th><th>Definition</th></tr>
<tr><td>Average of values obtained during one year</td><td>Average of all valid measurement values obtained during one year</td></tr>
</table>

Emission levels associated with the best available techniques (BAT-AELs) for emissions to water

Unless stated otherwise, emission levels associated with the best available techniques (BAT-AELs) for emissions to water given in these BAT conclusions refer to concentrations (mass of emitted substances per volume of water), expressed in mg/l.

Unless stated otherwise, the BAT-AELs refer to the flow-weighted monthly average values of all the following samples taken during that period under normal operating conditions.

1. for a continuous discharge or batch discharge with a duration of 24 hours or more: 24-hour flow-proportional composite samples,
2. for a batch discharge with a duration of less than 24 hours: flow-proportional composite samples taken over the discharge period,

Time-proportional composite sampling can be used provided that sufficient flow stability is demonstrated.

The flow-weighted monthly average concentration (c_w) is calculated using the following equation:

$$c_w = \sum_{i=1}^{n} c_i q_i \Big/ \sum_{i=1}^{n} q_i$$

Where

n = number of measurements;
c_i = average concentration during ith measurement;
q_i = average flow rate during ith measurement.

</td></tr>
<tr><td>Summary of comments</td><td>

<u>Best available techniques</u>

- (EUCOPRO 5) The term “generally applicable” is too “general” and could lead to several interpretations. It is proposed to modify the text as follows: "the BAT

</td></tr>
</table>

	conclusions are generally applicable unless otherwise stated. This could include configuration of the plant (existing or new plants,...), the characteristics of the waste, the type of treatment." • (NL 3) For some activities, or small companies (e.g. occasionally rented wood shredder, or storage of small amounts of hazardous waste such as WEEE, asbestos, C-wood, tar-containing roofing material), exemptions should be made possible because costs and efforts are exorbitant in regards to the benefits. <u>BAT-AELs</u> • (MWE 124) There is a risk that BAT-AELs are mixed up with emission limit values. So it is important that terms are defined in the chapter of General considerations. • (EEB 257) Similar to other BREFs, a standard sentence should be retained in case of different averaging periods used / BAT-AE(P)Ls set: "Where emission levels associated with the best available techniques (BAT-AEL) are given for different averaging periods and environmental performance levels associated with the best available techniques (BAT-AEPL) are set, all of those BAT-AE(P)Ls apply" <u>Emission levels associated with the best available techniques (BAT-AELs) for emissions to air</u> • (EEB 336) Express BAT-AELs for substances that are Persistent Bioaccumulative Toxic (PBT) also in absolute loads, e.g. for Hg and PCDD/F, in order to reflect the true environmental impact of a given process in the short and long term. • (BE 15) Replace with: "Unless stated otherwise, emission levels associated with the best available techniques (BAT-AELs) for emissions to air given in these BAT conclusions refer to concentrations (mass of emitted substance per volume of waste gas) under the following standard conditions: dry gas at a temperature of 273.15 K and a pressure of 101.3 kPa, without correction for O_2, and expressed in mg/Nm^3." • (AT 19) Change the averaging periods for emissions to air as follows: "Average value of three consecutive measurements of at least 30 minutes each, unless otherwise stated" because 1/ after one year the authorities do not have any possibility to react if the yearly BAT-AELs are exceeded, and 2/ in practice and according to the annexes to the IED, in nearly all European MS the current ELVs for WT plants are also defined in mg/Nm^3 dry as half-hourly, hourly or daily averages and not as yearly averages. • (EEB 337) Instead of average, each value should be within a BAT-AEL range. Moreover, it should be stated how many measurements have to be done (minimum) as a basis for the average. • (BE 49) Introduce short-term BAT-AELs. • (ECN 259) Develop a more transparent and understandable procedure for proposals on BAT-AELs. <u>Emission levels associated with the best available techniques (BAT-AELs) for emissions to water</u> • (AT 20, AT 29) Change to short-term averages based on daily average period. The present water emission data for WT plants are available only as short-term averages namely as spot samples or as daily averages in mg/l. The use of monthly averages as BAT-AELs is not practical because 1/ after one month the authorities do not have any possibility to react if the monthly BAT-AELs are exceeded, and 2/ in practice and according to annexes to the IED, in nearly all European MS the current ELVs for WTP plants are also defined in mg/l as daily averages and not as monthly averages. Introduce the "4 out of 5" methodology for verification if emission values are within the BAT-AEL range. • (BE 50) Include short-term BAT-AELs (instantaneous or daily averages). • (FR 203, EURITS 16, HWE 3) The point where the emission levels are measured should be clearly defined, as follows: "The point where the levels of emission are monitored and measured is called the point of discharge. The point of discharge is located where the emission leaves the installation at which the BAT-AELs apply." • (DK 82) For the sake of clarity, there should be one bullet point for continuous discharge and one for batch discharge. • (DK 72) For the sake of clarity, define how the monthly average is calculated (based on ROM). • (EUCOPRO 7, 15) As for batch discharge, in order to check the conformity of the

	parameters with the permit values, the sampling should be taken before and not over the discharge period. Moreover, the duration of the discharge does not matter. The text should read: "for a batch discharge: flow-proportional composite samples taken before the discharge period". • (FR 352) It is proposed for batch discharge to have the following text: "For a batch discharge: grab samples taken before the discharge period". • (EEB 65) The number and volume of subsamples should be defined as follows: volumes of 100 ml for a composite sample container of 20 litres.

EIPPCB assessment	<u>Best available techniques</u>
	• The applicability restrictions are given in the relevant BAT conclusions. This text is to explain that, where no mention is made to applicability in a BAT, it means that the BAT is generally applicable.
	• The BAT apply to the IED activities mentioned in the Scope with, in some cases, an associated capacity threshold.
	
	<u>BAT-AELs</u>
	• BAT-AELs and relations with ELVs are described in the IED.
	• It is not proposed to have BAT-AELs associated with different averaging periods, therefore the proposed text is not needed.
	
	<u>Emission levels associated with the best available techniques (BAT-AELs) for emissions to air</u>
	• If BAT-AELs are expressed in units other than concentration (for instance load or specific load), it is mentioned in the related table.
	• It is not clear why the reference to $\mu g/Nm^3$ should be deleted.
	• As for the averaging period, the situation of the data collection is the following:
	  o For aerobic and anaerobic treatment of waste, only periodic monitoring is reported, without the averaging period mentioned (expect for Plant 537 for odour).
	  o For MBT, mainly periodic monitoring is reported, without the averaging period mentioned. Continuous monitoring is reported for dust and organic compounds in 9 and 8 cases respectively. In those cases, the averaging period is yearly or long-term/short-term without further specification.
	  o For mechanical treatment in shredders of metal waste, only periodic monitoring is reported, without the averaging period mentioned
	  o For mechanical treatment of waste with calorific value, only one plant reports continuous monitoring for dust, VOCs and mercury, with a yearly average. For the other plants, only periodic monitoring is reported, without the averaging period mentioned.
	  o For mechanical treatment in shredders of equipment containing VFCs or VHCs, continuous monitoring is reported for dust (one emission point), VOCs (two emission points) and CFC (three emission points).
	  o For mechanical treatment of mercury-containing WEEE, continuous reporting is reported for dust in one case and for mercury in two cases. In those three cases, the averaging period is an unspecified short term.
	  o For PCT of solid and pasty waste, all plants report periodic monitoring, without the averaging period mentioned, except one (for dust and VOCs, with a yearly average).
	  o For re-refining of waste oil, either periodic monitoring is reported or continuous monitoring for dust (in two cases) and VOCs (in one case). In those cases, the averaging period is either not mentioned or is monthly.
	  o For regeneration of spent solvent, periodic monitoring is reported or continuous monitoring for VOCs (in three cases), with yearly averaging or no averaging period reported.
	  o For PCT of waste with calorific value, the monitoring is periodic with no averaging period mentioned or continuous for dust and VOCs with short-term or daily averaging.
	  o For PCT and/or biological treatment of WBLW, all plants report periodic monitoring without the averaging period mentioned except two plants which report continuous monitoring for TVOC and one for HCl (with yearly averaging or no averaging period specified).

	o For PCT of contaminated soil, one plant reports continuous measurement of dust and TVOC with both a half-hourly and a daily averaging. This shows that the monitoring is mostly carried out periodically without a specific averaging period. In the case of continuous monitoring, the averaging period is rarely mentioned and is yearly, monthly or daily (and in one case half-hourly). According to the ROM REF, in the case of periodic measurement, when measuring a stable emission, best practice is to take a minimum of three samples consecutively in one measurement series and the most common sampling duration is 30 minutes, but may be longer for some parameters. <u>Emission levels associated with the best available techniques (BAT-AELs) for emissions to water</u> • Regarding the point where the emission levels are measured, see the assessment related to BAT 3 (Section 1.5.2). • As for monitoring, the situation of the data collection is the following: o For aerobic and anaerobic treatment, mainly grab sampling is reported, with a frequency ranging from one measurement every three years to one measurement per month. o For MBT, only grab sampling is reported, with a frequency ranging from one measurement every three years to one measurement per month. o For mechanical treatment in shredders of metal waste, mainly grab sampling is reported, with a frequency ranging from one measurement every three years to one measurement per month. o For mechanical treatment of waste with calorific value, mainly grab sampling is reported, with a frequency ranging from one measurement every three years to one measurement per month. o For mechanical treatment in shredders of equipment containing VFCs or VHCs, only grab sampling is reported, with a frequency ranging from one measurement every three years to four measurements per year. o For mechanical treatment of mercury-containing WEEE, no emissions to water were reported. o For PCT of solid and pasty waste, the 4 plants (out of 41) having emissions to water reported performing 24-hour flow proportional composite sampling (2 plants), composite sampling (1 plant) and grab sampling (1 plant), with a frequency ranging from one measurement per year to one measurement per month. o For re-refining of waste oil, mainly grab sampling is reported, with a frequency ranging from two measurements per year to one measurement per month. o For regeneration of spent solvent, the 6 plants (out of 12) having emissions to water reported performing 24-hour flow proportional composite sampling (1 plant), composite sampling (2 plants) and grab sampling (3 plants), with a frequency ranging from one measurement every three years to three measurements per year. o For PCT of waste with calorific value, the 10 plants (out of 16) having emissions to water reported performing 24-hour flow proportional composite sampling (1 plant), composite sampling (4 plants) and grab sampling (4 plants), with a frequency ranging from one measurement every three years to one measurement per month. One plant reported continuous monitoring for TOC. o For PCT of contaminated soil, the 3 plants (out of 10) having emissions to water reported performing 24-hour flow proportional composite sampling (1 plant), composite sampling (1 plant) and grab sampling (1 plant), with a frequency ranging from two measurements per year to one measurement per month. o For PCT and/or biological treatment of WBLW, mainly 24-hour flow proportional composite sampling followed closely by composite sampling are reported, and, to a lesser extent, grab sampling. Short-term averaging (from daily to weekly) and long-term averaging (from monthly to yearly) are almost equally divided, and the reported monitoring frequencies range from once a year to at least 12 measurements per year, depending also on the parameter and on the discharge mode (continuous or batch).

	This shows that, except for PCT and/or biological treatment of WBLW, grab sampling is the main monitoring regime reported. For PCT and/or biological treatment of WBLW, two monitoring regimes are largely predominant: 24-hour flow proportional composite sampling and composite sampling. It should also be noted that, for this latter process, batch discharge to water was reported 16 times and continuous discharge 19 times. According to the ROM REF, spot samples can be used in the case of batch discharge, but only when the effluent is well mixed. It seems therefore relevant to favour 24-hour flow-proportional composite sampling. When the sampling method is 24-hour flow-proportional composite sampling, the number of samples depends on the flow. Information on the sample volume and types of containers may be found in the relevant EN standards for the monitoring of waste water parameters. The BAT-AELs apply where the emissions leave the installation and it should be indeed reflected in the BAT conclusions.
EIPPCB proposal	<u>Emission levels associated with the best available techniques (BAT-AELs) for emissions to air</u> • To change the averaging period for emissions to air to an average over a sampling period. <u>Emission levels associated with the best available techniques (BAT-AELs) for emissions to water</u> • To modify the averaging period for emissions to water from monthly to daily. • To add the possibility of grab sampling in the case of batch discharge. • To specify that BAT-AELs apply at the point where the emission leaves the installation. • To add the method for calculating the abatement efficiency.

1.3 Environmental management system (EMS)

Location in D1	Section 6.1.1.1 – page 882 – BAT 1
Current text in D1	**BAT 1. In order to improve the overall environmental performance, BAT is to implement and adhere to an environmental management system (EMS) that incorporates all of the following features:** I. commitment of the management, including senior management; II. definition of an environmental policy that includes the continuous improvement of the installation by the management; III. planning and establishing the necessary procedures, objectives and targets, in conjunction with financial planning and investment; IV. implementation of procedures paying particular attention to: (a) structure and responsibility, (b) recruitment, training, awareness and competence, (c) communication, (d) employee involvement, (e) documentation, (f) effective process control, (g) maintenance programmes, (h) emergency preparedness and response, (i) safeguarding compliance with environmental legislation; V. checking performance and taking corrective action, paying particular attention to: (a) monitoring and measurement (see also the Reference Report on Monitoring), (b) corrective and preventive action, (c) maintenance of records, (d) independent (where practicable) internal or external auditing in order to determine whether or not the EMS conforms to planned arrangements and has been properly implemented and maintained; VI. review of the EMS and its continuing suitability, adequacy and effectiveness by senior management; VII. following the development of cleaner technologies; VIII. consideration for the environmental impacts from the eventual decommissioning of the plant at the stage of designing a new plant, and throughout its operating life; IX. application of sectoral benchmarking on a regular basis. X. waste treatment strategy that includes inventories of waste input streams (see BAT 2 and BAT 14); XI. procedures to ensure the compatibility of wastes before mixing/blending (see BAT 2); XII. odour management plan (see BAT 8); XIII. noise and vibration management plan (see BAT 18); XIV. residues management plan (see description in 6.6.4); XV. accident management plan (see description in Section 6.6.4). **Applicability** The scope (e.g. level of detail) and nature of the EMS (e.g. standardised or non-standardised) will generally be related to the nature, scale and complexity of the installation, and the range of environmental impacts it may have (determined also by the type and amount of wastes processed).
Summary of comments	All of Section 6.1 • (EEB 157, EEB 158) Keep existing BATs 2 and 15. • (CEFIC 3) The section headings should make clear that the BAT Conclusions only cover specific plants treating waste as a main activity and not plants which are using waste as a raw material.

	• (CEFIC 4) Delete BAT 7, 16, 21 as they do not improve the environmental performance. <u>BAT 1</u> • (EUROMETAUX 12, FEAD 109, CEFIC 5, ECN 102, SE 62) The EMS may not contain all the features listed but only some of them. • (CEFIC 6) Add in the statement that an equivalent management system could be implemented (e.g. EMAS or ISO). • (SE 62) Explain the difference between EMS and ISO 14001. • (FEAD 101) Indicate that the BAT is deemed fulfilled when ISO 14001 is applied. • (EFR 101) Add examples of EMS (ISO 14001, EMAS or national standards). • (IE 56) Add a "waste storage plan" to incorporate fire prevention measures. • (BE 18) Add a management plan for non-ducted dust emissions and a measurement and management programme for fugitive VOC emissions. • (UK 223) Add a Dust and Particulate Management Plan. • (ESRG 4) Delete paragraphs VII – XV as they are unnecessary duplications of other standards. • (FEAD 201) Ensure consistency between BAT 1 and the text in Section 2.3.1.1. of the BREF. <u>Point IV</u> • (UK 226) The utilisation of qualified personnel is an integral part of waste stream management and should be referred to explicitly. • (EFR 21) The adjective "effective" is unnecessary in item f. <u>Point V</u> • (EEB 156) Add the following point: (e) periodic examination and validation of the EMS and the audit procedure by an accredited certification body or an external EMS verifier. <u>Point VII</u> • (DE 196, FEAD 235, EFR 133) It is not clear what is meant by point VII or it may be covered by the continuous improvement requirement of ISO 14001, and it should be deleted. <u>Point XII</u> • (EFR 33, EFR 34) Point XII is not applicable to metal waste. Add the applicability of BAT 8, i.e. that the applicability is restricted to cases where an odour nuisance can be expected and/or has been substantiated. <u>Point XIII:</u> • (DE 197) A noise and vibration management plan is excessive, especially considering that health and safety rules at the plants also have to be followed. A measurement and actions to protect the workers should be more relevant and sufficient. <u>Point XV</u> • (DE 48) According to Section 3.1.3.1.2.3 of the BREF, there should also be a "deflagration management plan".

EIPPCB assessment	<u>All of Section 6.1</u>
	• Existing BAT 2 is about the provision of the full details of the activities carried out on site. The documentation is already covered by BAT 1 and the detail of what should be provided to the Authority is an implementation issue.
	• Existing BAT 15 is about improving waste treatment efficiency. According to the conclusions of the kick-off meeting:
	  o *End-of-waste criteria, product specifications and by-products criteria will not be defined in the WT BREF; defining such criteria is outside the WT BREF/BATC scope.*
	  o *Acceptance criteria in the downstream utilisation of "output" from waste treatment installations will not be defined in the*

	WT BREF/BATC scope. o *In order to evaluate their correlation with the environmental performance of the waste treatment installations, the following information will be requested via the questionnaire:* ▪ *information on the quality of the "output"* ▪ *information on the quality of the input used, and* ▪ *information on the implementation of an "output" quality management system (which system is implemented, if any).* In compliance with these conclusions, the waste treatment efficiency (for instance in terms of residual contaminants in the output) is not covered by these BAT conclusions unless there is a correlation with the environmental performance of the waste treatment installations. • All BAT apply to the activities listed in the Scope. • It is not clear why BAT 7, 16 and 21 do not have added value for the environment. <u>BAT 1</u> • The text of BAT 1 is based on a standard text which has been used for other BAT conclusions and any modification should be considered carefully, so as not to lose consistency with other BAT conclusions. Points X to XV of D1 are however specific to the Waste Treatment BAT conclusions. • All points of the EMS are to be implemented, obviously taking into consideration the applicability, which provides for a fair amount of flexibility. However, to ensure consistency with other BATC, it should be explicit that some of these points specific to WT (i.e. compatibility of wastes before mixing/blending, odour and noise) may be applied only in some cases (which are detailed in the relevant BAT conclusions). • An EMS can take the form of a standardised (ISO, EMAS) or non-standardised ("customised") system. The type of EMS is an implementation issue and it does not seem necessary to add additional references to specific systems. • Points X to XV are listed here in order to highlight that these features which are mentioned later on as BAT are parts of an integrated management system. It does not mean that other points cannot be added to the list such as a waste storage plan or dust and diffuse VOC emissions plans. However, as these points are covered by BAT 10, 22 and 23 but are not referred to explicitly as a "management plan", it does not seem necessary to extend the list of the EMS points, which is already quite long. • Consistency should indeed be ensured between the BATC and the BREF. • In addition to the comments, it is to be noted that: a) the wording of point X (waste treatment strategy) should be in line with BAT 2, b) waste inventory and compatibility of wastes before mixing/blending are part of the waste stream management and there is no reason for a specific focus on these items, and c) a new BAT for the establishment and maintenance of an inventory of waste water and waste gas streams should be added in response to comments made for instance on BAT 3 (see Section 1.5.2) and on BAT 13 (see Section 0). <u>Point IV</u> • The use of qualified personnel is part and the objective of the point on recruitment, training, awareness and competence and does not need to be mentioned explicitly. • The term "effective process control" is the standard wording which is also used in other BATC and it does not seem necessary to change it. <u>Point V</u> • The text refers to external auditing: how these external audits are carried out can be considered an implementation issue. <u>Point VII</u> • Point VII is part of the standard text and refers to the follow-up by the plant of technique developments in other plants/sectors, which may be applied in the plant to improve its environmental performance. <u>Points XII and XIII</u> • As mentioned above, it is proposed to change the wording of the BAT to explicitly state that the odour management plan and the noise and vibration management plan

	may not be applicable in all cases. • As for health and safety, it is of course very relevant but this issue is not covered by the BATC, as mentioned in the Scope. <u>Point XV</u> The deflagration management plan is not mentioned as such in the BATC and deflagrations may be addressed in the accident management plan, so it is not necessary to introduce this new management plan.
EIPPCB proposal	• To reword point X (waste treatment strategy). • To delete point XI (blending and mixing). • To add a new BAT (BAT 2bis) for the establishment and maintenance of an inventory of waste water and waste gas streams.

1.4 Waste stream management

<table>
<tr><td>Location in D1</td><td>Section 6.1.1.2 – pages 883-884 – BAT 2</td></tr>
<tr><td>Current text in D1</td><td>

BAT 2. In order to improve the overall environmental performance, BAT is to use all of the techniques given below

<table>
<tr><th colspan="2">Technique</th><th>Description</th></tr>
<tr><td>a</td><td>To implement waste characterisation and pre-acceptance procedures</td><td>These procedures aim to ensure the technical (and legal) suitability of waste treatment operation for a particular waste prior to the arrival of the waste at the plant. It includes procedures to collect information about the waste to be treated and may include waste sampling and characterisation to achieve sufficient knowledge of the waste composition.</td></tr>
<tr><td>b</td><td>To implement waste acceptance procedures</td><td>Acceptance procedures aim to confirm the characteristics of the waste, as identified in the pre-acceptance stage. The procedures define the elements to be verified upon waste arrival at the plant as well as the waste rejection criteria. They may include waste sampling, inspection and analysis.</td></tr>
<tr><td>c</td><td>To implement a waste tracking system and inventory</td><td>A waste tracking system aims to keep control on the location and quantity of waste in the plant. It holds all the information generated (e.g. date of arrival on site, unique reference number, producer details, pre-acceptance and acceptance analysis results, intended treatment route, nature and quantity of waste held on site including all identified hazards) during waste pre-acceptance, acceptance, storage, treatment and/or transfer off-site.</td></tr>
<tr><td>d</td><td>To ensure waste segregation</td><td>Waste is separated prior to treatment depending on its properties in order to enable easier and environmentally safer treatment. Waste segregation relies on the physical separation of waste and on procedures that define when the mixing of waste is allowed and how it is carried out.</td></tr>
<tr><td>e</td><td>To assess waste compatibility</td><td>Compatibility assessment consists of a set of verification measures and tests in order to detect any unwanted and potentially dangerous chemical reactions between wastes (polymerisation, gas evolution, exothermal reaction, decomposition, crystallisation, precipitation, etc.) when mixing, blending or carrying out other treatment operations.</td></tr>
<tr><td>f</td><td>To sort incoming waste</td><td>Waste sorting[(1)] aims to prevent unwanted material to enter the waste treatment process. may include:
• Manual separation by means of visual examinations to sort out the recyclables and contaminants;
• Ferrous metals, non-ferrous metals or all-metals separators;
• Optical separation by e.g. Near Infrared spectroscopy or X-ray systems;
• Density separation by e.g. air classification, sink-float tanks, vibration tables;
• Size separation by screening/sieving.</td></tr>
<tr><td colspan="3">[(1)]Sorting techniques are described in Section 6.6.3</td></tr>
</table>

</td></tr>
<tr><td>Summary of comments</td><td><u>Entire BAT 2</u>
• (BE 19) The description should be completed with the valuable information given in</td></tr>
</table>

	Section 2.3.2.1 to 2.3.2.3 of D1; an alternative could be to explicitly refer to these sections. • (UK 225) In the current BREF (2006), BAT for pre-acceptance, acceptance, storage, treatment etc. were explicitly individually listed as BAT points, while it is more generic in D1, which could diminish the requirements of each point. The link between the techniques listed in BAT 2 and the technical descriptions in Chapter 2 of the BREF should be very clear. • (AT 27, FEAD 135, CEFIC 7) Flexibility should be given by clarifying that BAT is to use an appropriate combination of the techniques (and not all the techniques). • (UK 227) It should be clarified that the BAT applies also to transfer (storage) of waste. • (CEFIC 48) Clarify whether this BAT applies also to non-hazardous waste. • (NL 4) This BAT addresses potential chemical reactions suspected to arise when mixing and processing wastes. The listed techniques, and especially technique c and technique e, do not concern biological treatment of source-separated biowaste. <u>Technique a</u> • (EEB 106, DE 411) Add that a chemical characterisation is, in principle, mandatory for hazardous waste. • (EEB 125) The wording is too vague and should be complemented with the information provided by several technical descriptions in D1, e.g. in Sections 2.3.2, 4.5.1, 4.5.2, 5.2.3, and by conclusions 6 to 10 of the current WT BREF (2006). • (EEB 260, FR 337, EURITS 19, HWE 5) Specific requirements should be added when dealing with hazardous wastes (technique description is provided). • (BE 21) The reasons why waste sampling, characterisation, inspection and analysis are needed should be specified, as indicated e.g. in Section 2.3.2.1 of D1. • (BE 23, 24) Specific requirements should be added regarding internal and external evaluation of the procedures, and on their availability to the local authority. • (UK 228, FEAD 203) It should be clarified that the technique applies both to treatment and storage. • (EFR 196) This technique is not applicable to the shredding of non-hazardous metal waste. <u>Technique b</u> • (EEB 126) Same comment as for technique a (see comment EEB 125). • (EEB 261, FR 338, EURITS 20, HWE 6) Specific requirements should be added when dealing with hazardous wastes (technique description is provided). • (BE 22) The reasons why waste sampling, characterisation, inspection and analysis are needed should be specified, as indicated e.g. in Section 2.3.2.1 of D1. • (BE 24) Specific requirements should be added regarding internal and external evaluation of the procedures that should be made available to the local authority. • (ERFO 3, DE 3, ES_A 36, FEAD 111) It should be added that acceptance procedures may include separation of unwanted material before entering the waste treatment process. Indeed, those separation techniques differ from those given in technique f. • (UK 229) Waste acceptance criteria should be added in the description of the technique (together with the rejection criteria). • (EFR 197, 198) Delete "as identified in the pre-acceptance stage" because this is not always true; for instance, radiation contamination is determined at the gate monitors of shredder plants. This technique is generally applicable. • (ECN 253) Waste sampling and analysis is not applicable to biological treatment of source-separated biowaste. <u>Technique c</u> • (EEB 105, DE 410) Details about the recipients of waste should be added in the list of information to be held in the waste tracking system. • (EEB 127) The description of the technique should be completed, in particular with regard to the traceability of the treatment as described in conclusion 12 of the current BREF (2006). • (EEB 262, FR 339, EURITS 21, HWE 8) Specific requirements should be added when dealing with hazardous wastes (technique description is provided). • (BE 94) Clarify in the description that the operator should be able to prove, via the

	waste tracking system, that priority hazardous substances are not being diluted.
	• (DK 75) This technique is very welcome. However, in the case of hazardous waste (and hazardous fractions coming from the waste treatment), traceability could be extended to the way it is handled after treatment.
	• (EFR 199) Clarify in the description that procedures, systems, activities and operations should be proportionate to the type of waste treated, and to the recovery or disposal treatment carried out in the facility.
	• (EFR 200) This technique is not applicable to the shredding of non-hazardous metal waste.
	• (ECN 105) Clarify that waste sampling and characterisation for biological treatment of source-separated biowaste are only applicable where it is suspected that the waste might not meet the qualitative minimum requirements for further use.
	• (NL 4) This technique is applicable mainly to some hazardous waste streams.
	
	<u>Technique d</u>
	• (EEB 263, FR 341, EURITS 22, HWE 9) Specific requirements should be added when dealing with hazardous wastes (technique description is provided).
	• (IE 7) Add in the description that waste segregation is also essential for fire prevention and for preventing the spread of fire.
	• (DK 146) Add that, as a general rule, hazardous waste should not be mixed: defining conditions for authorising the mixing of hazardous waste is up to local authorities.
	• (UK 230, FEAD 145) This technique is about segregation, and not separation; this should be changed in the description. Segregation is primarily about storage and not treatment. Mixing, which is treatment, should not be referred to in the description.
	• (EFR 201) This technique is not applicable to the shredding of non-hazardous metal waste.
	
	<u>Technique e</u>
	• (EEB 128) The wording is too vague and should be complemented with the information provided by several technical descriptions in D1 (e.g. Section 2.3.2), and by conclusions 13, 14, 29, and 30 of the current WT BREF (2006).
	• (EEB 264, FR 342, HWE 10) Specific requirements should be added when dealing with hazardous wastes (technique description is provided).
	• (AT 28) Clarify that the potential reactions listed in the description are only examples.
	• (CEWEP 105) It should be taken into consideration that, in some cases (e.g. when treating solid waste), it is not possible to assess waste compatibility.
	• (ES_C 4) As written, technique e is applicable only to hazardous wastes. This should be clearly stated in the description.
	• (EFR 202) This technique is not applicable to the shredding of non-hazardous metal waste.
	• (NL 4) This technique is applicable mainly to some hazardous waste streams.
	• (EEB 221, ECN 106) This technique is not applicable to biological treatment of source-separated biowaste.
	
	<u>Technique f</u>
	• (EEB 108, ERFO 4, DE 4) Rename technique f: to apply sorting techniques. Indeed, the description relates to techniques applied in the facility in order to achieve the desired waste output, and not to techniques preventing unwanted waste from entering the process.
	• (EEB 129) The technique description should be completed to emphasise the waste hierarchy: sorting also aims at redirecting waste streams to alternative treatment options in line with the waste hierarchy.
	• (EEB 267, FR 212, EURITS 25, HWE 12) Clarify that the current description is applicable to mechanical and biological treatments, and add specific requirements when dealing with hazardous waste, such as:
	  o a qualified person attends the waste holder site for checking, classifying, repackaging e.g. laboratory smalls;
	  o specific requirements for handling packaging waste are put in place in order to gather and pack containers of compatible chemicals into dedicated drums, and sort containerised wastes in the best delays.

	• (AT 26) Clarify that sorting also aims at preparing/sorting waste/recyclables in defined qualities for further (more specific) treatment. • (IT 38) Clarify that technique f is applicable to solid waste by renaming it: to sort incoming solid waste • (EFR 203, 204) Amend the description by adding that initial sorting of the waste entering the facility aims to prevent unwanted material entering subsequent waste treatment processes, so to differentiate sorting for waste acceptance from sorting that is a waste treatment in itself. This technique is generally applicable. <u>Applicability</u> • (EEB 259, FR 276, 340, EURITS 18, HWE 4) Add a column on the applicability of techniques a to f when hazardous wastes are handled, stored and treated. In particular, requirements proposed in technique f are not applicable to hazardous waste management, for which other sorting precautions should be listed, and examples given in technique c relate only to hazardous waste. • (IE 41, SE 102, NL 4, EFR 195 to 203, ECN 103, 105, 106, 253) Include a column on applicability because all the techniques do not apply to all waste treatments. • (DE 198, FEAD 237) Add applicability to technique e which is not applicable to mechanical treatment and to biological treatment of mainly non-hazardous waste. • (FEAD 110) Clarify the applicability of acceptance and pre-acceptance procedures: the applicability of waste pre-acceptance and acceptance procedures will generally be related to the nature, scale and complexity of the installation and the nature of the waste. <u>New techniques</u> <u>Mixing/blending vs dilution</u> • (EEB 109, BE 26, DE 406, EURITS 17, HWE 11) Add a technique on mixing/blending that reads: to ensure the avoidance of dilution of pollutants by mixing/blending waste. • (EEB 265, EURITS 23) A technique with specific requirements regarding mixing rules and blending operations should be added when dealing with hazardous wastes, specifying when these operations are restricted or forbidden. <u>Plant design</u> • (EEB 218, IT 37, ECN 104, MWE 125) Add a technique applicable to new plants, related to plant design and the use of predictive models, which is key for prevention of emissions from biological treatments. <u>Flow analysis, waste stream and process control</u> • (EEB 266, EURITS 24, HWE 21) A technique with specific requirements regarding material flow analysis should be added when dealing with waste containing hazardous components, in particular ensuring that the waste is suitable for a particular operation, waste characterisation (e.g. fate of hazardous components in the waste) for choosing the most appropriate forms of treatment, avoiding dilution of hazardous components into a product cycle (technique description is provided). • (IE 42) Add a technique for monitoring waste stockpiles (e.g. temperature, visual checking for smoke or smouldering) which may help to prevent fires occurring. • (BE 92) Add a technique to implement a database containing information on the materials present in the site, regarding e.g. danger symbols, COD value, biodegradability, which should be available to the local authority. • (UK 224) Add a technique to implement general treatment procedures for ensuring that waste treatment is well understood, monitored and controlled. <u>Output quality</u> • (ERFO 6, DE 6) Add a technique to ensure the achievement of output quality by using standards (such as EN 15359 when the output is used as a solid fuel). <u>Selection of waste input</u> • (ECN 107) Insert as a new technique the selection of waste input described in BAT 31 of D1, and clarify this is applicable for biological treatments.

EIPPCB assessment	<u>Entire BAT 2 and comments generic to several techniques and applicability</u> • Giving an exhaustive list of all points to be looked at for pre-acceptance and acceptance procedures is not possible and would be a potential source of errors, omissions or loopholes. It seems preferable to set the general principles, with some illustrating examples. The BAT conclusions will be a stand-alone document in which no reference to the BREF is made. However, the more detailed technical information of the BREF will be available for support when needed. • BAT 2 is generic and therefore all techniques apply in their principles to all waste treatment processes covered by the Scope of the WT BAT conclusions, however to a certain extent based on the environmental risks posed by the waste to be treated. This should indeed be better reflected in the BAT statement. • BAT 2 applies to all activities mentioned in the Scope, including activity 5.5. • As a general point, internal and/or external evaluation of procedures is part of the process control procedures included in the EMS (point IV f). Their availability to the local authority is to be dealt with at the local level. • The way in which the waste to be treated is characterised and in what level of detail will be adapted to the type of waste to be treated (e.g. hazardous, non-hazardous, biodegradable, solid, liquid). However, it does not seem possible to list each and every possibility without risking omissions or errors. This detailed analysis would be better done at a local level on a case-by-case basis. Finally, as decided in point 1.3 of the KoM conclusions, the WT BAT conclusions (or the WT BREF in general) will not seek to establish whether a waste is hazardous or non-hazardous. <u>Technique b</u> • Separation of unwanted materials (by sorting) is the purpose of technique f. Separation of unwanted materials (by administrative check) is already covered by technique 2b as accepting or rejecting an entering waste implies separation of unwanted waste. • Adding that waste acceptance criteria are also defined in the procedures would indeed enhance clarity. • Radioactive wastes are excluded at the pre-acceptance stage in most of the cases. Gate monitoring is a way to detect and prevent such wastes from entering the process. <u>Technique c</u> • The waste tracking system holds all the information generated during waste pre-acceptance, acceptance, storage, treatment and/or transfer off site. The list given in the description of technique c is indicative; it is not intended to be exhaustive, and does not preclude the addition of further information, e.g. on recipients of waste or on further destinations. • When a waste tracking system is put in place, the operator is able to follow each waste entering the installation, the route it follows, and therefore identify whether or not wastes have been mixed. <u>Technique d</u> • Indeed, maintaining consistency between the wording of the description and the technique name would enhance clarity. Segregation is about storage, but also about avoiding accidental and/or uncontrolled mixing of incompatible wastes during the process. • Fire prevention or preventing the spread of fire are environmental benefits of the technique, not technical descriptions. <u>Technique e</u> • Potential reactions listed in the description are indeed only examples. This technique also applies to non-hazardous waste, to a certain extent based on the environmental risks posed by the waste to be treated as indicated in the second bullet point of the assessment of the entire BAT 2 above. <u>Technique f</u> • Techniques described are sorting techniques which may indeed be applied to achieve the desired waste output. However, technique f targets only the incoming waste and it is not clear why the sorting techniques, when applied at an initial stage, do not prevent unwanted wastes from entering the process. Moreover, the techniques are

	only given as examples ("it may include") and are not exhaustive. • Specific requirements (such as segregation, mixing rules), e.g. when dealing with hazardous waste, are dealt with by technique d. • Indeed, the sorting step also leads to the redirection of waste streams to the appropriate waste treatment and to the improvement of the waste hierarchy. However, the waste hierarchy is already defined in Article 4 of Directive 2008/98/EC on waste. <u>Mixing/blending vs dilution</u> • Blending/mixing rules and avoidance of dilution are dealt with by techniques d and e. It is not clear why a new technique with specific requirements should be added. <u>Plant design</u> • Plant design is indeed relevant to prevent emissions and the use of predictive models may indeed be an important tool but this issue is more connected to the environmental impact assessment of a new plant, prior to the permitting of the plant and is therefore not a BAT which can be reflected in the permit itself. <u>Flow analysis, waste stream and process control</u> • The specific requirements suggested are actually already included in BAT 2. However, a reference to material flow analysis could be useful, in particular to ensure that the waste treatment is performing as expected. • Measures to prevent or limit the environmental consequences of emissions accidents or incidents are dealt with in BAT 22. • The waste tracking system should contain the suggested information. Its availability to the local authority is to be dealt with at the local level. • General procedures for ensuring that waste treatment is well understood, monitored and controlled are part of the EMS described in BAT 1. <u>Output quality</u> • As mentioned in point 1.4 of the KoM conclusions, acceptance criteria in the downstream utilisation of "output" from waste treatment installations will not be defined in the WT BREF/BATC Scope. However, quality management is part of the overall waste stream management to ensure that the output of the waste treatment is in line with the expectations and to monitor the performance of the waste treatment. <u>Selection of waste input</u> • BAT 31 is indeed connected to pre-acceptance and acceptance but is specific to biological treatments, as BAT 26 is specific to shredders of metal waste and BAT 38 specific to PCT of solid and pasty waste. It would be easier for the reader to keep the process-specific BAT in the specific chapters.
EIPPCB proposal	• To reword the description of techniques a, b, c and e to clarify the flexibility with regard to the waste to be treated. • To reword the description of technique b regarding waste acceptance criteria. • To reword the description of technique d for wording consistency. • To clarify the description of technique f. • To add a technique c1 about an output quality management system. • To ensure consistency between BAT 2 and the BREF.

1.5 Monitoring

1.5.1 General comments on monitoring

Location in D1	Section 6.1.1.3 – pages 884 to 889
Current text in D1	Not applicable

Summary of comments	<u>Monitoring frequencies</u>
	• (DK 147) Monitoring frequencies for emissions to air and emissions to water are very high. It should be emphasised that this is for focusing on the performance of the plant and implemented techniques, and preventing emissions. Make clear that the frequency may be adapted when data series clearly demonstrate stability.
	• (ES_A 18, FEAD 4) Monitoring requirements, both for water and air emissions, should apply only when a BAT-AEL range is defined because they are costly and should be limited to what is strictly mandatory and necessary.
	• (ES_A 19, ES_A 93, FEAD 78) Monitoring frequencies are too high and not justified. They should be changed as follows:
	  o For emissions to water:
	  ▪ from "'once every day" to "once every week";
	  ▪ from "'once every week" to "once every month".
	  o For emissions to air:
	  ▪ from "once every three months" and "once every six months" to "once every year".
	• (ES_A 93) Clarify in footnotes 1 of Tables 6.1 and 6.2 that monitoring frequencies should also be adapted on the basis of a risk assessment.
	• (SE 63) It is not clear how monitoring frequencies have been determined. This should be clarified in conjunction with the relevant BAT-AELs.
	• (MWE 126) Monitoring frequencies are too high and too costly in relation to environmental benefits. They should be either removed, reduced, or it should be clearly stated that they are not legally binding.
	
	<u>Monitoring exemptions</u>
	• (FEAD 5) Add possibility of monitoring exemptions for existing situations taking into account cost-effectiveness because there may be situations in existing sites, where it is not possible to monitor each installation but only the whole site.
	
	<u>Standards</u>
	• (FEAD 87) Standards to use should not be limited to EN standards at first, but should include the possibility to use also scientifically equivalent standards.
	
	<u>New parameters</u>
	• (SE 209) Requirements on POP monitoring should be more ambitious: new POP substances are regularly added to the Regulation. Even if the POPs are regulated in new products they can still be present in wastes for the foreseeable future.
	
	<u>New BAT conclusion</u>
	• (EEB 168) Add a BAT conclusion to monitor mineral oil and heavy metal concentration in soil (and ground water).

EIPPCB assessment	<u>Monitoring frequencies</u> • Monitoring requirements are proposed when a BAT-AEL is set, and for parameters considered key environmental issues but for which it was not possible to set a BAT-AEL due to the lack of data. • See the following sections on emissions to air and water for the assessment of monitoring frequencies. • Concerning the cost of monitoring, useful information may be found in the ROM REF for emissions to air (mainly in Table 6.6, where for instance one measurement of dust is estimated to be between EUR 0.7 thousand and EUR 3.6 thousand). As for emissions to water, the annual cost of weekly monitoring is estimated at

	EUR 16 thousand by EFR and the cost of one periodic analysis is estimated at EUR 1 thousand by PL. Monitoring exemption • Flexibility is given by footnote 1 which allows the monitoring frequency to be reduced, down to a level to be determined locally, and by footnote 4 which refers to the inventory mentioned in BAT 2bis (see the assessment of monitoring exemption in the following sections on emissions to air and water). Standards • The priority to use EN standards aims at ensuring the comparability of emissions data and therefore is beneficial for improving the assessment of environmental performances achieved over Europe. This priority has already been introduced in several other BAT conclusions, and it is not clear why this should be different for waste treatment activities. New parameter • Indeed, the list of POPs is regularly updated. However, waste containing POPs are, in principle, treated in installations specifically designed for this purpose, of which some processes are described in Section 5.8 of D1. According to the collected information, emissions of POPs are mainly emissions to air, for which monitoring is included in Table 6.2. New BAT conclusion • Emissions to soil and to groundwater are, in principle, not allowed. In order to prevent them, specific techniques are described in BAT 20 of D1. Moreover, consideration of the environmental impacts from the eventual decommissioning of the plant at the stage of designing a new plant, and throughout its operating life, is included as part of the environmental management system in BAT 1 of D1.
EIPPCB proposal	• See the proposals in the sections dedicated to monitoring of emissions to water and to monitoring of emissions to air.

1.5.2 Monitoring of emissions to water

Location in D1	Section 6.1.1.3 – pages 884 to 887 – BAT 3

Current text in D1

BAT 3. BAT is to monitor emissions to water with at least the frequency indicated in Table 6.1 and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.

Table 6.1: Monitoring of emissions to water

Substance / parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (1) (2) (3)
Total organic carbon (TOC) (4)	EN 1484	All treatments of waste except physico-chemical and/or biological treatment of water-based liquid waste	Once every week
		Physico-chemical and/or biological treatment of water-based liquid waste	Once every day
Chemical oxygen demand (COD) (4)	No EN standard available	All treatments of waste except physico-chemical and/or biological treatment of water-based liquid waste	Once every week
		Physico-chemical and/or biological treatment of water-based liquid waste	Once every day
Total suspended solids (TSS)	EN 872	All treatments of waste except physico-chemical and/or biological treatment of water-based liquid waste	Once every week
		Physico-chemical and/or biological treatment of water-based liquid waste	Once every day
Hydrocarbon oil index (HOI)	EN ISO 9377-2	Mechanical treatment in shredder of metal waste	Once every week
		Re-refining of waste oil	
		Physico-chemical treatment of waste with calorific value	
Total nitrogen (TN)	EN 12260	Biological treatment of waste	Once every week
		Re-refining of waste oil	
		Physico-chemical and/or biological treatment of water-based liquid waste	Once every day
Total phosphorus (TP)	Various EN standards available (e.g.	Biological treatment of waste	Once every week
		Re-refining of waste oil	

			EN ISO 15681-1 and -2, EN ISO 6878, EN ISO 11885)	Physico-chemical and/or biological treatment of water-based liquid waste	Once every day	
		Phenol index	EN ISO 14402	Re-refining of waste oil	Once every week	
				Physico-chemical treatment of waste with calorific value		
				Physico-chemical and/or biological treatment of water-based liquid waste	Once every day	
		Arsenic (As) ([5])	Various EN standards available (e.g. EN ISO 11885, EN ISO 17294-2, EN ISO 15585)	Mechanical treatment in shredder of metal waste	Once every week	
				Mechanical biological treatment of waste		
				Re-refining of waste oil		
				Water washing of excavated contaminated soil		
				Physico-chemical and/or biological treatment of water-based liquid waste	Once every day	
		Cadmium (Cd) ([5])		Mechanical treatment in shredder of metal waste	Once every week	
				Mechanical biological treatment of waste		
				Re-refining of waste oil		
				Water washing of excavated contaminated soil		
				Physico-chemical and/or biological treatment of water-based liquid waste	Once every day	
		Chromium (Cr) ([5])		Mechanical treatment in shredder of metal waste	Once every week	
				Mechanical biological treatment of waste		
				Re-refining of waste oil		
				Water washing of excavated contaminated soil		
				Physico-chemical and/or biological treatment of water-based liquid waste	Once every day	
		Copper (Cu) ([5])		Mechanical treatment in shredder of metal waste	Once every week	
				Mechanical biological treatment of waste		
				Re-refining of waste oil		
				Water washing of excavated contaminated soil		
				Physico-chemical and/or biological treatment of water-based liquid waste	Once every day	
		Nickel (Ni) ([5])		Mechanical treatment in shredder of metal waste	Once every week	
				Mechanical biological treatment of waste		

			Re-refining of waste oil	
			Water washing of excavated contaminated soil	
			Physico-chemical and/or biological treatment of water-based liquid waste	Once every day
	Lead (Pb) ([5])		Mechanical treatment in shredder of metal waste	Once every week
			Mechanical biological treatment of waste	
			Re-refining of waste oil	
			Water washing of excavated contaminated soil	
			Physico-chemical and/or biological treatment of water-based liquid waste	Once every day
	Zinc (Zn) ([5])		Mechanical treatment in shredder of metal waste	Once every week
			Mechanical biological treatment of waste	
			Re-refining of waste oil	
			Water washing of excavated contaminated soil	
			Physico-chemical and/or biological treatment of water-based liquid waste	Once every day
	Mercury (Hg) ([5])	Various EN standards available (e.g. EN ISO 17852, EN ISO 12846)	Mechanical treatment in shredder of metal waste	Once every week
			Mechanical biological treatment of waste	
			Re-refining of waste oil	
			Water washing of excavated contaminated soil	
			Physico-chemical and/or biological treatment of water-based liquid waste	Once every day
	(1) Monitoring frequencies may be adapted if the data series clearly demonstrate a sufficient stability of emissions over time. (2) The sampling point is located where the emission leaves the installation. (3) In the case of batch discharge with a duration < 24 hours, once per batch discharge. (4) Either TOC or COD is monitored. TOC is the preferred option, because its monitoring does not rely on the use of very toxic compounds. (5) The monitoring may not apply when the substance concerned is not present in the waste to be treated.			
Summary of comments	Direct and indirect discharge • (AT 32) It should be clear that the parameters TOC/COD, TSS, TN, TP and phenol index have to be monitored in the case of direct discharge only. This could be done either by combining Tables 6.1, 6.3 and 6.4, or by adding a specific footnote. • (BE 30, FR 13) Clarify that the monitoring requirements apply both to direct and indirect discharge. • (ECN 254) Clarify whether the monitoring requirements apply to direct discharge, indirect discharge, or both. • (DK 29, EBA 56, PL 10) Clarify that monitoring requirements apply for direct			

	discharge only. • (DK 64, PL 10) Differentiate monitoring frequency for direct and indirect discharge. It should be lower for indirect discharge. • (FI 13, FEAD 238, ECN 108, ECN 254, MWE 127) Monitoring requirements should make the distinction between direct and indirect discharge, and in particular take into account specific contracts between the waste treatment plant and the external WWTP. • (CEFIC 8) Clarify in the statement that BAT is to monitor direct emissions to water from a waste treatment plant, and for key parameters. <u>Other general comments</u> • (DK 81, DK 161, UK 234, SE 16, FEAD 262) Clarify to which BAT each monitoring requirement refers, especially when this is related to a BAT-AEL (i.e. add "monitoring associated with" as is done for monitoring of emissions to air). • (NL 5) Monitoring requirements, which are very strict, should apply only when a BAT-AEL is set or when a parameter is considered a key environmental issue (KEI). • (UK 232) It is not clear what biological treatment of water-based liquid waste applies to. A definition should be added because there is a need to clearly distinguish between wastes and liquid wastes which are subject to biological treatment. • (EUCOPRO 14) Clarify that the monitoring can be done by an internal laboratory. <u>Additional parameters to monitor</u> • (EEB 111, DE 413, DE 445) Add AOX monitoring for physico-chemical and/or biological treatment of water-based liquid waste, and water washing of excavated contaminated soil, once every day (standard not identified). • (EEB 112, DE 414) Add perfluorocarbon (PFC) monitoring, for physico-chemical and/or biological treatment of water-based liquid waste, and water washing of excavated contaminated soil, once every day if specific waste is treated (no standard available). • (FI 18, FI 19, SE 208) Add monitoring of perfluoro-octane sulfonate (PFOS) and perfluoro-octanoic acid (PFOA), which are respectively classified and proposed to be classified as POP in European Regulation 850/2004 EC, and which might be present in waste water released by all mechanical, biological, and physico-chemical treatment of waste. Monitoring these parameters would provide important data of emissions to water in Europe. • (EEB 277) Add continuous monitoring of any relevant substance listed in Annex X to Directive 2000/60/EC. Relevant means that the substance is likely to be used or found in the upstream process or treatment activities related to waste water, irrespective of thresholds. If the operator can demonstrate that the relevant substance is not emitted or transferred from the site, the competent authority may derogate from this requirement. • (BE 28) Add monitoring of PCBs for mechanical treatment in shredders of metal waste. • (BE 29) Add monitoring of PAHs. • (BE 27) Add continuous monitoring of flow rate, temperature, conductivity, and acidity. BOD should be monitored at least monthly, and silver at least once every three months. • (BE 31, DE 445) Add monitoring of toxicity, (BE 31) when hazardous substances are treated. • (EUCOPRO 12) Add the possibility to monitor N Kjeldahl instead of Total N. <u>Standards</u> • (FR 213, EUCOPRO 10, EURITS 26, HWE 13) Clarify that, in the case of self-monitoring (i.e. by internal laboratories), it would be possible to use internal methods (not standardised) that ensure the provision of data of an equivalent scientific quality as the standardised methods given in Table 6.1. (FR 213) In this case, measurement with the mandatory standardised method should also be done periodically (e.g. once or twice a year). • (GEIR 20, IT 39) The use of rapid test methods should also be allowed for frequent monitoring, with regular checking (e.g. monthly) against EN standards, (IT 39) or, if EN standards are not available, against ISO, national or other international standards, which ensure the provision of data of an equivalent scientific quality. This could be

	the case for monitoring COD, HOI, Total N, Total P, phenol index, As, Cd, Cr, Cu, Ni, and Zn.
	• (FR 215, HWE 15) Standard EN ISO 15585 for measuring metals should be changed to EN ISO 15586.
	• (EURITS 28, HWE 16) Add the possibility to use new monitoring standards (other than those listed in the BAT conclusions) once they are published.
	
	<u>COD</u>
	• (FI 33) Replace requirements for COD monitoring in the same way it has been proposed in the Urban Waste Water Directive (UWWD) because its monitoring relies on the use of very toxic compounds. It should read: "*COD measures based on homogenized, unfiltered, undecanted samples may be used until 31 Dec 2020 to establish a COD-TOC ratio [for a waste water treatment plants]*".
	• (SE 4) Remove COD monitoring, and consider only TOC.
	
	<u>Hydrocarbon oil index (HOI)</u>
	• (EUCOPRO 11) Clarify (e.g. in a footnote) that HOI monitoring applies when there is a potential release based upon the water treatment technique. For instance, in the case of activated carbon adsorption, there is no release of hydrocarbon oil, and COD is monitored.
	
	<u>Metals</u>
	• (BE 32) The metals to be monitored should be clearly defined. They could be As, Cd, Cu, Hg, Ni, Pb and Zn.
	
	<u>Monitoring frequency / Footnote 1</u>
	• (DK 32, DK 47, GEIR 20, DE 201) The monitoring frequencies are too high and should be lowered so as to take into account stable process conditions. It is especially the case for monitoring of (DK 47) leachate from outdoor waste and soil treatment, (DE 201) of TOC/COD, TSS, Total N, and Total P from biological treatments as composting and anaerobic digestion are quite stable processes in which the proposed parameters do not vary a lot.
	• (DE 419) Clarify that monitoring frequency may be adapted (i.e. increased or decreased) depending on whether the data series show a high or low variability.
	• (IE 51) Clarify, e.g. in footnote (1), that monitoring parameters and frequencies may be adapted based on nature of waste, risk assessment, and sensitivity of receptors.
	• (FI 12) Monitoring frequencies should take into account the specificities of plants in relation to pollution load, characteristics of discharge, hazardous or non-hazardous waste.
	• (FR 51, ES_A 34, PL 11) Include climate conditions for adapting the monitoring frequency (e.g. dry weather with no emissions to water).
	• (EFR 221) In the footnote, replace the word "may" with "shall".
	• (ES_A 31, ES_C 12, ES_C 15, EERA 50, EFR 205) Monitoring frequencies are too high for shredding plants that do not release process water but only run-off water in wet climate conditions. The monitoring frequency for metal emissions from shredders of metals and shredders of WEEE should be (EERA 50, EFR 206 to 220) twice per year, or (ES_12) once every year.
	• (FR 361) Monitoring frequencies are not adapted:
	  o when there is no discharge of process water, e.g. mechanical treatments where the discharge is mainly linked to rainfall (batch discharge);
	  o for MBT of non-hazardous waste for which the frequencies should be changed to once every three months for metals, and once every month for COD, TSS, TN and TP;
	  o for indirect discharges, whose monitoring is usually defined through a specific contract between the waste treatment plant and the external WWTP.
	• (AT 31, DE 201) It is not clear how the monitoring frequency has been derived from the collected data. (DE 201) This should be clarified in a specific workshop. (AT 31) Change the frequency to "once every month" for direct discharge (see also comment AT 31 on indirect discharge).
	• (EBA 2, EBA 3, EBA 14) Monitoring frequencies are too high for biological treatment of waste, and should be changed:

	o from once every day to once every week for TOC/COD, TN, TP, and phenol index; o from once every day to once every three months for heavy metals and As; o for MBT, to once every week for monitoring of metals. • (UK 233) Where the frequency is once every day, this needs to be changed to "once every working day". <u>Point of discharge / Footnote 2</u> • (FR 217, EURITS 29, HWE 17, EFR 222) In footnote 2, change the wording "where the emission leaves the installation" to "at the point of discharge", (FR 217, HWE 17) because it is essential to clearly define the point where the emission levels are monitored and measured. It is also important for avoiding dilution and difficult calculations when, at the point where the emission leaves the installation, there are different water streams from different (end-of-pipe) techniques. • (AT 33) Specify the point where the emission leaves the installation as the "exit point of the site" so that the quality of the waste water reflects the waste water handed over to third parties (e.g. WWTP). • (FR 348, EURITS 30, HWE 18) Clarify (e.g. in a new footnote) that sampling of process water and sampling of cooling water/rainwater should be done on separate points of discharge in order to avoid samples" dilution. • (CEFIC 9) Footnote 2 should apply to all parameters. <u>Batch release / Footnote 3</u> • (FR 53) In footnote 3, remove the mention of duration of release (24 hours) in the case of batch discharge. • (EUCOPRO 13) There should be one control per batch discharge, whatever the duration of the discharge. • (AT 31) Change footnote 3 to "In the case of batch discharge with duration shorter than one month, once per batch discharge" (see also comment AT 31 on monitoring frequency). • (DK 83) Remove footnote 3 because this could lead to the monitoring of each batch operation carried out in the process. • (FEAD 146) It is not appropriate to measure each batch frequently discharged, e.g. every hour. • (FEAD 147) It is not clear how batch discharges separated by more than 24 hours should be monitored. <u>Monitoring exemption / footnote 5</u> • (AT 35) Clarify the need for possible monitoring exemptions, or remove footnote 5 because this potential exemption is not legally applicable: it is not possible to know at any time all the possible compositions of wastes treated in a plant. • (FI 15) Clarify (e.g. in a footnote) that the monitoring may not apply if concentrations of a pollutant are proved to be low, and without any environmental impacts. • (NL 6, FEAD 6) Add a monitoring exemption when waste cannot be in contact with water. • (IT 40) Clarify the exemption as follows: "*the monitoring may not apply when the substance concerned is not ~~present in the waste to be treated~~ relevant for the treatment process and the waste treated*". • (FI 16) Clarify which waste water release should be monitored. For instance, it should be clear whether or not the monitoring requirements apply to run-off water. • (AT 30, EUCOPRO 9) Clarify (e.g. in a new footnote) that monitoring requirements do not apply to uncontaminated water. • (CEWEP 106, CEWEP 107, EUCOPRO 9) Clarify that monitoring requirements apply only to process waste water, and (EUCOPRO 9) to water potentially contaminated by waste contacts. • (EURITS 27, HWE 14) Add a monitoring exemption for stand-alone temporary storage of hazardous waste where no other treatment activities covered by 5.1, 5.2 and 5.3 of Annex I to Directive 2010/75/EU are operated. • (CEFIC 9) Footnote 5 should apply to all parameters.

EIPPCB assessment	<u>Direct and indirect discharge</u> • Clarification is indeed needed as to whether the monitoring applies to direct or indirect discharge. • The BAT-AELs associated with BAT 15 make the distinction between direct and indirect discharge. It would therefore be logical that the monitoring makes the same distinction. • Indeed, clarification on monitoring in the case of indirect discharge, in line with a specific contract between the waste treatment plant and the external WWTP, would enhance clarity. However, such adaptation would make sense only if the receiving WWTP is able to treat the pollutants concerned. <u>Other general comments</u> • Monitoring exemption of uncontaminated water is dealt with through new footnote 5 (see below). • As there is only one BAT (BAT 15 in D1) defining BAT-AELs, all monitoring requirements refer to this BAT. However, since it is proposed that for some parameters only monitoring is required (no BAT-AEL), adding a reference to the associated BAT would enhance clarity. • To set specific BAT and BAT-AELs for emissions to water from biological and/or physico-chemical treatment of water-based liquid waste treatment would enhance clarity. • Determining which laboratory (e.g. internal or external) carries out monitoring and how to guarantee compliance with EN standards are implementation issues which may depend on local considerations. The BAT does not preclude the possibility of using an internal laboratory. <u>Additional parameters to monitor</u> • Parameters to be monitored have been determined when sufficient data were provided through the data collection, and when a parameter was considered a key environmental issue for the sector even though no data were provided. The BAT conclusions do not aim at being a means to ensure the survey of emission of substances that are not considered key environmental issues. • Total Kjeldahl nitrogen (TKN) includes free ammonia and ammonium, and organic nitrogen compounds, but, in contrast to total nitrogen (Total N), does not include nitrate (NO_3-N) or nitrite (NO_2-N). It is not clear therefore why the choice to monitor TKN instead of Total N would be needed. • Some of the substances listed in Annex X to Directive 2000/60/EC are proposed to be monitored (cadmium, lead, mercury, nickel) because the data collection shows that they are relevant parameters for a number of waste treatment processes. Additional parameters may also be monitored if deemed relevant at local level. • Silver: this parameter does not seem to be monitored by the plants of the data collection. • PCBs from shredders: PCB emissions to water are monitored by 10 plants of the data collection, including two shredders (Plants 54 and 478). Based on this information, it seems difficult to conclude whether the parameter is a key environmental issue and for which waste treatment process. • PAHs: PAHs are monitored by 11 plants of the data collection. Based on this information, it seems difficult to conclude whether the parameter is a key environmental issue and for which waste treatment process. • Toxicity: toxicity is monitored by eight plants of the data collection and may refer to different parameters. Based on this information, it seems difficult to conclude on which parameters the toxicity monitoring targets, whether these parameters are key environmental issues and for which waste treatment process. • Antimony (Sb): Sb is monitored by five plants of the data collection. Based on this information, it seems difficult to conclude whether the parameter is a key environmental issue and for which waste treatment process. • Dioxin and furans (PCDD/F): PCDD/F is monitored by three plants of the data collection. Based on this information, it seems difficult to conclude whether the parameter is a key environmental issue and for which waste treatment process. • Thallium (Tl): Tl is monitored by one plant of the data collection. Based on this information, it seems difficult to conclude whether the parameter is a key environmental issue and for which waste treatment process.

	• PFOS, PFOA: information on PFOS was provided only by Plant 421_422 and no information on PFOA was provided. • Perfluorocarbon (PFC): No information on perfluorocarbon (PFC) monitoring was provided. • Hexavalent chromium (Cr(VI)), cyanides (CN^-), manganese (Mn), and BTEX: see the assessment in the section on emissions to water from physico-chemical and/or biological treatment of WBLW (Section 1.13.6.4). • Monitoring of process parameters such as flow rate, temperature, acidity and BOD is indeed relevant, especially in the case of treatment of water-based liquid waste, and this should be clarified in a specific BAT. <u>Standards</u> • The list of standard is given in a similar way as in all other BAT conclusions. The use of EN standards guarantees the scientific quality and comparability of the measurements. • Determining the possibility to use internal methods and how to guarantee compliance with EN standards is an implementation issue (see also assessment related to monitoring of air emissions). • Indeed, one of the standards for measuring metals is EN ISO 15586. • The use of new monitoring standards would indeed be possible: the issue date of the EN standards is not mentioned and it would be possible to use an update. In the case of newly created EN standards, it is assumed they would be of an equivalent scientific quality. <u>COD</u> • COD is still widely used. Although its replacement by TOC is expected, this would be dealt with by binding rules on the use of toxic compounds. <u>Hydrocarbon oil index (HOI)</u> • Monitoring requirements are set up precisely to verify that an implemented technique is efficient for reducing emissions of a given pollutant. Additionally, footnotes 1, 5 and 7 in the table of BAT 3 allow flexibility, in certain circumstances, with regards to monitoring. <u>Metals</u> • Footnote 5 should allow determining, at a local level, which of the metals are expected to be released, and therefore should be monitored. When this is not possible, all metals are to be monitored. <u>Monitoring frequency</u> • Footnote 1 already provides for flexibility in the monitoring frequency, considering the stability of the emissions over the time. • BAT 3 aims at setting the minimum monitoring frequency and is based on the data collection which encompasses real cases and therefore accounts for specific conditions such as weather conditions, nature of waste and waste processes. The type of discharges (indirect or direct) needs however to be specified in order to ensure consistency with BAT 15. • If there are no emissions to water, there is indeed nothing to be monitored but this is a clear case which could be dealt with at local level. • Footnote 1 gives flexibility in the monitoring frequency which may be adapted in the permit by the responsible authority, in conjunction with the operator. This is done at local level and it does not seem appropriate to interfere with this local level by replacing "may" with "shall". • All treatment of waste except PCT and/or biological treatment of WBLW: according to the data collection, for all parameters, monitoring is essentially done by grab sampling, with a monitoring frequency ranging from once over the three-year reference period to monthly. Only four plants report a higher monitoring frequency: daily monitoring at Plants 605 and 619 for COD, TSS, HOI, Total P and phenol index, weekly monitoring at Plant 160C for phenol index, continuous monitoring of TOC at Plant 425_426 and continuous monitoring of mercury at Plant 610. A higher monitoring frequency than once per month therefore does not seem to be in line with the data collection.

	• PCT and/or biological treatment of WBLW: except for AOX (composite sample), the reported monitoring method is mainly 24-hour flow-proportional composite sampling. In this case, the averaging period is mainly short-term (from daily to monthly when indicated). As for monitoring frequency, diverse information was provided. However, it appears that, for batch discharge, each batch is generally monitored before discharge. For continuous discharge, a daily monitoring frequency seems relevant in order to detect as soon as possible any potential fluctuations in emissions to water. • In the case of daily monitoring, whether this monitoring should only be carried out on working days or not is an implementation issue to be addressed at local level. <u>Point of discharge</u> • According to IED Article 15(1), "the emission limit values for polluting substances shall apply at the point where the emissions leave the installation, and any dilution prior to that point shall be disregarded when determining those values." The BAT-AELs apply at the points where the emissions leave the installation and therefore the monitoring as well. • BAT 20 provides for the segregation of water streams and it is not necessary to repeat it in a footnote. As for the mixing of samples, footnote 2 mentions that the sampling should be done at the point where the emissions leave the installation. It seems unnecessary to add that a subsequent mixing of samples from different emission points would change the results of the monitoring. • Footnote 2 applies to all parameters. <u>Batch release</u> • Indeed the duration of the batch discharge should not condition the type of sampling. More generally, considering the new wording of the "General considerations" related to batch discharges, this footnote is no longer needed. • As for batches discharged frequently (e.g. every hour) and as for knowing whether a discharge should be considered a continuous or batch discharge, this is an implementation issue to be addressed at local level. <u>Monitoring exemption</u> • It may indeed be unclear whether or not a substance is present in the waste water. This is precisely one of the objectives of the waste water streams inventory introduced in BAT 2bis. • Monitoring applies to emissions to water at the point where the emission leaves the installation and the pollutants to be monitored are determined by the waste water inventory. Uncontaminated water is segregated from waste water which needs further treatment according to technique a3 (ex-technique b) of BAT 13. The monitoring of uncontaminated water depends on whether or not uncontaminated water is considered in the inventory of waste water streams (new BAT 2bis). • It is not clear why stand-alone temporary storage of hazardous waste should be exempted from monitoring. • Footnote 5 applies to parameters that may contaminate water by contact. This is not the case, as such, for parameters like COD/TOC, nitrogen or phosphorus that can result from chemical/biological reactions.
EIPPCB proposal	• To clarify which parameters are to be monitored in the case of direct or indirect discharge. • To clarify the BAT associated with the monitoring. • To clarify the adaptation of monitoring frequencies in the case of indirect discharge. • To clarify monitoring exemptions. • To modify the list of parameters to be monitored. • To modify the minimum monitoring frequency as per the assessment described above. • To add a BAT conclusion on monitoring of waste water process parameters (BAT 3bis).

1.5.3 Monitoring of channelled emissions to air

Location in D1	Section 6.1.1.3 – pages 887-888 – BAT 4
Current text in D1	**BAT 4. BAT is to monitor emissions to air with at least the frequency indicated in Table 6.2., and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.**

Table 6.2: Monitoring of channelled emissions to air

Parameter	Standard(s)	Waste treatment process	Monitoring associated with	Minimum monitoring frequency ([1])
Dust	EN 13284-1	Mechanical treatment of waste	BAT 25	Once every six months
		Mechanical biological treatment of waste	BAT 37	Once every three months
		Physico-chemical treatment of solid and/or pasty waste	BAT 39	Once every six months
		Thermal treatment of spent activated carbon, waste catalysts and excavated contaminated soil	NA	
		Treatment of excavated contaminated soil	NA	
TVOC	EN 12619	Mechanical treatment in shredder of equipment containing VFCs and/or VHCs	BAT 29	Once every six months
		Mechanical biological treatment of waste	BAT 37	Once every three months
		Physico-chemical treatment of solid and/or pasty waste	BAT 39	Once every six months
		Re-refining of waste oil	BAT 41	
		Physico-chemical treatment of waste with calorific value	BAT 43	
		Regeneration of spent solvents	BAT 45	
		Thermal treatment of spent activated carbon, waste catalysts and excavated contaminated soil	NA	
		Treatment of excavated contaminated soil	NA	
		Physico-chemical and/or biological treatment of water-based liquid waste	BAT 52	
		Decontamination of equipment containing POPs ([3])	NA	
NH_3	No EN standard available	All biological treatments of waste	BAT 32	Once every three months
		Physico-chemical treatment of solid and/or pasty waste	BAT 39	Once every six months
		Physico-chemical and/or biological treatment of water-based liquid waste	BAT 52	

	H_2S	No EN standard available	All biological treatments of waste	BAT 32	Once every three months
	HCl	EN 1911	Thermal treatment of spent activated carbon, waste catalysts and excavated contaminated soil	NA	Once every six months
			Physico-chemical and/or biological treatment of water-based liquid waste	BAT 52	
	HF	ISO 15713	Thermal treatment of spent activated carbon, waste catalysts and excavated contaminated soil	NA	Once every six months
	Hg (total)	EN 13211	Treatment of mercury-containing waste	BAT 30	Once every six months
	PCBs	EN 1948-1, -2, and -4 ([2])	Decontamination of equipment containing POPs	NA	Once every six months
	Relevant metals and metalloids except mercury (e.g. As, Cd, Co, Cr, Cu, Mn, Ni, Pb, Sb, Se, Tl, V)	EN 14385	Mechanical treatment in shredder of metal waste	NA	Once every six months
	NA: Not applicable ([1]) Monitoring frequencies may be adapted if the data series clearly demonstrate a sufficient stability. ([2]) Instead of EN 1948-1, sampling may also be carried out with CEN/TS 1948-5. ([3]) When solvent is used for cleaning the contaminated devices.				

Summary of comments

Standards

- (FR 213) Clarify that, in the case of self-monitoring (i.e. by internal laboratories), it would be possible to use internal methods (not standardised) that ensure the provision of data of an equivalent scientific quality to the standardised methods given in Table 6.2. In this case, measurement with the mandatory standardised method should also be done periodically (e.g. once or twice a year).
- (EFR 244) EN standards are not applicable to mechanical treatment of metals because of the design of shredders and of the unacceptable safety risks associated with technicians" access to the stack.

All BAT

- (DE 263, CEFIC 10) Specify "channelled emissions" in the BAT statement.
- (SE 177) Channelled emissions should be defined.
- (ESRG 5) Specify "point source emissions" in the BAT statement.
- (FR 153) The title of Table 6.2 means that only channelled emissions are monitored. However, emissions from biofilters (BAT 32) for biological treatments are mainly diffuse and non-channelled emissions.
- (BE 33) All parameters for which BAT-AELs are defined should be monitored.
- (AT 114) Only parameters for which BAT-AELs are defined should be monitored.
- (DK 108, ECN 109) The rationale for the parameters selection is not clear.
- (SE 110) The monitoring frequency should be described in conjunction with the relevant BAT-AEL.
- (EEB 113, DE 415) Add a general standard for measurement sections and sites and for the measurement objective, plan and report (EN 15259).
- (EEB 276) Add a standard sentence requiring selection of a monitoring device / system which enables compliance assessment and ensures verification that the abatement techniques are functioning properly. Where CEMs / monitoring data is available, it should be made available in public.
- (EEB 230, SE 39, PL 22, ECN 112, MWE 130) Performance of biofilter (with or

	without wet/acid scrubber) does not change within periods of weeks/months. Regular two- or three-yearly checks are sufficient. • (BE 89) For all waste treatment processes, the monitoring frequency should be reduced as follows: at least monthly for dust (> 0.5 kg/h), H_2S, HF, Hg, PCB and metals, and at least once every three months for HF. (DE 528) The frequency to monitor emissions to air from mechanical treatment of waste ("once every six months") is supported. • (FR 152) Clarify what is meant by "NA: not applicable" by replacing this wording with "no BAT associated". <u>Dust</u> • (EEB 279) Increase monitoring frequency to continuous. • (UK 236) It is not clear if dust is total dust or a subset of the IED lists "dust including fine particulate matter" in Annex II. • (AT 40) Dust monitoring frequency should be consistent between mechanical treatment and MBT, therefore the monitoring frequency should be every six months for MBT. • (ES_A 32, ES_A 33, ES_C 13, EFR 239, EFR 242) Both for mechanical treatment of metal waste and for mechanical treatment in shredders of equipment containing VFCs and/or VHCs, the dust monitoring frequency should be reduced to once per year as the levels of emissions to air from shredders are relatively stable. <u>TVOC</u> • (EEB 114, DE 416) Add the Standard CEN/TS 13649:2015-03 for the determination of mass concentration of individual gaseous organic compounds. • (EEB 339) Monitoring of TVOC emissions should be applicable to all mechanical treatment processes and should be once every three months (see comment on BAT 25). • (AT 37) TVOC should also be applicable to shredders of metal waste and should be once every three months (see comment related to Section 6.2.2.1 of draft D1). • (FR 349) It should be made explicit that TVOC includes CH_4. • (ES_C 14) For mechanical treatment in shredders of equipment containing VFCs and/or VHCs, the monitoring frequency should be reduced to once a year. • (FR 362) Concerning mechanical treatment, if appliances containing VFCs are treated, a monitoring frequency of four times per year should be applied. • (AT 39) For mechanical treatment in shredders of equipment containing relevant substances, add monitoring of sum of CFC, HFC, HCFC with the monitoring standard TS 50574-2, and a frequency of once every three months. • (DE 94, DE 417, EEB 110) For mechanical treatment in shredders of equipment containing relevant substances, add continuous monitoring of VHCs/VFCs (see also comment DE 384, 431, 498 related to BAT 29). • (HWE 19) In line with comments related to physico-chemical processes, all BAT-AELs about TVOC for physico-chemical treatments should be gathered and it should also be taken into consideration in Table 6.2. The monitoring frequency would be unchanged. <u>NH_3 and H_2S monitored at biological treatment plants</u> • (CEWEP 92, SE 36) There are no EU standards for NH_3 and H_2S monitoring available, which makes the benchmarking difficult. • (SE 111) Monitoring of H_2S and NH_3 should be limited to plants where odour nuisance by H_2S/NH_3 can be expected • (DK 113, EBA 15, PL 23, ECN 113) Delete parameter NH_3 and H_2S and extend the minimum monitoring frequency to once a year for dust. NH_3 and H_2S might be included in BAT 35 as key process parameters but are not relevant environmental emissions from biogas and compost plants. The most important parameter to monitor in the emission of a plant is odour. A minimum monitoring frequency of once a year for biological treatment is sufficient. • (DK 111, ECN 110, MWE 128) NH_3 is a parameter to be observed with respect to its toxicity for the microbial functions in the biofilter and to reduce the potential for N_2O formation in the biofilter. • (DK 112, ECN 111, MWE 129, AT 38) As for H_2S, it is monitored to protect the gas engine and there is no need to monitor H_2S emissions.

	• (SE 40) H_2S is a component indicating possible odour emissions to a limited extent. H_2S monitoring should be deleted from the table or the frequency reduced to once every year or once every two years - more frequent if there is problem. • (DK 109, DK 110, ECN 109) There is no distinction made between aerobic and anaerobic treatment. • (CEWEP 108, MWE 1) The monitoring frequency should be reduced to once every year as the proposed monitoring is neither practicable nor necessary. • (CZ 4) Set the minimum monitoring frequency at once every six months for all biological open air treatments of waste. • (FR 155) Add a footnote for H_2S and NH_3 (monitoring associated with BAT 32) for open biofilters: emissions should be sampled through a chimney. <u>Hg</u> • (EEB 281) Increase monitoring frequency to a minimum of once every three months. If satisfactory levels are achieved (close to detection limit), e.g. activated carbon filter in combination with dust controls and constantly kept low, a lower frequency of six months may be considered. • (EEB 151, EEB 315) Hg emissions to air should also be monitored in MBT plants and in shredders of metal waste with a minimum frequency of once every three months (see comment related to Section 6.2.2.1 of draft D1). <u>PCB and PCDD/PCDF</u> • (DK 162) For PCB, add the standard ISO 11338 part 1 (used in Denmark). • (EEB 282) Increase the monitoring frequency, especially due to variation in pollutants content in input waste and waste treatment performance. • (EEB 342) Monitoring of PCDD/F, dl-PCB and hexachlorobenzene should be added for the PCT treatment of POP-containing waste, with a semi-continual monitoring (3x8 hours sampling every month). • (DK 91) PCB is a relevant parameter to measure in emissions to air from "Mechanical treatment in shredder of metal waste". • (EEB 312, DK 92) PCDD/PCDF should be added for "Mechanical treatment in shredder of metal waste with a proposed minimum monitoring frequency of once per year. <u>Metals</u> • (DK 59, PL 12) Metal emissions to air from the shredding of metal waste can be effectively controlled by monitoring of dust emissions. Therefore monitoring of metals from shredders should be an option. • (EFR 49) There are no monitoring standards for metals applicable to shredders of metal waste (see comment EFR 244). • (EFR 243) Reduce the monitoring frequency for metals to once every year, because of the low metals concentration detected. <u>Additional parameters</u> • (EEB 152, EEB 153) Add monitoring of Hg, N_2O and PCDD/F emissions for MBT plants. In the existing BREF, it is clearly stated that the TWG (at that time) "recognised that N_2O and Hg also needed to be added to this table, however not enough data were provided to validate values on these issues". This is an issue also referred to in the "recommendations for future work", where it is noted that "one member state considered important to include the dioxins parameter in table of BAT 70". • (EEB 338) Add monitoring of PAH and BTEX for thermal treatment of spent activated carbon, waste catalysts and excavated contaminated soil (monitoring frequency of once every three months). • (FI 20) Add annual monitoring of Brominated Diphenyl Ethers (BDE) and Hexabromocyclododecane (HBCDD) emissions to air from metal shredder plants to get indicative information on the emission levels. • (AT 36) Add monitoring of odour for biological treatment of waste, with standard EN 13725 and frequency once every six months. • (UK 235) Odour concentration (OUe/m^3) should be monitored from the abatement inlet and outlet in order to identify the removal destruction efficiency for the treatment system, with a frequency of once per year.

	• (SE 91, SE 109) Add monitoring of CH_4 emissions to air from anaerobic digestion. Footnotes • (IE 52, UK 237) Amend footnote (1) to include that the monitoring parameters and frequencies may be adapted based on nature of waste, assessment of risk and sensitivity of receptors. Add a footnote stating that the monitoring may not apply when the substance concerned is not present in the waste to be treated or generated. • (FI 21) Add a footnote stating that the monitoring may not apply if concentrations of the pollutant are proved to be low and without any environmental impacts. • (HWE 20, FR 297) For all parameters, add a footnote "The monitoring may not apply when the substance concerned is not expected to be emitted through the raw gas". • (UK 237) Add a footnote stating that surrogate monitoring techniques may be applied in replacement of monitoring of channelled emissions. • (CEFIC 11) Add in footnotes that 1/ the sampling point is located where the emission leaves the installation and 2/ the monitoring may not apply when the substance concerned is not present in the waste to be treated.
EIPPCB assessment	Standards • The comment refers to "self-monitoring" which is understood as monitoring carried out by the operator for the purpose of process control, in addition to the monitoring of BAT 4. Therefore, it is a local issue. • Concerning the use of EN standards for shredders of metal waste, the standard EN 13284 has been reported to be used for 16 emission points (out of the 40 measuring dust) and the standard EN 12619 has been reported to be used for 8 emission points (out of 14 measuring organic compounds). It is not clear why EN standards could not be used for this waste process. All BAT • BAT 4 indeed concerns channelled emissions. • Concerning emissions from biofilters, monitoring of diffuse emissions is reported only by 7 plants out of the 46 plants carrying out biological treatment of waste and using a biofilter. Out of these 7 plants, 2 give information about the results of the measurements performed and the other 5 report no measurement or report measurements as measurements of channelled emissions. • Concerning the selection of parameters to be monitored, all parameters for which BAT-AELs are defined are to be monitored, as well as parameters considered key environmental issues but for which it was not possible to set a BAT-AEL due to the lack of data. • The monitoring frequency is addressed in a specific BAT and not together with the BAT-AELs concerned, in line with the other recent BAT conclusions. • As for the standard EN 15259, monitoring and measurement are already addressed in BAT 1-V-a and, as for the other recent BREFs, it does not seem necessary to add a specific focus on this standard. • The verification of compliance and the mode of reporting are implementation issues. • As for the comments about the monitoring frequency, see the assessment for each individual parameter below. • The term "not applicable" may indeed be confusing. Dust • Concerning the mechanical treatment of waste, see also the assessment of the comments related to BAT 25 and the associated BAT-AEL: dust monitoring is almost exclusively periodic, with a frequency going from once every three years to once every two months and is carried out at 69 emission points (out of 95 concerned). The data collection does not show big variations from month to month at plants which monitor dust more than once per year, so a higher monitoring frequency does not seem necessary. The data collection may however show variations from year to year (Plants 441, 571, 432, 136, 95) and it may be useful to carry out dust monitoring every six months to detect these variations more quickly. • Concerning MBT, dust monitoring is also almost exclusively periodic, with a frequency going from once every three years to once every six months and is carried out at 24 emission points (out of 37 concerned). None of the plants carry out dust

	monitoring once every three months. Considering that the waste may vary in nature or quantity over the year, monitoring dust once every six months seems appropriate. • The standard associated with dust monitoring is EN 13284-1 which defines dust as "particles, of any shape, structure or density". This should be reflected in the definitions of the BATC. <u>TVOC</u> • Standard EN 13649:2015-03 is indeed used to monitor individual gaseous organic compounds, however only very few data were collected about the monitoring of specific VOCs, which do not allow the specification in BAT 4 of which compounds should be monitored, for which waste treatment process and with which frequency. • Organic compounds are monitored at 14 emission points from shredders of metal waste (out of 44 emission points), and sometimes very high concentrations are reported (for instance from Plant 25). The VOC emissions could indeed be reduced by the implementation of a waste acceptance procedure (as set in BAT 2 and BAT 26) but TVOC monitoring may still be relevant, in line with the proposed PCB monitoring (see below). A frequency of once every six months, consistent with dust monitoring, would be the most simple and practical option. • Organic compounds are monitored at 18 emission points from MBT plants (out of 35). Monitored parameters are TVOC, TOC and CH_4 and the monitoring frequency varies between one and six times in the three-year reference period in the case of periodic monitoring. 8 of the emission points report continuous TOC monitoring. When the standard for TOC monitoring is reported, it seems in fact to correspond to TVOC. A TVOC monitoring frequency of every six months would therefore be in line with the data situation and also consistent with the monitoring frequency of other parameters at MBT plants, and therefore the most simple and practical option. • The definition of TVOC is given in the "definitions" section of the BAT conclusions. • Concerning the mechanical treatment in shredders of equipment containing VFCs and/or VHCs, see also the assessment of comments related to BAT 29 and the associated BAT-AELs: VOC monitoring is reported by 4 out of 10 plants, with continuous monitoring in two cases or a monitoring frequency of between once per year and once every three years. In one case (Plant 138), the data collection shows that the emissions vary significantly from year to year. It may therefore be useful to carry out the monitoring of organic compounds every six months to detect these variations more quickly. • Based on the assessment of comments related to BAT 29, it is proposed to add BAT-AELs (and associated monitoring) for VFCs emitted from the mechanical treatment in shredders of equipment containing VFCs and/or VHCs. A monitoring frequency of once every six months would be consistent with the TVOC monitoring. There is no EN standard for VFC monitoring (TS 50574-2 is about the determination of VFC removal of the depolluted equipment). • A new BAT (and BAT-AEL) is proposed to be added for mechanical treatment of waste with calorific value, therefore the associated monitoring should be reflected in the table. • Concerning the physico-chemical treatments of waste, no BAT-AELs common to all processes are proposed to be set for TVOC (see the assessment further below). <u>NH_3 and H_2S monitored at biological treatment plants</u> • There are indeed no EN standards for NH_3 and H_2S. In that case, the BAT statement indicates that BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality. • NH_3 and H_2S do indeed cause odour nuisance, and are indeed also used for purposes of process control but it is not clear why they would not also have an environmental impact. It is to be noted that NH_3 and H_2S are also monitored parameters in BAT conclusions concerning other sectors: NH_3 monitoring is for instance mentioned in the WBP, NFM or IRPP BAT conclusions and H_2S monitoring in the NFM BAT conclusions. • It is not very clear what distinction should be introduced between aerobic and anaerobic treatment of waste. • NH_3 monitoring is carried out at 51 emission points (out of 175) in the plants performing biological treatment of waste. All these emission points but one are related to the process or to the buildings housing the process. The monitoring is

	periodic, with an associated frequency ranging between once every three years and once every month (only in five cases). The monitoring frequency of once every three months therefore does not seem to be in line with the data collection. However, the monitoring frequency should allow the detection of seasonal peaks when more waste treated may lead to higher emissions, which seems to be possible with a monitoring frequency of one every six months. • H_2S monitoring is carried out at 35 emission points out of 175 in the plants performing biological treatment of waste. Of these 35 emission points, 7 are associated with biogas combustion, the rest of the points being connected to the process or to the buildings housing the process. The monitoring is periodic with an associated frequency ranging between once every three years and twice every year. The monitoring frequency of once every three months therefore does not seem to be in line with the data collection. However, the monitoring frequency should allow the detection of seasonal peaks when more waste treated may lead to higher emissions, which seems to be possible with a monitoring frequency of one every six months. • BAT 4 concerns channelled emissions to air and it is not necessary to add a footnote about sampling in a chimney. • Concerning the monitoring of odour, it should be made clear that it is possible as an alternative to NH_3 and H_2S monitoring for biological treatments of waste (see the assessment of comments related to BAT 32 for further details). <u>Hg</u> • All the plants (five) treating mercury-containing waste reported mercury monitoring, either continuous in two cases or periodic in three other cases, with a frequency of three to four times a year respectively. A monitoring frequency of lower than once every three months seems therefore inconsistent with this situation. • As for mercury monitoring at shredders of metal waste or at MBT plants, see the assessment of comments related to BAT 25 and BAT 37 respectively. <u>PCBs and PCDD/PCDF</u> • The standard ISO 11338 part 1 concerns the determination of gas and particle-phase polycyclic aromatic hydrocarbons, not PCBs. • Only one plant from the data collection carries out decontamination of PCB-containing equipment. This plant monitors PCB and dioxin-like PCB three times per year. Less frequent monitoring therefore seems inconsistent with this situation. Moreover, as it is proposed to change the name of this waste treatment (to PCB only instead of POP, see the assessment of comments related to BAT 50), the monitoring of dioxin-like PCB seems to be sufficient. • In line with the assessment of comments related to Section 6.2.2.1 of D1 (see Section 0 of this document), it is proposed to monitor PCDD/F and PCB emissions from the shredders of metal waste. The situation concerning monitoring of PCDD/F and PCBs at shredders of metal waste is as follows: PCDD/F, PCBs and/or dl-PCB are monitored at 11 emission points (out of 45). These 11 emission points are located in six plants. PCDD/F is monitored at four emission points, dl-PCB at two emission points and PCB at eight emission points. In three cases, the standard for PCB monitoring is reported to be EN 1948, which seems to indicate that the parameter monitored is in fact dl-PCB. Concerning the monitoring frequency, it varies between once every three years and four times a year. A monitoring of once per year seems sufficient to verify the efficiency of dust abatement techniques to also reduce emission of dioxins and PCBs. <u>Metals</u> • Metals can indeed be particle-bound and therefore abated by dust abatement techniques, as is also the case for PCBs and PCDD/PCDF. It therefore seems appropriate to adopt a similar approach, i.e. to monitor metals in order to verify the abatement efficiency, with a monitoring frequency of once a year. • As for the monitoring standards, it is not clear why they could not be applied to shredders of metal waste (see also the assessment related to standards above). <u>Additional parameters</u> • Concerning odour, the standard is mentioned in the dedicated BAT 6. See also the assessment of BAT 32.

	• Concerning PAHs and BTEX from treatment of contaminated soil, the data collection does not give information about the monitoring of these parameters in emissions to air. These parameters would however be part of the TVOC monitored. • As for BDE and HBCDD, the data collection does not provide information about these substances in mechanical shredders of metal waste. • Concerning CH_4 at AD plants, CH_4 is monitored at 4 emission points (located in three plants), out of 72. The aim of the AD plant is to recover CH_4 generated from the waste treatment; the CH_4 emissions generally occur as diffuse emissions and may be part of the LDAR mentioned in BAT 10. • Concerning additional parameters for MBT, mercury is monitored at one emission point and PCDD/F at five emission points, all located in the same Member State. The BREF review did not reveal whether mercury and dioxins are key environmental issues for MBT. As for N_2O, this concerns not only MBT but all biological processes using a biofilter as an abatement technique. For this point, see also the assessment of BAT 32: as it is proposed to monitor the content of NH_3 at the inlet of the biofilter, which induces the formation of N_2O inside the biofilter, it is unnecessary to monitor N_2O. <u>Footnotes</u> • Monitoring frequencies may be adapted if the data series clearly demonstrate a sufficient stability. Adding further flexibility would undermine the relevance of the BAT. • Adding a general footnote on all parameters that the monitoring requirement may not apply when the substance is not present in the waste would undermine the usefulness of the BAT for the permit writers. Guidance is given by the column "Waste treatment process", which already considers the expected relevance of each substance for each process. On a case-by-case basis, however, this may be useful to add a footnote referring to the proposed BAT 2bis. • Concerning the use of surrogate monitoring, it is not clear what surrogate methodology is proposed to be used. BAT is to use EN standards when they are available in order to guarantee the scientific quality of the data which are connected with a BAT-AEL. • Concerning the sampling point, the footnote is indeed useful for emissions to water but is more difficult to use for emissions to air.
EIPPCB proposal	• To add "channelled" in the BAT statement. • To replace "not applicable" with the BAT concerned even though there is no BAT-AEL. • To add VFC monitoring for WEEE containing refrigerants. • To add TVOC, PCDD/F and dioxin-like PCB for mechanical treatment in shredders of metal waste. • To add TVOC monitoring for mechanical treatment of waste with calorific value. • To add, where relevant, a footnote mentioning that the monitoring applies when the substance is mentioned in the waste gas inventory (new BAT 2bis). • To modify the minimum monitoring frequency as per the assessment described above. (i.e. once every six months for all parameters except for PCDD/F, dioxin-like PCBs and metals once every year for mechanical treatment in shredders of metal waste and dioxin-like PCBs once every three months for decontamination of equipment containing PCB). • To add a footnote on odour monitoring as an alternative to the monitoring of H_2S and NH_3 emissions. • To add the definition of dust in the BATC. • To update the names of the waste treatment processes in line with the changes made elsewhere in the BAT conclusions.

1.6 Odour

1.6.1 Odour management plan

Location in D1	Section 6.1.2 – page 889 – BAT 8
Current text in D1	**BAT 8. In order to prevent or, where that is not practicable, to reduce odorous emissions from the plant, BAT is to set up, implement and regularly review an odour management plan, as part of the environmental management system (see BAT 1), that includes all of the following elements:** • a protocol containing actions (see BAT 9) and timelines; • a protocol for conducting odour monitoring as set out in BAT 6. It may be complemented by measurement/estimation of odour exposure or estimation of odour impact; • a protocol for response to identified odour incidents; • an odour prevention and reduction programme designed to identify the source(s); to measure/estimate odour exposure; to characterise the contributions of the sources; and to implement prevention and/or reduction measures. **Applicability** The applicability is restricted to cases where odour nuisance can be expected and/or has been substantiated.
Summary of comments	Whole section • (EUROMETAUX 13) BAT 8 and BAT 9 should not be in the General BAT conclusions but in the section related to the biological treatments as they are based on information given in Sections 2.3.3.4, 2.3.5.1, 4.5.1.3, 2.3.5.2, 4.5.1.2 and 4.5.2.1. • (CEFIC 50) For simplification, combine this section with BATs 5 and 6. • (DK 114, CEWEP 94) Merge BAT 6 and BAT 8. • (AT 44) Move BAT 8 into Section 6.1.1 as it concerns diffuse and channelled emission of odour and change the title of Section 6.1.2 to address only diffuse emissions. BAT 8 • (MWE 133) Reword the statement as follows: "in order to prevent or, where that is not practicable, to reduce the potential for nuisance from odour" as the requirement for odour reduction should be based on risk assessment and presence of receptors. • (EFR 51, EFR 148) Odour management is not applicable for shredders as shredders do not produce odour due to the fact that no (or an omissible amount of) organics are treated. This should be reflected in the applicability of the BAT. • (CEFIC 17) Add in applicability restriction: "is restricted to cases where no active measurement of odour prevention is done" because most of the WT plants in the chemical sector use air extraction and the release of odour is impossible with this technique. • (CEFIC 16) Rewrite BAT 8 because all the features describe techniques for the reduction of diffuse emissions. Diffuse emissions and odours are two different kinds of emissions. • (CEFIC 15) Replace "all of the following elements" with "one or a combination of" because it hinders the improvement and evolution of other techniques which could have a better environmental performance. • (EURITS 33, HWE 25) The four points should not have the same applicability (point 1: applicability: where odour nuisance can be expected, and points 2 to 4: applicability: where odour nuisance has been substantiated). Indeed, some installations would be considered as an installation where odour nuisance can be expected without ever having been substantiated. • (EUCOPRO 17) In line with comment EUCOPRO 16 on BAT 6, remove the reference to BAT 6.

	• (IE 12) Include an additional bullet point as follows "a protocol for recording and responding to complaints relating to odour nuisance".
EIPPCB assessment	<u>Whole section</u> • Examples of plants with odour management plans are available for all sectors (see Table 2.41 in the BREF). • BAT 5 and 6 are indeed about odour and diffuse emissions but only from the perspective of monitoring. Even if the combination of BAT were to reduce the number of BAT conclusions, it may not necessarily bring clarity. • BAT 6 and BAT 8 are indeed connected but one is about monitoring and is therefore in the "monitoring" section while the other is about prevention and reduction measures. It is to be noted that the current structure is consistent with other BAT conclusions (mainly CWW and IRPP). • BAT 8 and BAT 9 concern the reduction or prevention of odour emissions at source, whether diffuse or channelled, and it is not necessary to change the heading of the section or the location of the BAT conclusions. <u>BAT 8</u> • BAT 8 needs to remain consistent with similar BAT in other BREFs (such as CWW, WBP, IRPP) and proposals for changes should be examined with this in mind. • The rewording of the BAT statement is not necessary as the consideration of the potential for odour nuisance is reflected in the applicability. • BAT 8 concerns all types of odorous emissions, channelled and diffuse. • It is not clear how the application of all bullet points, which are quite generally stated, would hinder the development of other techniques. Moreover, the techniques listed and described in these BAT conclusions are neither prescriptive nor exhaustive. Other techniques may be used that ensure at least an equivalent level of environmental protection. • The applicability of the BAT accommodates the situation of mechanical shredders of metal waste where no odour nuisance can be expected and it does not seem necessary or appropriate to focus on this particular case. It also covers the cases where prevention measures have already been taken (it may be that the odour management plan identifies no further prevention measures to be taken). • As for the differentiation of applicability between the bullet points, the BAT leaves considerable flexibility regarding the content of those elements and an installation where an odour nuisance can be expected but has been not substantiated may have also a protocol for odour monitoring, for response to odour incidents or an odour prevention or reduction programme. • The point concerning complaints has been reflected in the revised text of the BREF but as it is covered by the third bullet point, and again for consistency with other BREFs, it does not seem necessary to add further detail to the text of the BAT. • As for the reference to BAT 6, see the assessment of the comments related to BAT 6. • Although there were no comments on this point, it does not seem appropriate to have a cross-reference to BAT 9 as it could be understood that only actions listed in BAT 9 should be in the protocol.
EIPPCB proposal	• To remove the cross-reference to BAT 9.

1.6.2 Techniques for the prevention or reduction of odorous emissions

<table>
<tr><td>Location in D1</td><td>Section 6.1.2 – pages 889-890 – BAT 9</td></tr>
<tr><td>Current text in D1</td><td>

BAT 9. In order to prevent or, where that is not practicable, to reduce odorous emissions, BAT is to use one or a combination of the techniques given below.

<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a</td><td>Minimise residence times</td><td>Minimise the residence time of odorous waste and potentially odorous waste in collection and storage systems, in particular under anaerobic conditions. When relevant, adequate provisions are made for the acceptance of seasonal peak volumes of waste.</td><td>Generally applicable.</td></tr>
<tr><td>b</td><td>Chemical treatment</td><td>Use chemicals to destroy or to reduce the formation of odorous compounds (e.g. oxidation or precipitation of hydrogen sulphide).</td><td>Generally applicable.</td></tr>
<tr><td>c</td><td>Optimise aerobic treatment</td><td>This can include:
• controlling the oxygen content;
• frequent maintenance of the aeration system;
• use of pure oxygen;
• removal of scum in tanks.</td><td>Generally applicable in case of aerobic treatment of waste.</td></tr>
</table>

</td></tr>
<tr><td>Summary of comments</td><td>

<u>BAT statement</u>

- (AT 113) Change wording of BAT 9 to "to reduce diffuse odorous emissions…" as BAT 9 concerns only diffuse emissions.
- (EEB 233, DK 115, ES_A 22, FEAD 113, ECN 118, SE 211) The BAT point should aim to reduce the potential for odour nuisance and not simply to reduce odorous emissions, which should be reflected in the statement.
- (ESRG 8) Insert nuisance into BAT 9: "...to reduce odorous emissions nuisance,..."
- (EEB 233, EEB2_1, DK 115) One technique only is unlikely to be sufficient.

<u>BAT applicability</u>

- (EERA 51, EFR 52) As for BAT 8, the applicability is restricted to cases where an odour nuisance can be expected or has been substantiated.
- (EFR 149, EFR 53, EFR 54) Restrict the applicability to exclude shredders of metal waste, which do not produce odours.

<u>Additional techniques</u>

- (HWE 27, EURITS 35) Add a new technique about human sensing, which is the fastest and most efficient technique to find the origin of an odorous nuisance and also to identify if the installation is the origin of the nuisance.
- (BE 74, IT 42) Add a technique about enclosure and collection of odorous waste gas.
- (IE 64) Add a technique which is to divert particular waste streams away from the facility or limiting the type of treatment processes on certain waste types.
- (BE 76) Include improvement of emission dispersion. Indeed, according to the Flemish BAT study for processing external industrial waste water and liquid/sludgy industrial waste flows: 1/ A relocation of existing process components is not always technically feasible (e.g. loss of natural hydraulic line, lack of space). 2/ The result of an increase in the chimney is situation-specific (e.g. height of chimney, dominant meteorological conditions). Improvement of dispersion is not an effective odour reduction technique. However, in exceptional cases, for existing installations where local odour nuisance requires radical techniques/measures, it can offer a solution.

<u>Technique a</u>

- (ECN 117, EBA 4) Technique a is only needed in the case that the storage is not enclosed and not connected to an odour control/removal unit.

</td></tr>
</table>

	• (UK 242) Irrespective of seasonal variation, it is important to limit the residence time to 24 hours, in order to minimise the impact of odour at all times, but taking into account weekends or public holidays, 48 hours is more practicable. • (IE 44) Change text from "...in collection and storage systems..." to "...during collection and storage...". • (IE 45) Cleaning and housekeeping can also influence the level of nuisance from odorous emissions: row g of BAT 10 should be repeated here. • (BE 80, BE 81) Residence time is only one housekeeping measure among others such as controlling storage and treatment conditions of odorous waste (e.g. temperature, pH, oxygen content) and avoiding spillage of odorous waste. <u>Technique b</u> • (FR 223, EURITS 34, HWE 26) Delete the examples between brackets as they are not exhaustive or helpful). • (EUCOPRO 18) Odour-neutralising substances could also be used. • (IE 11) Addition of chemicals to treat odour emissions (masking) can in itself lead to an odour nuisance of a different kind. This technique should not be relied upon as a routine approach. <u>Technique c</u> • (BE 75) Include technique c. in Section 6.3.2 on aerobic treatment. • (FR 313) Specify in the applicability column that the use of pure oxygen and removal of scum in tanks are only applicable to treatment of water-based liquid wastes. • (CZ 3) Another basic parameter to optimise aerobic treatment in BAT 9 is humidity.
EIPPCB assessment	<u>BAT statement</u> • BAT 9 is about the prevention or reduction at source of odorous emissions which, if released, can be either collected and channelled or diffuse. • It is not clear why one technique only would not be enough. • The wording "nuisance" implies both notions of odour emission and odour reception. As the BAT is proposed to be applied regardless of the nuisance (see below), it is not needed to change the BAT statement. <u>BAT applicability</u> • As far as shredders are concerned, technique a concerns only odorous waste, and technique b only odorous compounds, and both exclude mechanical treatment in shredders of metal waste if they do not produce odours. As for technique c, it concerns only aerobic treatment of waste. Therefore it does not seem necessary or appropriate to specifically exclude this process. • As for the restriction to cases where an odour nuisance can be expected or has been substantiated, BAT is to apply one or a combination of techniques. In the case of installations treating odorous waste, technique a is a normal housekeeping measure (see below) and technique c would be applied anyway in case of aerobic treatment in order to optimise the process, so at least one technique would be applied regardless of the odour nuisance. <u>Additional techniques</u> • Human sensing can be a part of the odour management plan mentioned in BAT 8. • Enclosure and collection of odorous waste gas is addressed in BAT 10 which concerns all diffuse emissions and not only odorous emissions. • The reduction of odour by selecting and permitting the type of waste to be treated and/or type of treatment to be carried out at an installation is an implementation issue. • BAT 9 is about prevention or reduction of odour emissions which is not the case of improvement of emission dispersion. <u>Technique a</u> • BAT 9 is about prevention and reduction of odour at source, irrespective of the storage being enclosed or emissions to air being collected. Moreover, minimisation of the residence time seems to be a normal housekeeping measure to avoid accumulation of waste and the technique as stated leaves flexibility in terms of residence time.

	• Considering the residence time, Section 4.5.1.2 of the BREF mentions a period of between 24 hours and 72 hours to treat putrescible waste when it is not stored indoors. It could indeed be useful to give some more details. • The current wording "in collection and storage system" could lead the reader to understand that waste collection is concerned by this BAT, which is not the case. In this context, "collection system" means, for instance, pipework carrying liquid waste. • Cleaning, housekeeping, waste storage and handling are addressed in BAT 10, 23 and 24 respectively. Specific process conditions are addressed, when relevant, in the subsector chapters. <u>Technique b</u> • The examples in brackets are indeed not exhaustive but it is not clear why they are not helpful as they give an illustration of the technique. • Neutralising agents are already covered by the wording "chemicals to destroy or to reduce the formation of odorous compounds" which is more specific. This technique does not concern masking agents, however, which do not prevent or reduce emissions but mask the smell by substituting it with another odour. <u>Technique c</u> • Technique c does indeed concern aerobic treatment of solid waste as addressed in Section 6.3.2 but also biological treatment of water-based liquid waste as addressed in Section 6.5, which is why it is in the generic chapter. • Control of moisture content is relevant for the aerobic treatment of solid waste and is already mentioned in BAT 34, but is not relevant for aerobic treatment of water-based liquid waste. • Use of pure oxygen and removal of scum in tanks are indeed only relevant for water-based liquid waste and it would bring clarity to explicitly mention what waste treatment processes are concerned by technique c.
EIPPCB proposal	<u>Technique a</u> • To replace "collection" with more explicit wording. • To further specify the residence time. <u>Technique c</u> • To make it clear what types of waste treatment processes are concerned by this technique. • To add clarification on the use of pure oxygen and removal of scum.

1.7 Diffuse emissions to air

<table>
<tr><td>Location in D1</td><td>Section 6.1.2 – pages 891-892 – BAT 10</td></tr>
<tr><td>Current text in D1</td><td>
BAT 10. In order to prevent or, where that is not practicable, to reduce diffuse emissions to air, BAT is to use one or a combination of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Limit the number of potential diffuse emissions sources</td><td>This includes:
appropriate design of piping layout (e.g. minimising pipe run length, reducing the number of flanges and valves, using welded fittings and pipes);
favouring the use of pressure transfer (e.g. gravity) rather than pumps;
limiting the drop height of material.</td><td>The design of piping layout is only applicable to new plants.</td></tr>
<tr><td>b.</td><td>Select and use high integrity equipment</td><td>This includes:
valves with double packing seals or equally efficient equipment;
high-integrity gaskets (such as spiral wound ring joints) for critical applications;
pumps/compressors/agitators fitted with mechanical seals instead of packing;
magnetically driven pumps/compressors/agitators.</td><td rowspan="3">Generally applicable.</td></tr>
<tr><td>c.</td><td>Select appropriate materials for equipment</td><td>This includes:
appropriate selection of construction material to avoid corrosion;
lining or coating of equipment and painting of pipes with corrosion inhibitors to prevent corrosion.</td></tr>
<tr><td>d.</td><td>Ensure containment, collection and treatment of diffuse emissions</td><td>This includes:
storing and handling waste and material that may generate diffuse emissions in enclosed equipment or buildings;
collecting and directing the emissions to an appropriate abatement system (see Section 6.6.1);
dampening waste that can generate diffuse dust emissions with water.</td></tr>
<tr><td>e.</td><td>Use semipermeable membrane covers</td><td>Active composting heaps are located in positively aerated plants covered with semipermeable membranes and sealed closed.</td><td>Only applicable to aerobic treatment of waste.</td></tr>
</table>
</td></tr>
</table>

	f.	Limit potential generation of odour, dust and bioaerosols by considering meteorological conditions in the operation of the plant	This includes: • Monitoring weather conditions and wind direction and taking those conditions into account when undertaking major outdoor process activities. • Avoiding formation or turning of windrows or piles on windy days. • Undertaking screening and shredding when the wind speed is low or the wind direction is away from sensitive receptors. • Orientating windrows considering the direction of the prevailing wind. The smallest possible area of composting mass is exposed to the prevailing winds, to avoid 'stripping' of the windrow surface, and preferably at the lowest elevation within the overall site layout.	Only applicable to aerobic treatment of waste, when techniques (d) and (e) are not used.
	g.	Maintenance and cleaning	This includes: • ensuring access to potentially leaky equipment; • regularly controlling protective equipment such as lamellar curtains, fast-action doors; • regularly cleaning halls, conveyor bands, etc.	Generally applicable.
	h.	Set up and implement a leak detection and repair (LDAR) programme	See the description of the technique in Section 6.6.1.	Only applicable to plants that contain a large number of piping components (e.g. valves) and that process a significant amount of lighter hydrocarbons.
Summary of comments	All BAT • (FR 89, AT 47, ES_A 23, EUCOPRO 19, FEAD 91) In all technique descriptions, replace "this includes" with "this may include" as the techniques listed in the description column should be only indicative and not mandatory. • (EEB 234, UK 243, IT 43) One technique is not enough and the statement should be replaced by "a combination of techniques". • (ES_A 87, FEAD 90) The statement should read: "one or an appropriate combination of". • (BE 82, DE 369) Replace with "…BAT is to use all of the techniques given below." • (DE 421) Reduction of odour should be also mentioned as one objective of BAT 10. • (DE 369) Mention only those techniques which can be applied in all sectors of the WT BREF document. • (EFR 147) Similarly with BAT 19, add at the end of the statement: "unless restricted by a lack of space or excessive cost". • (EFR 115, 116) Delete all instances of "Generally applicable" in column 4 except for row g as few of the techniques described in the table are applicable to metal waste shredders. • (EUCOPRO 20) For techniques b, c and d, replace "generally applicable" with "to be related to the configuration of the site (new or existing), to the size of the plant, the type of operation/treatment, the waste characteristic".				

	• (CEFIC 51) Measures b-d and g do not work in open systems and this should be clarified. • (IE 1) BAT should be addressing potential for nuisance and not just be trying to reduce actual diffuse emissions. • (BE 84) Summarise here the BAT conclusions from the EFS BREF as there is no certainty that this BREF will be revised. <u>Additional techniques</u> • (EEB 46, DE 368, DE 523, DE 91) There are many more techniques available to reduce diffuse emissions than mentioned in BAT 10, such as application of water or fog cannons at open handling processes, use of sprinkler systems in unloading areas, etc. (more techniques are listed in an attachment to the comments). • (BE 83) This table should be extended with all relevant techniques of Section 2.3.5.3 of the BREF. • (AT 49) Add technique "Use impermeable capping and negative aeration (suction)" for composting heaps. • (IT 45) Add technique "Enclosed systems with exhaust air collection and treatment for the intensive decomposition (active composting time) of highly putrescible waste" as the intensive decomposition should not take place in open systems when an odour nuisance can be expected or has been substantiated, since this is one of the main odour sources in the process. <u>Technique a</u> • (DK 116, EBA 5, ECN 119) Delete the first two examples in brackets because 1/ emissions to air cannot be released over the length of a pipe which is gastight and 2/ high-integrity equipment prevents emissions to air. • (UK 244) The design of piping layout should also apply when plants are substantially modified from maintenance and plant replacement. • (FEAD 148) Delete the bullet point about the use of pressure pumps as gravity-driven unloading may imply the storage to be underground. <u>Technique b</u> • (ESRG 9) There are situations / waste streams -such as organic liquids containing trace levels of ferrous particles- where magnetically driven equipment would not be the best equipment. • (FR 158) The applicability for BAT 10b should be modified and should exclude biological and mechanical treatment plants which do not deal with hazardous wastes. <u>Technique d</u> • (FR 225, EURITS 36, HWE 28) If the diffuse emissions are not significant, the imposition of enclosed equipment or buildings is not cost-effective. The technique should also not lead to more dangerous situations like an ATEX area. In addition, in order to avoid misinterpretation of this technique, it should be clearly stated that this technique may not apply to reactors for biological treatment of water-based liquid waste. Even if reactors of PCT of WBLW are closed, the main objective is to monitor the reaction correctly and not necessarily to prevent emissions. • (IT 44, EFR 84, EFR 153) Use of enclosed buildings may be limited by safety issues (such as risks of explosion for shredders or risks of oxygen depletion when storing metal waste)**.** • (IE 2, FEAD 221) Not all waste management facilities need collection and treatment of diffuse emissions. Containment alone may be sufficient at some sites, where dust and odour are very minor issues. (IE 63) The monitoring/control of the dust extraction system also needs to be listed as an important control point for any dry scrubber. • (BE 85) Conclusions on waste fractions that can be stored outside (open storage), provided that fractions are moistened or covered with e.g. tarpaulins, and waste fractions that must be stored inside (enclosed storage) seem to be missing. Only active composting heaps are explicitly mentioned. • (UK 245) Buildings should be under negative pressure in order to extract any odorous compounds and bioaerosols to abatement. (UK 246) Covered conveyors are also an important technique. • (ES_C 35) A very good technique to avoid diffuse emissions is semi-closed buildings

	properly adapted for loading, unloading, handling and storing, which protect the waste from the wind. Technique e • (DK 117, ECN 120, ECN 167) Describe technique e in Section 6.6.1 and leave only a cross-reference in BAT 10. • (FEAD 93) Semi-permeable membranes can be used only if a forced ventilation system exists and a positive one (blowing and not sucking) that is located under the heap. Secondly, it can be applicable when adequate walls or other infrastructure are in place and if space allows. • (FR 159) The applicability of semi-permeable membrane should be restricted to active and positive ventilation of the windrows and in the case of local heavy rainfall periods. Ensure that this technique is not linked to a single patent with a single supplier. Technique f • (FR 160, MWE 135) Windy weather is not the only adverse weather condition, absence of wind can even be worse. • (IE 40, UK 247) Extend the applicability of technique f. For instance, moving external stockpiles of waste may create dust emissions and so weather conditions should always be considered in this situation. Also when a semi-permeable membrane is removed, odour will occur. • (DK 96) Techniques f and g are also related to odour and should be repeated in BAT 9. • (UK 248) Add in the description column "monitoring the moisture during the composting process to limit the generation of dust and bioaerosols". Technique g • (EEB 235, DK 118, FEAD 119, IT 46, ECN 121, MWE 134) Add a new bullet point "regularly cleaning of traffic areas, equipment and containers of odorous waste residues and spillage". • (AT 48) Change last bullet point to read "regularly cleaning the whole waste treatment area (including halls, conveyer belts, roads, storage areas, acceptance area, trucks, etc.)". Technique h • (ESRG 10, FR 226, AT 50, EURITS 37, HWE 29) "Lighter hydrocarbons" is not clear and should be replaced by "highly volatile components" or "volatile hydrocarbons". • (IE 10, FR 93, ES_A 24, EUCOPRO 21, FEAD 92) The applicability of technique h needs to be specified, in particular “large number of” and “significant amount”. • (UK 249) Technique h is applicable to all sites with pipe runs and storage tanks. Plants with a small number of piping components still require a LDAR programme.
EIPPCB assessment	All BAT • "This includes" can be replaced by "this includes techniques such as" as the techniques listed and described in these BAT conclusions are neither prescriptive nor exhaustive. • Indeed, BAT 10 is also relevant for odorous emissions in addition to other diffuse emissions such as dust and VOC emissions. • Having in mind the applicability restrictions of the different techniques and the use of " includes techniques such as ", it would in principle be BAT to use more than one technique. However, as it is proposed to move techniques e and f into another BAT (see below), it may not be the case anymore (for example for aerobic treatments). • To use all of the techniques may be not feasible or necessary for some waste treatment processes (for instance treatments where only dust is relevant). • It is true that techniques e and f are only relevant for aerobic treatments of solid waste. This being considered, and considering also that the applicability column does not aim to indicate which waste treatment processes the technique is relevant for, is more appropriate that these two techniques are moved to the "aerobic treatment" section.

	• The "applicability" column does not aim to indicate for which waste treatment process a given technique is relevant but to indicate technical considerations which may restrain its application. The text gives flexibility as to the possible choice of techniques, considering the type of waste treatment process. In addition, the techniques are of course applied considering the plant's condition, waste characteristics, space constraints, etc., but this is an implementation issue to be addressed on a case-by-case basis. • The techniques also aim to prevent diffuse emissions and not only reduce them (for instance techniques a, b or c), which encompass the reduction of possible nuisances. • The existing EFS BREF is mentioned in the Scope as another reference document which could be relevant for the activities covered by these BAT conclusions so it is not necessary to repeat here some of the EFS conclusions. <u>Additional techniques</u> • Of course, there are more techniques than those listed in BAT 10 which does not aim to be exhaustive, which is clearly reflected by "this includes techniques such as ". However, in order to make use of the information available, techniques not listed in BAT 10 should be listed in Section 2.3.5.3 of the BREF. • As for enclosed systems with exhaust air collection and treatment for intensive decomposition, this technique is already one of the techniques (technique d) of BAT 10. Based on the data collection, it is not clear that this technique should be favoured for intensive decomposition over another one. However, enclosure of intensive decomposition could be one of the actions of the odour management plan if an odour nuisance can be expected or has been substantiated. • Negative aeration (suction) is indeed a type of aeration which is used not only for composting heaps but also to capture emissions at source ("source suction"), which could be better reflected in technique d. <u>Technique a</u> • The reduction of pipe length and of the number of components reduces the probability of failure of these pipes/components due to ageing, malfunction or damage. High-integrity equipment is another parameter which reduces the risk of leakage and is addressed in technique b. • Indeed, the piping layout could also be modified during major plant upgrades as mentioned in Section 2.3.5.3 of the BREF. • The second bullet is about favouring the use of pressure transfer instead of pumps but not to use it systematically. Moreover, the use of " includes techniques such as " in the description of the technique leaves even more flexibility for the application of this point. <u>Technique b</u> • Indeed, magnetically driven equipment may not be advised in the case of organic liquids containing trace levels of ferrous particles and it should be reflected in a technical restriction to the applicability. • Technique b may indeed be not relevant for all types of waste treatments but flexibility is already given by the choice of the combination of techniques to be applied and by the use of " includes techniques such as " in the technique description. <u>Technique d</u> • This technique may indeed not be relevant for water-based liquid waste, for installations with very minor diffuse emissions, or for other cases not mentioned in the comments but flexibility is already given by the choice of the combination of techniques to be applied and by the use of " includes techniques such as " in the technique description. • On the other hand, the use of enclosed buildings may indeed be restricted by safety considerations such as the risk of explosion or oxygen depletion e.g. in the case of storage of fine and wet scrap metal. • Maintaining negative pressure is indeed an important technique to avoid diffuse emissions, as mentioned in Section 2.3.5.3 of the BREF. So are covered conveyers but this technique is already addressed by "handling waste in enclosed equipment". • Controlling the efficiency of dust extraction to avoid e.g. clogging of activated carbon

	is indeed an important point. However, BAT 10 is about prevention and reduction of diffuse emissions to air and this point related to the operational data of activated carbon fits better in Section 2.3.4.9 of the BREF. • As for waste fractions to be stored outside or inside, some more information can be found in Section 2.3.5.3 of the BREF. BAT 10 does not aim to be exhaustive, which is clearly reflected by "this includes techniques such as ". Composting heaps are mentioned specifically because technique e is directly related to this type of waste. • Semi-closed containers are indeed mentioned in Section 2.3.5.3 of D1 but the meaning of this term is not very clear and could therefore be removed. • The last bullet point of technique d (damp to reduce dust emissions) is not related to containment, collection and treatment of diffuse emissions. It would be clearer to add a specific technique for the reduction of dust diffuse emissions. • Technique d is the preliminary step before channelled emissions are treated. As BAT 10 is expressed as one or a combination of techniques, the link between firstly the containment and collection of emissions, and secondly the treatment of collected emissions, is not ensured and should be clarified in all subsequent BAT addressing techniques to abate emissions to air. <u>Technique e</u> • Techniques are described in Section 6.6.1 when they are mentioned more than once in the BAT conclusions, in order to avoid repetition, which is not the case of semipermeable membranes. • Indeed, active and positive aeration is an important feature of technique e and it is already reflected in the description of the technique. However, for the sake of clarity, it could be mentioned in the title of the technique too. • The different designs of semipermeable membrane are presented in Section 4.5.2.3 of the BREF. Walls or infrastructure are parts of some of these designs (i.e. part of the technique) and are not an applicability restriction. The restriction due to space constraints does not seem very clear as the membrane can be adapted to the size of the heap. • The membrane may be more necessary in regions with heavy rainfall but this is not an applicability restriction. • As for the availability of semipermeable membranes in the market, it is confirmed that there is more than one supplier. <u>Technique f</u> • Indeed, not only windy conditions but also other adverse weather conditions could prevent the formation or turning of windrows or piles. • Indeed, there may be situations where, even when using technique d or e, it may be necessary to consider the weather conditions (for instance when carrying out outdoor activities). • Techniques f and g, but also all the other techniques, may be relevant for odour, and it could bring clarity to mention it in the BAT statement • The monitoring of moisture content during the composting process is mentioned in BAT 34. • The first three bullet points pertain to the same idea of considering weather conditions before undertaking some major activities outdoors. <u>Technique g</u> • The description of areas to be cleaned would indeed bring additional value by being extended. <u>Technique h</u> • The applicability restriction needs indeed some rewording: the aim of LDAR is to prevent or reduce diffuse VOC emissions and is therefore applicable to installations handling VOCs. It is not possible to further specify "large number" or "significant number" so these terms should be removed. It is necessary however to maintain the idea that was reflected by these terms, i.e. LDAR is implemented in a risk-based approach, which fits better as a description than as an applicability restriction

EIPPCB proposal	• To mention the pollutants concerned in the BAT statement. • To replace "includes" with " includes techniques such as " in the technique descriptions. • To extend the applicability of technique a to major plant upgrades. • To modify the applicability of techniques b, d and h. • To complete the descriptions of techniques d, e, g and h. • To adapt the wording of the title of technique e. • To move techniques e and f into a new BAT (34bis). • To merge the first three bullet points of technique f. • To add a new technique (d1) about the reduction of diffuse dust emissions by using dampening. • To make references to BAT 10d in all subsequent BAT addressing techniques to abate emissions to air.

1.8 Emissions to water

1.8.1 Water usage and discharge of pollutants to water

<table>
<tr><td>Location in D1</td><td>Section 6.1.3 – page 894 – BAT 13</td></tr>
<tr><td>Current text in D1</td><td>

BAT 13. In order to reduce water usage and to prevent or, where that is not practicable, to reduce the discharge of pollutants to water from waste treatment, BAT is to use all of the techniques given below.

<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a</td><td>Water-saving action plan and water audits</td><td>A water-saving plan includes:
• flow diagrams and water mass balance,
• establishment of water efficiency objectives,
• implementation of water optimisation techniques (e.g. water pinch techniques, minimising use of washing and cleaning water).

Water audits are carried out with the aim of increasing the reliability of the control and abatement performance of pollutants, reducing water usage, and preventing water contamination.</td><td>Generally applicable.</td></tr>
<tr><td>b</td><td>Segregation of different water streams in the water and drainage systems</td><td>Each water stream (e.g. road water, run-off water, process water) is collected and treated separately, depending on the pollution content. Uncontaminated water is reused as much as possible in the substitution of fresh water. Drainages from incompatible wastes are not mixed.</td><td>Generally applicable to new plants.

Applicable to existing plants within the constraints given by the configuration of the water circuits.</td></tr>
<tr><td>c</td><td>Maximise internal water recycling</td><td>Increase the number and/or capacity of water recycling systems.</td><td>Water recycling may be limited by the content of impurities in the water.</td></tr>
</table>

</td></tr>
<tr><td>Summary of comments</td><td>

<u>Whole "Emissions to water" section</u>

- (EEB 116, CEWEP 58, CEWEP 59, SE 183, SE 186, DE 42, MWE 139, NL 10, FEAD 84) "Waste water", "indirect discharge" and "direct discharge" should be defined.
- (BE 95) Define specific and adequate (pre)treatment techniques for priority substances (persistent, toxic, bioaccumulating).
- (FEAD 181, EFR 121) Considerations of the state and tolerance of the recipient should be included in the BAT conclusions for emissions to water.

<u>Whole BAT 13</u>

- (CEWEP 95, DE 518, FEAD 246, ECN 124) Merge BAT 13 and BAT 14 because waste water volume reduction is mentioned in both BAT conclusions.
- (UK 257, CEFIC 20) Not all the techniques but only one or a combination should be used because one technique may be enough and the application of all techniques may result in lower energy efficiency.
- (CEFIC 52) Clarify that BAT 13 does not apply for WWT plants in the chemical industry in order to avoid overlapping with the CWW BREF.
- (EEB 134) BAT 13 should be complemented with specific requirements as per existing BAT 42-55. The most important concepts that have not been considered are outlined in existing BAT 44 (no effluent bypassing) and existing BAT 54

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	(assessment of fate of chemical constituents of treated effluent). Technique a • (FR 167, ECN 125, MWE 136) Technique a is neither necessary nor applicable for the biological treatments of waste because the use of water is well known and depends on the process. Moreover, it is disproportionate for this sector. • (FEAD 247) An economical and considerate exploitation of resources is in the interest of each industry. It is disproportionate to ask for water-saving action plans and water audits and technique a should be deleted. • (FR 65, EFR 55) The applicability of technique a should be limited to cases where water is used or recovered in the process. • (FR 167, HWE 31, EURITS 40) It should be clarified that audits are internal to avoid misunderstanding. • (AT 51) "Audit" should be clarified or deleted. • (FR 167, HWE 32, EURITS 40) Reducing water usage by itself does not make sense and should be replaced by waste water not being generated by unnecessary uses. • (AT 51, ES_A 25) Replace "A water-saving plan includes" with "a water-saving plan may include" because other techniques may be used to reach an equivalent level of environment protection. • (SE 34, NL 7) A water-saving action plan should only be required for plants using large amounts of water (if water consumption is more than 5000 m^3/year). Technique b • (IE 57) References to "water streams" should more correctly be "waste water streams". • (BE 37) Define "run-off water" and specify if it is contaminated or uncontaminated in the context. • (UK 253, FEAD 193) Replace "depending on the pollution content" with "based on the pollutant content" to clarify that similar water streams (road water and clean run-off water) can be combined if they have a similar (insignificant) pollution content. • (SE 195) Clarify that separation of water streams should be motivated by environmental benefits. BAT 13b should allow the mixing of waters that preferably are treated in a common WWT. • (UK 254) It should be noted that different waste streams will often be blended to produce a waste water suitable for indirect discharge. • (AT 52) Concerning the reuse of water, not only uncontaminated but all collected water should be reused as much as possible. Technique c • (ESRG 12, FR 230, EUCOPRO 22, EURITS 41, FEAD 86, HWE 33) Replace "maximise" with "optimise" as the word "maximise" is too broad and could, for example, imply disproportionate energy costs. • (FR 230, EURITS 41, HWE 34, HWE 35) In line with the previous point, replace "increase" with "adapt" and reflect that the type and amount of impurities acceptable also depend on how the recycled water is used. • (EUCOPRO 23) Water recycling should be related to an effective need for the site, as well as its technical and economical feasibilities. • (ES_C 20, EFR 177) Technique c should be applicable only to new plants.
EIPPCB assessment	Whole "Emissions to water" section • As for the definitions, see the assessment of the "definitions" section. • Definition of (pre)treatment techniques is part of the integrated waste water management and treatment strategy. It seems difficult to define specific techniques for each and every type of waste water or water-based liquid waste (or combination) potentially received at a plant. BAT 15 gives indications of the typical pollutants targeted by each of the techniques listed. • The state and tolerance of the recipient are a local issue. However, the proposed new BAT 2c1 (implementation of an output quality management system) should address this.

	Whole BAT 13 • As BAT 14 is now proposed to be deleted (see the assessment on BAT 14 in Section 1.8.2), there would not be overlaps. • As for which of the techniques are to be used, considering the new wording of the techniques and the applicability restrictions proposed in the revised BAT conclusions, it seems that all techniques are to be used • BAT 13 applies to the IED activities as defined in the Scope of the BAT conclusions. • According to the statement of BAT 15, BAT is to treat waste water before discharge (i.e. no bypassing). The waste water treatment techniques which are selected based on the waste water streams inventory introduced in BAT 2bis, the monitoring of key process parameters and of emissions (BAT 3bis and BAT 3), and the implementation of an output quality management system (new BAT 2c1) should ensure the adequate treatment of waste water. Technique a • The objective of the BAT is indeed to reduce the volume of waste water generated but also to optimise the water consumption. • Technique a and the whole BAT 13 indeed make only sense if water is used or recovered in the process but it does not seem necessary to make this explicit. • According to Section 2.3.7 of the BREF, water-saving action plans and audits are only examples of techniques to optimise water consumption. • Audits are ways to verify the proper implementation of the water-saving plans and are already covered by BAT 1. Technique b • Waste water implies water that requires treatment, which may not be the case of uncontaminated water streams. • For the definition of "run-off water", see the assessment of the section "Definitions" • The segregation is based on the pollutant content and not on the type of water. For instance, in the case of waste treatment being carried out outdoors, some run-off water may be contaminated and some not. • Segregation of water streams is motivated by the reduction of waste water volume and is based on the pollution content. This does not prevent the use of treatment techniques such as neutralisation and equalisation which are mentioned in BAT 15. • Reuse of uncontaminated water is more relevant to technique c which is about water recycling. Technique c • The objective of technique c is to recycle as much water as possible, while considering other factors such as the destination of recycled water, energy efficiency or economics aspects. • The applicability restriction is related to the content of impurities of recycled water. The acceptable content depends on the use of the recycled water but the added value of an additional explanation is not very clear. Moreover, the content of impurities in the recycled water is not an applicability restriction but instead dictates the degree of recycling. • It is not clear why technique c should be restricted to new plants only.
EIPPCB proposal	BAT statement • To reformulate the BAT statement to make it clear that one of the objectives is to optimise water consumption. Optimisation is also in line with the comments on technique b. Technique a • To reformulate the description of technique a to list other possible ways to optimise water consumption and to remove the reference to audits. • To change the name of technique a to reflect better the description. Technique b

	• To amend the wording of technique b. • To remove "reuse of uncontaminated water". • To move this technique downwards in the list next to ex-technique 20b which also deals with drainage. <u>Technique c</u> • To clarify the wording of technique c and to remove the applicability restriction. <u>Whole BAT</u> • To merge BAT 13 with BAT 20 (see the assessment of BAT 20). • To add the technique from BAT 46 as an example of a water-saving technique in BAT 13a (see the assessment of BAT 46).

1.8.2 Waste water management plan

<table>
<tr><td>Location in D1</td><td>Section 6.1.3 – page 894 – BAT 14</td></tr>
<tr><td>Current text in D1</td><td>

BAT 14. In order to prevent or, where that is not practicable, to reduce emissions to water, BAT is to use the technique given below.

<table>
<tr><th colspan="2">Technique</th><th>Description</th></tr>
<tr><td>a</td><td>Integrated waste water management and treatment strategy</td><td>The integrated strategy is based on the inventory of waste water streams (see BAT 2), and considers the following principles:
• segregation of waste water streams depending on the pollution load and the combination of techniques of the treatment process (see Section 6.6.2.);
• reduction of the remaining pollutants (e.g. organics) after the physico-chemical treatment, by means of e.g. activated sludge system;
• reduction of remaining contamination with finishing techniques (post-treatment techniques such as: coagulation and flocculation, sedimentation, filtration, flotation);
• in the case of indirect discharge, the level of emission of the remaining pollutants does not have a negative impact on the downstream WWTP and this plant can adequately deal with those remaining pollutants.</td></tr>
</table>

</td></tr>
<tr><td>Summary of comments</td><td>

<u>Entire BAT 14</u>

- (UK 255) The table is unwarranted as it only lists one technique. The technique could readily be incorporated into the BAT statement.
- (BE 87) The treatment as described in BAT 14 does not guarantee that dilution of dangerous substances, which may lead to releases without treatment, will be avoided. In BAT 14 segregation is recommended and in Section 6.6.2 several treatment techniques are summed up. But it is not indicated in which cases and for which pollutants these techniques should be used as a pretreatment. Inspiration could be taken from some of the CWW BAT conclusions.
- (EUCOPRO 24) Specify that this BAT may apply differently to new or existing installations.
- (CEFIC 21) Delete BAT 14 because it is redundant with BAT 1 which already includes mass and energy flow management.

<u>Description</u>

- (EEB 237, IE 58, AT 53, DK 120, FI 22, CEWEP 96, SE 35, ECN 126) The cross-reference to BAT 2, which concerns waste streams, is not appropriate, and should be clarified. It should be BAT 13 (EEB 237, DK 120, CEWEP 93, SE 35) or BAT 13b (AT 53).
- (FI 22) If BAT 14 refers to waste water streams, the relation between segregation of waste water and monitoring requirements, and the way BAT-AELs apply should be clarified.
- (ECN 127) Clarify the meaning of the wording "consider the following principles".

<u>Second bullet point</u>

- (SE 73) Remove the reference to techniques from this BAT 14 (e.g. activated sludge system), because this is confusing with BAT 15.

<u>Fourth bullet point (Indirect discharge)</u>

- (EEB 135) Regarding the third bullet point, see comment 134 on BAT 13.
- (FI 24) The potential negative impact of remaining pollutants to be taken into account should be extended to the sewer network, sewage sludge quality, and quality of the water environment.
- (EURITS 42, HWE 36) Clarify when indirect discharge is possible: it is not because the plant uses indirect discharge that the level of emissions is compatible

</td></tr>
</table>

	with a downstream WWTP, but only when the level of emission and the type of pollutants can be correctly treated by the downstream WWTP. • (ES_A 111) A definition for "direct discharge" and "indirect discharge" is needed.
EIPPCB assessment	<u>Entire BAT 14</u> • Indeed, indications of which cases and for which pollutants techniques should be used as a pretreatment are useful. Considering the potential high diversity of these waste water streams in the waste treatment sector, it would be very difficult to extensively describe all possibilities in BAT conclusions. For this reason, no explicit distinction between pretreatment and treatment has been made. However, the adequate management and treatment of waste water streams should be ensured in order to facilitate the reduction of emissions to water. This could be done by means of the inventory of those waste water streams and the monitoring of key process parameters for relevant emissions to water as identified by the above mentioned inventory. • BAT 15 gives an indication of which pollutants are targeted by the various techniques. <u>Description</u> • The reference to BAT 2 may indeed be confusing when the activity carried out at the plant is not the treatment of water-based liquid waste. • It is clear in the statement of BAT 15 (and the associated emission levels and monitoring) that BAT 15 applies before discharge to the environment. • As it would not be possible to describe all of the possibilities for defining a waste water management and treatment strategy, only the main features can be indicated. <u>Second and third bullet points</u> • These two bullet points are indeed an unnecessary repetition of BAT 15. <u>Fourth bullet point (Indirect discharge)</u> • According to the statement of BAT 15, BAT is to treat waste water before discharge. • Considering the remaining impact on a downstream WWTP does indeed include consideration of the potential impact on the sewer network, sewage sludge, etc.. In order to enhance clarity, the adequate treatment of pollutants in the case of indirect discharge would be better dealt with by means of a footnote in Table 6.4 related to BAT-AELs. • Indeed, definition of direct and indirect discharge would enhance clarity. As a result of the above assessment, it appears that all of the items that were addressed in BAT 14 of D1 are now covered in other BAT conclusions, and that BAT 14 is no longer necessary.
EIPPCB proposal	• To delete BAT 14. • To add instead a new BAT for the inventory of waste water streams (BAT 2bis) and a new BAT for the monitoring of key process parameters (BAT 3bis). • To add a footnote in Table 6.4 bringing clarity for the adequate treatment of pollutants in the case of indirect discharge. To add definitions for direct and indirect discharge.

1.8.3 Techniques for the reduction of emissions to water

<table>
<tr><td>Location in D1</td><td>Section 6.1.3 – page 895 – BAT 15</td></tr>
<tr><td>Current text in D1</td><td>

BAT 15. In order to reduce emissions to water, BAT is to treat waste water before discharge to the environment with an appropriate combination of techniques given below.

<table>
<tr><th colspan="2">Technique [1]</th><th>Typical pollutants targeted</th><th>Applicability</th></tr>
<tr><td colspan="4">Preliminary and primary treatment, e.g.</td></tr>
<tr><td>a</td><td>Equalisation</td><td>All pollutants</td><td rowspan="3">Generally applicable.</td></tr>
<tr><td>b</td><td>Neutralisation</td><td>Acids, alkalis</td></tr>
<tr><td>c</td><td>Physical separation, e.g. screens, sieves, grit separators, grease separators or primary settlement tanks</td><td>Suspended solids, oil/grease</td></tr>
<tr><td colspan="4">Physico-chemical treatment, e.g.</td></tr>
<tr><td>d</td><td>Adsorption</td><td>Organics, inorganics</td><td rowspan="6">Generally applicable.</td></tr>
<tr><td>e</td><td>Distillation/rectification</td><td>Organics</td></tr>
<tr><td>f</td><td>Chemical precipitation</td><td>Metals, phosphorus</td></tr>
<tr><td>g</td><td>Chemical oxidation</td><td>Nitrite, cyanide</td></tr>
<tr><td>h</td><td>Chemical reduction</td><td>Chromium (VI)</td></tr>
<tr><td>i</td><td>Ion exchange process</td><td>Metals</td></tr>
<tr><td>j</td><td>Stripping</td><td>Hydrogen sulphide (H_2S), ammonia (NH_3), adsordable organically bound halogens (AOX), hydrocarbons</td></tr>
<tr><td colspan="4">Biological treatment, e.g.</td></tr>
<tr><td>k</td><td>Activated sludge process</td><td rowspan="2">Biodegradable organic compounds</td><td rowspan="2">Generally applicable.</td></tr>
<tr><td>l</td><td>Membrane bioreactor</td></tr>
<tr><td colspan="4">Nitrogen removal</td></tr>
<tr><td>m</td><td>Nitrification/denitrification</td><td>Total nitrogen, ammonia</td><td>Not applicable when the final treatment does not include a biological treatment.</td></tr>
<tr><td colspan="4">Solids removal, e.g.</td></tr>
<tr><td>n</td><td>Coagulation and flocculation</td><td rowspan="4">Suspended solids</td><td rowspan="4">Generally applicable.</td></tr>
<tr><td>o</td><td>Sedimentation</td></tr>
<tr><td>p</td><td>Filtration (e.g. sand filtration, microfiltration, ultrafiltration)</td></tr>
<tr><td>q</td><td>Flotation</td></tr>
<tr><td colspan="4">[1] The descriptions of the techniques are given in Section 6.6.2.</td></tr>
</table>

</td></tr>
<tr><td>Summary of comments</td><td>

<u>Whole BAT 15</u>

- (ESRG 13, SE 77) Maintain flexibility in the application of BAT 15 (e.g. by means of an applicability threshold) in order to avoid unjustified requirements for water treatment when e.g. small volumes of waste water with a low pollution content are generated.
- (SE 77) Add an applicability threshold based on annual waste water volumes and/or annual flow of pollutants in order to optimise the ratio of cost/benefits to the environment of a WWTP.
- (DK 18, DE 211, ECN 128) Clarify that uncontaminated water (e.g. rainwater separately collected from rooftops) is excluded from the waste water to be treated.
- (BE 63) Expand the list of typical pollutants targeted for consistence with Section 6.6.3.

</td></tr>
</table>

	• (MWE 138) Clarify that the BAT 15 only applies to waste water coming from waste treatment activities falling under the BATC Scope, and for example does not apply to the treatment of landfill leachate. BAT statement • (FR 168) In the BAT statement, replace "discharge to the environment" with "discharge to a water body" to take into account e.g. indirect discharge, and for consistency with the title of Tables 6.3 and 6.4. • (DK 97) It is not clear how the term "to the environment" should be understood in the case of indirect discharge. Delete this term from the statement. • (MWE 141) Clarify the term "environment" as "open water and groundwater bodies". • (DK 53) Clarify whether BAT 15 applies to waste water treatment only or to all types of waste treatment. • (DK 99) Clarify that this BAT aims at reducing emissions of pollutants to water. • (DK 101) Clarify (e.g. in a footnote) that the techniques do not apply for indirect discharge. • (ES_A 88, FEAD 82) Clarify that it would also be possible to use one technique, and not only a combination of techniques. • (CEFIC 22) Clarify in the statement that this BAT concerns direct emissions to water from a waste treatment plant, and for key parameters. Indeed, WT plants in the chemical industry discharge their waste water into on-site WWT plants which are covered by the CWW BREF. List of techniques • (ESRG 11, ECN 128) Delete the table under BAT 15 and refer to those techniques listed in Section 6.6.3 because it is not clear why some techniques mentioned in Section 6.6.3, that can be BAT, have been excluded. • (UK 256) Remove the list of techniques because this generic list does not add anything useful to the BAT conclusions. If the list is kept, add reed beds to biological treatment techniques (see below). • (BE 73) Clarify which of the common waste water treatment techniques listed are BAT for the most relevant waste treatment processes in Europe. Indeed, all of these techniques are not relevant for all waste treatment activities, and a more detailed BAT is expected. • (DK 46) Bring consistency between the list of techniques in BAT 15 and the techniques described in Section 2.3.6 of the BREF. • (IT 47) Add wet oxidation as it is an applied technique for which data have been provided. Consistently, add "organics" under typical pollutants targeted. • (NL 8) Add anaerobic treatment as a technique for waste water. Biological treatment • (BE 64, UK 256) Add reed beds purification as a technique, because it is used as a polishing technique. • (FEAD 83) Add macrophyte bed because it is commonly used to remove contaminants such as NH_3 and metals. • (BE 71) Clarify that a reserve of pulverised coal should be available for dosing in case of a problem in the biological treatment. It should be ensured that the technical conditions (including mixing) are met when applying such a dosage. Technique a - Equalisation • (IE 59) Clarify that equalisation is applicable to existing plants within the constraints given by the configuration of water circuit, because it might be onerous with respect to storm water discharges for existing plants where it is not already in place. • (UK 258) Replace equalisation with homogenisation. Technique c - Physical separation • (EEB 48, DE 369) Add sand filter, oil separator and coalescence separator.

	Technique m - Nitrification/denitrification
	• (BE 72) Remove the applicability restriction because the absence of a biological treatment is not an applicability restriction as such.
	• (FR 233, EURITS 45, HWE 37) Add an applicability restriction in the case of high salt content in the influent because nitrification is very sensitive to salts. Moreover, this technique is in competition with the biodegradation of organic carbon, and decreases the biodegradation efficiency.
	
	Definition
	• (EBA 57, SE 68, DE 211, FEAD 81) Add a definition for waste water, clarifying that (FEAD 81, DE 211) the need for a treatment depends on the pollution level, the amount of water and the parameter requirements. The definition could be:
	  o (EBA 57) water that is not allowed to be directly discharged to the environment;
	  o (SE 68) water emitted from specific waste treatment processes/units within the scope of the BREF.
	• (SE 68) Add a definition for water streams which could be: water streams other than waste water, for example waste water excluded from the scope of the BREF, run-off waters or road water.

EIPPCB assessment	Whole BAT 15 • As stipulated under the General considerations of Chapter 6 (BAT conclusions) of D1, the techniques listed and described in these BAT conclusions are neither prescriptive nor exhaustive. Other techniques may be used that ensure at least an equivalent level of environmental protection. The combination of the implemented techniques will depend on the pollutant content of the effluent and on the receiving body, which should be checked at local level. • By definition, uncontaminated water is not to be decontaminated before release. It seems there is no need to clarify this in the BAT statement. • Expanding and clarifying the list of targeted pollutants may enhance clarity. • The WT BAT conclusions apply to activities that fall under the WT BAT conclusions Scope. BAT statement • Indeed, as BAT 15 concerns both direct and indirect discharge, mentioning "discharge to the environment" in the statement is confusing. • Some (pre)treatment may also be needed in the case of indirect discharge, which should be more explicit in the BAT statement. • Indicating that the use of just one technique is possible would enhance clarity. List of techniques • The table of BAT 15 and techniques described in Section 6.6.3 should indeed be consistent. For instance, in BAT 15, evaporation is missing from the list of physico-chemical treatment techniques. • The techniques of BAT 15 taken together with the pollutants targeted and the description of techniques in Section 6.6.3 provide an indication of the combination of techniques to use. • BAT 15 indicates which pollutants are targeted by a given technique. Knowing which pollutants are expected for the various WT processes should help with the selection of techniques for a given process. • Indeed, wet oxidation and anaerobic treatment were reported as techniques used in Section 2.3.6 but each of these techniques is used only by one installation in the data collection and it is not necessary to list in BAT 15 (where techniques are neither exhaustive nor prescriptive) all existing waste water treatment techniques. Biological treatment • A reed bed system has been reported to be used for treatment of waste water before discharge by one plant carrying out anaerobic treatment of source-separated biowaste, located in the United Kingdom. No technical information allowing a more appropriate description of this technique (and the macrophyte bed technique) was provided. Moreover, as previously mentioned, techniques listed and described in these BAT conclusions are neither prescriptive nor exhaustive.

	• Adsorption is one of the techniques listed in BAT 15 and the use of adsorption in case of dysfunction of the biological treatment is an operational issue. <u>Technique a - Equalisation</u> • When needed, equalisation applies to waste water or water-based liquid waste to be treated before release. This would concern storm water only when contaminated, whose volume should be minimised thus allowing equalisation of a limited amount of storm water. • Equalisation is the wording generally used in BAT conclusions. <u>Technique c - Physical separation</u> • Techniques are listed here as examples. As mentioned above, they are neither prescriptive nor exhaustive; however, oil separation is widely used by the plants of the data collection and is described in Section 6.3.3. Sand filter is already included in the technique "Filtration". <u>Technique m - Nitrification/denitrification</u> • Nitrification/denitrification is a specific biological treatment step that can only be carried out when a biological treatment step is part of a waste water or water-based liquid waste treatment. However, it is not an applicability restriction as such. • Although the data collection did not allow the correlation of a high chloride content with the applicability of nitrification, this correlation is clearly identified in CWW BAT conclusions, and there is no reason that this would be different in the case of waste treatment. <u>Definition</u> • Indeed, as already mentioned, only contaminated water has to be treated before release. BAT conclusions are proposed to segregate uncontaminated and contaminated water, and BAT-AELs to comply with before release of the latter are set. Determining whether or not a water stream should be treated depends on each particular case and is dealt with in particular by means of the inventory of waste water streams introduced in the new BAT 2bis. The terms process water and surface run-off water are widely used, and a definition is unnecessary.
EIPPCB proposal	• To complement the list of typical pollutants targeted. • To reword the statement to take into account both direct and indirect discharge. • To complement the list of examples in technique c. • To ensure consistency between BAT 15 and Section 6.6.3 regarding e.g. the list of techniques and the typical pollutants targeted. • To reword technique m of BAT 15 and its applicability.

1.8.4 BAT-AELs for direct discharge to a receiving water body

Location in D1	Section 6.1.3 – page 896 – BAT 15 – Table 6.3

Current text in D1

Table 6.3: BAT-associated emission levels (BAT-AELs) for direct discharge to a receiving water body

Parameter		BAT-AEL (Monthly average) ([1])	Waste treatment process
Total organic carbon (TOC) ([2])		10–40 mg/l	•Mechanical treatment of waste •Biological treatment of waste •Physico-chemical treatment waste
Chemical oxygen demand (COD) ([2])		30–120 mg/l	
Total suspended solids (TSS)		5–35 mg/l	
Hydrocarbon oil index (HOI)		0.5–5 mg/l	•Mechanical treatment in shredder of metal waste •Re-refining of waste oil •Physico-chemical treatment of waste with calorific value
Total nitrogen (Total N)		5–30 mg/l ([3])	•Biological treatment of waste •Re-refining of waste oil •Physico-chemical and/or biological treatment of water-based liquid waste
Total phosphorus (Total P)		0.3–3 mg/l	
Phenol index		0.05–0.2 mg/l	•Re-refining of waste oil •Physico-chemical treatment of waste with calorific value •Physico-chemical and/or biological treatment of water-based liquid waste
Metals and metalloids ([4])	Arsenic (expressed as As)	0.01–0.05 mg/l	•Mechanical treatment in shredder of metal waste •Mechanical biological treatment of waste •Re-refining of waste oil •Physico-chemical and/or biological treatment of water-based liquid waste •Water washing of excavated contaminated soil
	Cadmium (expressed as Cd)	0.01–0.05 mg/l	
	Chromium (expressed as Cr)	0.01–0.05 mg/l	
	Nickel (expressed as Ni)	0.05–0.5 mg/l	
	Lead (expressed as Pb)	0.05–0.1 mg/l	
	Copper (expressed as Cu)	0.05–0.2 mg/l	
	Mercury (expressed as Hg)	0.001–0.01 mg/l	
	Zinc (expressed as Zn)	0.1–0.5 mg/l	

([1]) The averaging period may be adapted when the monitoring frequency is reduced (see footnote ([1]) of Table 6.1.
([2]) Either the BAT-AELs for COD or the BAT-AELs for TOC apply. TOC monitoring is the preferred option because it does not rely on the use of very toxic compounds.
([3]) The upper end of the range may be up to 40 mg/l for Total N if the abatement efficiency is ≥ 70 % as a monthly average (considering all of the waste water treatment steps carried out).
([4]) The BAT-AELs may not apply when the substance concerned is not present in the waste to be treated.

Summary of comments	<u>Additional parameters</u> • (EEB 137) Although inclusion of additional parameters, in comparison to the current WT BREF, is welcome, BAT-AELs should be added on harmful pollutants, namely: Cr(VI), Mn, CN, Sb, PAHs, PCDD/F, PCB, TI, BTEX. An emission range is set for Cr(VI) in the current BREF, and its deletion is objected. If no sufficient data have been collected for deriving a BAT-AEL, at least the monitoring of these substances should be added in the BAT conclusions. <u>Monitoring</u> • (DE 419) Add that, instead of monthly average, the 2-hour flow-proportional composite sample combined with the four out of five rule can be applied (because it is an equal or higher standard). • (MWE 140) The averaging period of the proposed BAT-AELs should be yearly average; if monthly average is kept, the upper end of the BAT-AELs should be increased. • (UK 259) The monitoring of parameters should be based on a risk assessment. • (EURITS 44, HWE 38, HWE 3) Monitoring of emissions to water should not apply to the very specific activities of hazardous waste management consisting of stand-alone temporary storage of hazardous waste where no other treatment activities covered by 5.1, 5.2 and 5.3 of Annex I to Directive 2010/75/EU are operated. <u>Thresholds for emissions to water</u> • (EURITS 43, EURITS 46, FR 363, FR 364, ES_A 95, HWE 40, HWE 42) Thresholds in terms of flow rates should be defined above which the BAT-AELs apply. Indeed, below a certain flow rate, the benefit for the environment is not significant but the cost for the installation is very high (the comments propose different thresholds in terms of pollutant loads not repeated here). In particular for biological treatment, a risk-based approach could help to define BAT-AELs in a cost-effective way (balance between the environmental benefit and the cost per mg to treat). • (FEAD 132, ECN 261) Thresholds should be defined in terms of yearly concentration and the BAT-AELs should be revised (proposals are made in the comments). Higher BAT-AELs may be considered when it is demonstrated that it has no negative impact on human health and the environment, e.g. in the case of methanogenic leachate, for water with a high content of salts and water containing carbonates, and for temperatures above 38ºC for the biological treatment of waste water. • (DK 149) BAT-AELs should not be only expressed in concentration but should reflect the total impact on the environment. • (SE 15) BAT-AELs should be defined for emission loads to water, and not only concentrations. <u>Discharge</u> • (MWE 142) Clarify that the receiving water body can be open water and groundwater bodies. • (AT 15) In the titles, change the term "water body" to "surface water body". • (SE 155) Clarify the applicability of the BAT-AELs when it comes to mixed waste waters. • (IE 60) Run-off from the storage area should be covered in Tables 6.3 and 6.4 for the parameters with the following ranges: Total organic carbon (TOC) 10–40 mg/l, Chemical oxygen demand (COD) 30–120 mg/l and Total suspended solids (TSS) 5–35 mg/l. • (ECN 129) Make clear that direct discharge is only possible in the case of uncontaminated surface and roof water or in the case of waste water if the BAT-AELs of Table 6.3 are met. • (CEFIC 23) Table 6.4 describes requirements for WWT with the same values for direct discharge. Both tables are based on the CWW BREF and the REF BREF. All collected data for the CWW BREF are from chemical sites and should be deleted. <u>Cold weather</u> • (SE 210) Add a footnote to Tables 6.3 and 6.4 that for low ambient temperatures for the winter months these BAT-AELs do not apply and that annual average values should apply instead. Indeed, in Nordic conditions with low winter temperatures, sampling methods other than grab sampling is very expensive.

	• (SE 78) The applicability should be limited so that cold periods are not included. • (MWE 138) Clarify that BAT-AELs for N-tot, COD and TOC may not be achieved during cold periods in northern countries: Low temperatures reduce the efficiency of nitrogen compound reduction by nitrification/denitrification, and the suggested BAT-AELs are difficult to reach without applying, for example, SBR or MBBR which are more expensive and cannot be considered BAT in general. <u>Waste treatment processes concerned</u> • (BE 90) The BAT-AELs should apply to more waste treatment processes, for instance: Hg should be relevant for the waste treatment process "PCT of waste containing POPs or mercury". • (BE 65) For one given parameter, the BAT-AELs should be differentiated according to the waste treatment processes, using the data collection. • (IT 48) For the parameter "TOC, COD, TSS", in the Field "Waste treatment Process", the category "Physico-chemical and/or biological treatment of water-based liquid waste" should also be added. • (EFR 223, 224) Make specific BAT-AELs for Mechanical Treatment in Shredders of Metal Waste - which are not using process water - for each substance/parameter except Total N and Total P and phenol index. • (DK 98) The headings of the columns "BAT-AEL applicable to the following waste treatment processes" should be clarified. <u>General comments</u> • (BE 77) Only data provided by well performing plants should be taken into account. Moreover, techniques might be installed but the way and the extent to which they are applied has a huge impact on the emission values achieved. (BE 93) Indicate that for priority hazardous substances which are by definition PBT (persistent, toxic, bioaccumulating), including dioxins, PCBs, PFOS, nonylphenol, etc., BAT is the cessation or phasing out of discharges, emissions and losses. • (FEAD 142) BAT-AELs for TOC, COD and TN cannot be met for methanogenic leachate with the techniques mentioned. Indeed, a significant part of the dissolved COD in methanogenic leachate is not biologically degradable and it can be questioned whether COD really needs to be reduced to the BAT-AEL if it mainly consists of humic and fulvic substances. • (NL 9) The BAT-AELs of the existing BREF should be maintained as there is no reason to alter them. • (HWE 44) The ranges of BAT-AELs should be reassessed based on complementary data. • (ESWET 17) ESWET is concerned by the BAT-AEL derivation method that has led to this table (see position paper in BATIS). • (ES_A 35, ES_C 18) BAT-AELs are extremely low especially for SMEs and should be higher (proposal is made for mechanical treatment). • (DK 137, DK 140, DK 141, DK 142, DK 143, DK 144, DK 149) Plant 95 has not been considered in Table 3.9 of the BREF. Based on this plant, the BAT-AELs for Zn, Cu and Pb should be increased to 5 mg/l, 0.35 mg/l and 0.4 mg/l respectively. These should be BAT-AEPLs and not BAT-AELs. • (EURITS 51, HWE 51) Include a methodology to derive shorter-term ELVs/levels from BAT-AELs in order avoid misinterpretations. <u>TOC/COD</u> • (FR 237, EURITS 48, HWE 47) Integrate OTNOC as a footnote for biological treatments by activated sludge processes or membrane reactors when the temperature exceeds 38ºC. • (DK 134, DK 135) Analyses of COD in marine waters tend to give elevated levels of COD, due to the high levels of salt (Cl). As a result, BAT-AELs should be BAT-AEPLs and a footnote should be added to increase the upper level BAT-AEL to 360 mg/l for waste water with a chloride content > 1 000 mg/l. • (EURITS 47, HWE 46) Add a footnote on the performance of abatement techniques with regard to nitrification/denitrification in order to consider the characteristics of the input waste in the considered facilities (physico-chemical and biological treatment) and mainly the salt content.

	• (EFR 225, EFR 226) For the mechanical treatment of metal wastes in shredders, considering the very little data (<5), it is more appropriate to propose an upper end of the range value near the 95th percentile of the average measurements (i.e. 300 mg/l for COD and 130 mg/l for TOC). • (FI 34) Replace the requirement for the parameter COD in Table 6.3 in the same manner as the Commission has proposed for the Urban Waste Water Treatment Directive. <u>TSS</u> • (EFR 227) For the mechanical treatment in shredders of metal waste, it is more appropriate to propose an upper end of the range value near the 95th percentile of the average measurements, corresponding to 100 mg/l. <u>HOI</u> • (DK 150, FI 25, PL 13, EFR 228) BAT-AELs are very low and can be achieved only by a few oil separators, which would mean the use of an extra chemical treatment. The BAT-AELs should be deleted or the range modified. • (EUCOPRO 25) When there is a treatment with activated carbon, there is no discharge of hydrocarbon oil and therefore no need to monitor HOI. This should be reflected in a footnote. <u>Total N</u> • (FR 238, FR 365, EURITS 49, HWE 48) One of the main streams of waste treated in the physico-chemical treatment plant of water-based liquid waste is nitric acid. It is impossible to impose a level of emission on nitrogen when the installation is dealing with this acid, which should be reflected in a footnote. • (EURITS 50, HWE 49) For integrated installations with dedicated physico-chemical and biological treatment of water-based liquid waste, the BAT-AELs should be based on real information, which is lacking for the moment. The first step would be to request monitoring of Total N before a BAT-AEL is derived. <u>Total P</u> • (HWE 50) The approach should be the same as for Total N (see comment HWE 49). <u>Phenol index</u> • (BE 70) Replace phenol index with phenol, which is a more relevant parameter than phenol index. <u>Metals</u> • (BE 68) BAT-AELs for metals should be lowered for physico-chemical and/or biological treatment of water-based liquid waste, in line with BAT-AELs from the Flemish BAT study. • (AT 55) Unless there is a clear indication of how the proposed values have been derived, it is proposed to use the Austrian values for both direct and indirect discharges. • (EUCOPRO 27) BAT-AELs are too low and may be below the detection limit. Further data will be provided to reassess the values. • (PL 15) BAT-AELs for zinc, copper and lead are very strict with regard to the shredders and can be achieved only by precipitation. Moreover, emissions from open-air shredders are related to the rainfall, and therefore very difficult to reduce. The BAT-AELs should be revised in line with the data collection. • (MWE 143) BAT-AELs for metals should be higher and set according to Austrian legislation (AEV Abfall BGBl 1999/9), and the lower end of the range should be removed. <u>Cadmium</u> • (BE 66) The upper value of the BAT-AEL should be lowered as cadmium is a priority hazardous substance (including for indirect discharge). <u>Chromium</u> • (EFR 229) For mechanical treatment of metal wastes in shredders, it is more appropriate to propose an upper end of the range value near the 95th percentile of the

	average measurements, corresponding to 0.15 mg/l. Lead • (BE 67) The upper value of the BAT-AEL should be lowered as lead is a priority hazardous substance (for indirect discharge). • (EFR 230) For mechanical treatment of metal wastes in shredders, it is more appropriate to propose an upper end of the range value near the 95th percentile of the average measurements, corresponding to 0.3 mg/l. Copper • (EFR 231) Make a specific BAT-AEL for mechanical treatment of metal wastes in shredders, and increase the upper end of the range to make it more consistent with the dataset submitted by shredding operators (the range proposed is 0.05–0.5mg/l). Zinc • (EFR 232) For mechanical treatment of metal wastes in shredders, it is more appropriate to propose an upper end of the range value near the 95th percentile of the average measurements, corresponding to 3 mg/l. • (FI 26) The BAT-AEL should be raised to 0.1–1 mg/l because galvanized ferrous and rusty waste generates Zn oxide compounds, which are very difficult to precipitate from cold rainwater. Nickel • (AT 54) Add a footnote for parameter nickel (expressed as Ni) in Table 6.3 and Table 6.4: "The higher value of the range is 1 mg/l for all physico-chemical treatment processes" because in Austria there are two ELVs in use: 0.5 mg/l for waste water from biological treatment, 1 mg/l for waste water from physico-chemical treatment. Footnote 4 • (FR 172) The term "not present" should be clarified, in terms of quantity or risks. Moreover, BAT-AELs related to metal should not be applicable to MBT as MBT does not treat hazardous waste. • (IT 49) For clarification, it is proposed to reword the footnote as follows: "The BAT-AELs may not apply when the substance concerned is not relevant for the treatment process and the waste treated". • (FEAD 81) Clarify in Table 6.3 and Table 6.4 (e.g. in a footnote) that the BAT-AELs may not apply when the substance concerned is not present in the waste to be treated, and also when water is not in contact with the waste.
EIPPCB assessment	Additional parameters • See the assessment related to the BAT-AELs for emissions to water from PCT and/or biological treatment of WBLW. Monitoring • See the assessment related to monitoring and to the General considerations. • Monitoring applies to the activities within the scope of the BAT conclusions. It is not clear why an exemption should be made for stand-alone temporary storage of hazardous waste. Thresholds for emissions to water • Indeed, not only the concentration but also the load or the flow rate may be considered to reflect the impact on environment.. However, this potential impact also depends on local configuration that is taken into account at a local level (e.g. flow of the river receiving the effluent). Moreover, the environmental impact of the waste treatment activities is dealt with by mean of the thresholds in terms of capacities defined by the IED. Discharge • The term "receiving water body" is also used in the other sets of BAT conclusions. It is not clear why further specification is needed. • It is not clear why a reference is made to the CWW and REF BREFs. The two tables

	have been derived from the data collection for the WT BREF.
	• Indeed, the emissions to water depend on the type of waste treated and type of waste treatment process and the BAT-AELs may vary in some cases. It is not possible however to envisage all possible situations in which the waste water is generated by a combination of different wastes or waste treatments. This is, in fact, an implementation issue to be addressed at local level.
	• This is also the case for waste water generated from the storage areas. Moreover, the data collection does not allow the derivation of BAT-AEL for storage areas only.
	• Whether a discharge is direct or not depends on the local situation in terms of existing infrastructure, etc. and it cannot be addressed in the BAT conclusions. However, the BAT conclusions contain provisions related to waste water management such as segregation of water streams.
	
	<u>Cold weather</u>
	• All plants from the data collection have been considered in the data assessment, including plants located in areas with colder weather. This means that these specific conditions have already been accounted for in the derivation of the BAT-AELs and it does not seem necessary to make a specific focus on this.
	
	<u>Waste treatment processes concerned</u>
	• The waste treatment processes to which the BAT-AELs apply need indeed to be reassessed based on the data collection, in particular the following:
	  o Emissions to water from physico-chemical and/or biological treatment of water-based liquid waste are not comparable with those coming from other waste treatment processes because WBLW plants treat liquid waste whereas emissions to water from other process originate mostly from run-off water. The corresponding assessment is in Section 1.13.6.4.
	  o Concerning HOI, this parameter also seems relevant for mechanical treatment in shredders of equipment containing VFCs or VHCs and water washing of excavated contaminated soil.
	  o Concerning metals, these parameters also seem relevant for mechanical treatment in shredders of equipment containing VFCs or VHCs, PCT of waste with calorific value, regeneration of spent solvents and for PCT of solid and/or pasty waste, if they are identified in the waste water inventory (BAT 2bis).
	  o Concerning mercury in particular, it is not relevant for the mechanical treatment of waste containing mercury as this treatment does not generate waste water, neither for the decontamination of equipment containing PCBs.
	• As for the differentiation of BAT-AELs for shredders of metal waste, see below.
	• Concerning the heading of the third column, it could be indeed clarified.
	
	<u>General comments</u>
	• Concerning the General comments regarding the BAT-AELs and their derivation, see the assessments related to individual parameters below and in the section 1.13.6 concerning WBLW plants. These assessments are based on the plants that participated in the data collection and, when possible, data on the operation of the abatement techniques have been used.
	• The BAT conclusions are a technical document and BAT-AELs are derived from the data collection, including emission data and techniques used to abate pollutants. Whether or not the emissions of some pollutants should be banned is a legislative matter.
	• The derivation of ELVs from BAT-AELs is the responsibility of the permitting authority.
	
	<u>Specific parameters</u>
	• For the assessment related to individual parameters below, it should be kept in mind that: a) it does not concern WBLW plants which are dealt with later in this document, and b) the averaging period is proposed to be modified (see the assessment of the General considerations). The latter needs to be reflected in the table.
	
	<u>TOC/COD</u>
	• All plants from the data collection have been considered in the data assessment, including plants located in areas with hot weather. This means that these specific

	conditions have already been accounted for in the derivation of the BAT-AELs and it does not seem necessary to make a specific focus on this. • Analyses of COD in seawater and the influence of salt content on the measurement of COD is an implementation issue to be dealt with at local level. • There are 23 emission points with direct discharge to the receiving body and reporting COD and/or TOC emissions to water. The COD concentrations range from 11 mg/l to 54580 mg/l (the maximum value reported) and the TOC concentrations range from 0.1 mg/l to 280 mg/l. • Plants 372 (aerobic treatment) and 138 (mechanical treatment of equipment containing VFCs or VHCs) do not report any abatement technique. • Plants 441, 478 and 136 only use oil separation and sedimentation (as well as decantation and buffer tanks for Plant 136). • Plant 521 is equipped with biological treatment (reed beds) and reports COD emissions of 175 mg/l. • As for the performance of abatement techniques with regard to nitrification/denitrification and the salt content in the waste input, see the assessment of BAT-AELs for physico-chemical and/or biological treatment of water-based liquid waste (Section 1.13.6.4). • Indeed, TOC monitoring is the preferred option because it does not rely on the use of very toxic compounds. This is explicitly mentioned in footnote 2 of Table 6.3 in D1. However, COD is still used in some cases (COD concentration values were provided), and its complete elimination is beyond the competence of the TWG. <u>TSS</u> • There are 23 emission points with direct discharge to the receiving body and reporting TSS emissions to water. The TSS concentrations range from 0 to 3320 mg/l (the maximum value reported). • Plant 372 (aerobic treatment) does not report any abatement technique. • Plants 441 and 464W2 show a high variability of the reported values and seem to be able to achieve much lower values than the maximum reported values. • As for Plant 609, it is not clear whether this plant is equipped with a solids removal technique. • Plants 136 and 464W3 are equipped with decantation and oil separation and achieve a maximum TSS level of 64 mg/l. <u>Total N</u> • The plants equipped with treatment to remove nitrogen (in this case biological treatment) report a maximum value of 26 mg/l (considering the sum of NO_2^-/NO_3^- and NH_3-N). • Moreover, some plants seem to be able to achieve lower levels than the lower end of the range proposed in D1. <u>Total P</u> • Phosphorous concerns mainly the waste treatment dealing with biological waste. <u>THC and HOI</u> • Monitoring requirements are set up precisely in order to verify that an implemented technique is efficient for preventing or reducing emissions of a given pollutant. • There are 31 emission points with direct or indirect discharge to the receiving body and reporting THC and/or HOI emissions to water. The THC concentrations range from 0 to 51 mg/l (the maximum value reported) and the HOI concentrations from 0 to 100 mg/l (the maximum value reported). • Plants 636 and 630 do not report any treatment of waste water: the waste water is in fact tanked and sent to a physico-chemical treatment plant. • Plant 160C does not report any abatement technique either. • Plant 605 modified its abatement techniques in 2012, which resulted in a drastic reduction of the HOI emissions (from about 20 mg/l of THC to 7 mg/l). • Plants 282, 440, and 441 report peaks of THC and/or HOI emissions but seem to be able to achieve much lower concentrations in the other cases. • Plant 14 is not equipped with oil separation. • All other plants achieve levels of THC or HOI below 10 mg/l.

- Concerning the waste treatment processes concerned, it seems that waste water may also be contaminated with hydrocarbons coming from the recovery of blowing agent in the treatment in shredders of WEEE containing refrigerants and from water washing of soil contaminated with hydrocarbons.

Phenol index

- According to the ROM REF, the parameter to be monitored is the phenol index, i.e. the sum of concentrations of phenolic compounds, expressed as phenol concentration and measured according to EN ISO 14402:1999.

Arsenic

- There are 24 emission points with direct or indirect discharge to the receiving body and reporting As emissions to water. The As concentrations range from 1 µg/l to 500 µg/l (the maximum value reported)
- Values reported by Plants 566 and 170 seem to be in fact emission limit values and not real measurements.
- Plants 244 and 487 report very variable As emissions but seem to be able to achieve much lower concentrations than the maximum reported values.
- All the other installations report arsenic emissions below 0.05 mg/l, using precipitation or solids removal techniques to remove particulate-bound metals.

Cadmium

- There are 32 emission points with direct or indirect discharge to the receiving body and reporting Cd emissions to water. The Cd concentrations range from 0.1 µg/l to 400 µg/l (the maximum value reported).
- Values reported by Plants 566 and 170 seem to be in fact emission limit values and not real measurements.
- Plant 221 does not report any abatement technique and the values reported by Plant 605 are in fact <0.1 mg/l, which seems to indicate an emission limit value.
- Plant 174 (PCT of waste with calorific value) reports one value per month over the reference period but most of the measurements are in fact reported as "below the given value" so it is not clear what they refer to.
- All the other installations report cadmium emissions below 0.05 mg/l, using precipitation or solids removal techniques to remove particulate-bound metals.

Chromium

- There are 35 emission points with direct or indirect discharge to the receiving body and reporting Cr emissions to water. The Cr concentrations range from 0.1 µg/l to 1000 µg/l (the maximum value reported).
- Values reported by Plants 566 and 170 seem to be in fact emission limit values and not real measurements. Plant 549 reports one value per month during the reference period and all values are identical (0.3 mg/l), so it is not clear whether this is just the quantification limit of the method used (method not specified).
- Plants 14 reports very variable Cr emissions but seems to be able to achieve much lower concentrations than the maximum reported value.
- Plants 19 and 350 do not report any treatment.
- All the other installations report chromium emissions below 0.15 mg/l, using precipitation or solids removal techniques to remove particulate-bound metals.

Nickel

- There are 35 emission points with direct or indirect discharge to the receiving body and reporting Ni emissions to water. The Ni concentrations range from 0.01 µg/l to 1000 µg/l (the maximum value reported).
- Values reported by Plants 566 and 170 seem to be in fact emission limit values and not real measurements.
- Plant 549 reports one value per month during the reference period and shows two peaks in 2011 but the rest of the values are below 0.51 mg/l.
- All the other installations report nickel emissions below 0.5 mg/l, using precipitation or solids removal techniques to remove particulate-bound metals.

	Mercury • There are 29 emission points with direct or indirect discharge to the receiving body and reporting Hg emissions to water. The Hg concentrations range from 0 to 500 µg/l (the maximum value reported). • Values reported by Plants 566, 170 and 605 seem to be in fact emission limit values and not real measurements. • Plant 92 reports that all values are below the detection limit which is given as 0.2 mg/l. • Plant 172C reports one measurement per year. In 2012, the Hg concentration (measured with Standard NF EN ISO 17852) is 0.5 mg/l, which is 10 times the emission limit value and about 1000 times what was measured the years before. This value therefore seems unreliable. • Plant 244 is equipped with activated carbon adsorption, ultrafiltration and nitrification/denitrification and reports values up to 5.3 µg/l. • Concerning the lower end of the range, 12 plants seem able to achieve lower levels than the lower end of the range proposed in D1. Lead, copper and zinc From the data collection, it is clear that the emissions to water of these three metals are higher for shredders of metal waste than for the rest of the waste treatment processes. It therefore seems appropriate to make a distinction for this type of waste treatment. Lead • There are 39 emission points with direct or indirect discharge to the receiving body and reporting Pb emissions to water. The Pb concentrations range from 4 µg/l to 1000 µg/l (the maximum value reported). • Values reported by Plants 566 and 170 seem to be in fact emission limit values and not real measurements. • Plant 174 (PCT of waste with calorific value) reports one value per month over the reference period but most of the measurements are in fact reported as "below the given value" so it is not clear what they refer to. • Plant 549 (PCT of waste with calorific value) reports 32 values over the reference period, which are all 0.4 mg/l, so it is not very clear what it refers to. • Plant 243 (MBT) does not seem to have a technique to remove metals. • Plant 571 (shredder) reports one value of 0.3 mg/l which is mentioned to be below the limit of quantification. • Plants 14, 289C and 293C report very variable Pb emissions but seem to be able to achieve much lower concentrations then the maximum reported value. • All the other installations which are not shredders report lead emissions below 0.1 mg/l, using precipitation or solids removal techniques to remove particulate-bound metals. • As for shredders, all the installations not already mentioned above report lead emissions below 0.3 mg/l, using precipitation or solids removal techniques to remove particulate-bound metals. Copper • There are 37 emission points with direct or indirect discharge to the receiving body and reporting Cu emissions to water. The Cu concentrations range from 6 µg/l to 1000 µg/l (the maximum value reported). • Values reported by Plant 566 seem to be in fact emission limit values and not real measurements. • Plant 487 reports very variable Cu emissions but seems to be able to achieve much lower concentrations then the maximum reported value. • Plant 243 (MBT) does not seem to have a technique to remove metals. • Plant 14 (treatment of excavated contaminated soil) is equipped with decantation, neutralisation, flocculation and sedimentation and reports one value per month over the reference period. These values show a lot of variation over three years with a maximum of 0.46 mg/l. • Plants 282C and 293C (shredders) are equipped with oil separation and sedimentation and also report variable values with maxima of 0.56 mg/l and 0.54 mg/l respectively.

	<u>Zinc</u> • There are 46 emission points with direct or indirect discharge to the receiving body and reporting Zn emissions to water. The Zn concentrations range from 0.07 µg/l to 5000 µg/l (the maximum value reported). • Values reported by Plant 566 seem to be in fact emission limit values and not real measurements. • Plants 95C and 243 do not seem to be equipped with techniques able to remove metals. • Plant 127 (MBT) reports only one value over the reference period at 2.4 mg/l and it is not very clear whether the waste water is recycled, landspread or sent to a landfill WWTP. • Plants 14, 487 and 630 report very variable Zn emissions but seem to be able to achieve much lower concentrations then the maximum reported value. • Plants 289C, 282C and 293C are shredder plants equipped with coalescence separators with an integrated sludge trap. Plant 289C reports six values over the reference period: one is 3.6 mg/l and the other five values are below 2.4 mg/l. Plant 282C reports 12 values – all in 2013 – and one value is reported as 3.2 mg/l and all other values are below 1.6 mg/l. Plant 293C reports only two values in 2012, one at 2.6 mg/l and the other one at 1.18 mg/l. So it seems that these plants equipped with the same techniques are able to achieve levels below 2 mg/l. • All the other plants which are not shredder plants report zinc emissions below 1 mg/l, using precipitation or solids removal techniques to remove particulate-bound metals. • As for shredders, all the plants not already mentioned above report zinc emissions below 2 mg/l, using precipitation or solids removal techniques to remove particulate-bound metals. <u>Footnote 4</u> • Indeed, the wording of D1 is not very specific and should be made more precise by linking the presence of pollutants to the inventory of waste water mentioned in BAT 2bis. This inventory considers, of course, elements such as the waste treated, the waste treatment process, the use of water, etc. • Concerning the presence of metals in emissions to water from MBT, metals emissions are reported by several MBT plants from the data collection so it does not seem appropriate to remove the proposed BAT-AELs. However, according to the footnote, the BAT-AELs related to metals do not apply if metals are not present.

EIPPCB proposal	• To set specific BAT-AELs for PCT and/or biological treatment of WBLW.
	• Modify the proposed BAT-AELs according to the reassessment of the data situation;
	  o COD: change the upper end of the range to 180 mg/l and therefore the upper end of the range for TOC to 60 mg/l.
	  o TSS: change the upper end of the range to 60 mg/l.
	  o HOI: change the upper end of the range to 10 mg/l.
	  o Total N: change the upper end of the range to 25 mg/l and the lower end of the range to 1 mg/l.
	  o Total P: no change.
	  o Phenol index: no change.
	  o As: no change.
	  o Cd: no change.
	  o Cr: change the upper end of the range to 0.15 mg/l.
	  o Ni: no change.
	  o Hg: change the BAT-AEL range to 0.5 µg/l to 5 µg/l.
	  o Pb: introduce a footnote to set the higher end of the range at 0.3 mg/l for shredders. The range remains unchanged for the other waste treatments.
	  o Cu: change the upper end of the range to 0.5 mg/l for all waste treatments.
	  o Zn: change the upper end of the range to 1 mg/l for all waste treatments and introduce a footnote to set the higher end of the range at 2 mg/l for shredders.
	
	• To complete the list of waste treatment processes concerned: mechanical treatment in shredders of WEEE containing refrigerants for HOI and metals, water washing of excavated contaminated soil for HOI, regeneration of spent solvents for metals.
	• To modify footnote 4 to refer to the inventory now mentioned in BAT 2bis.
	• To add a footnote related to the capacity of the downstream WWTP to treat the

	pollutants concerned. • To add a footnote to refer to the averaging period for emissions to water as defined in the General considerations.

1.8.5 BAT-AELs for indirect discharge to a receiving water body

<table>
<tr><td>Location in D1</td><td>Section 6.1.3 – page 897 – BAT 15 – Table 6.4</td></tr>
<tr><td>Current text in D1</td><td>
<table>
<tr><th colspan="2">Parameter</th><th>BAT-AEL (Monthly average) (1)</th><th>Waste treatment process</th></tr>
<tr><td colspan="2">Hydrocarbon oil index (HOI)</td><td>0.5–5 mg/l</td><td>• Mechanical treatment in shredder of metal waste
• Re-refining of waste oil
• Physico-chemical treatment of waste with calorific value</td></tr>
<tr><td rowspan="8">Metals and metalloids (2)</td><td>Arsenic (expressed as As)</td><td>0.01–0.05 mg/l</td><td rowspan="8">• Mechanical treatment in shredder of metal waste
• Mechanical biological treatment of waste
• Re-refining of waste oil
• Physico-chemical and/or biological treatment of water-based liquid waste
• Water washing of excavated contaminated soil</td></tr>
<tr><td>Cadmium (expressed as Cd)</td><td>0.01–0.05 mg/l</td></tr>
<tr><td>Chromium (expressed as Cr)</td><td>0.01–0.05 mg/l</td></tr>
<tr><td>Nickel (expressed as Ni)</td><td>0.05–0.5 mg/l</td></tr>
<tr><td>Lead (expressed as Pb)</td><td>0.05–0.1 mg/l</td></tr>
<tr><td>Copper (expressed as Cu)</td><td>0.05–0.2 mg/l</td></tr>
<tr><td>Mercury (expressed as Hg)</td><td>0.001–0.01 mg/l</td></tr>
<tr><td>Zinc (expressed as Zn)</td><td>0.1–0.5 mg/l</td></tr>
<tr><td colspan="4">(1) The averaging period may be adapted when the monitoring frequency is reduced (see footnote (1) of Table 6.1).
(2) The BAT-AELs may not apply when the substance concerned is not present in the waste to be treated.</td></tr>
</table>
</td></tr>
<tr><td>Summary of comments</td><td>
<u>Indirect discharge</u>
• (DK 7) Replace the text "to a receiving water body" with "to an off-site waste water treatment plant", in line with the terms used in the questionnaires.
• (IT 50) Define "direct "and "indirect" discharge and amend the title of Table 6.4 as follows: "BAT-associated emission levels (BAT-AELs) for indirect discharge to a receiving water body".
• (BE 88) BAT-AELs should be the same for direct and indirect discharge; otherwise it may penalise plants which technically cannot have indirect discharge.
• (DK 37) Delete Table 6.4 as it is a matter of contractual relations between the plant and the WWTP.
• (DK 138, FI 27) These should be BAT-AEPLs as it is a matter of contractual relations between the plant and the WWTP. Values related to metals should be revised, and HOI should be deleted or the associated values revised.
• (GEIR 92, ES_A 36, ES_A 96, ES_C 17) BAT-AELs for indirect discharge should be higher than for direct discharge (see Article 15(1) of the IED).
• (EFR 233) It is not coherent to have the same values for indirect and direct discharge and Table 6.4 should be deleted.
</td></tr>
</table>

	• (EUROMETAUX 11) Table 6.4 should be deleted as it is sufficient that the emission levels comply with the requirements for further treatment which are defined in BAT 14. • (IT 52) Add a footnote as follows "these BAT-AELs might not apply if the plant discharges in a dedicated centralized downstream wastewater treatment plant" (see Article 15 of the IED). <u>Thresholds</u> • (HWE 41, HWE 43) BAT-AELs expressed only in concentration cannot correctly reflect the environmental impact and thresholds in terms of load should be defined. <u>Monitoring</u> • (HWE 39) Monitoring of emissions to water should not apply to the very specific activities of hazardous waste management consisting of stand-alone temporary storage of hazardous waste where no other treatment activities covered by 5.1, 5.2 and 5.3 of Annex I to Directive 2010/75/EU are operated. <u>General considerations</u> • (HWE 45) Ranges of BAT-AELs should be reassessed based on complementary data. • (HWE 52) Include a methodology to derive shorter-term ELVs/levels from BAT-AELs in order to avoid misinterpretations. <u>HOI</u> • (PL 14) BAT-AELs are very low and can be achieved only by a few oil separators, which would mean the use of an extra chemical treatment. The range should be modified for mechanical treatment in shredders of metal waste. <u>Metals</u> • (AT 56) Unless there is a clear indication of how the proposed values have been derived, it is proposed to use the Austrian values for both direct and indirect discharges. • (EUCOPRO 26) BAT-AELs are too low and may be below the detection limit. Further data will be provided to reassess the values. • (PL 16) BAT-AELs for zinc, copper and lead are very strict with regard to the shredders and can be achieved only by precipitation. Moreover, emissions from open-air shredders are related to the rainfall, and therefore very difficult to reduce. The BAT-AELs should be revised in line with the data collection. • (ECN 131) BAT-AELs are not based on the data collection and should be in line with the national discharge regulations. <u>Footnote 2</u> • (FR 173) The term "not present" should be clarified, in terms of quantity or risks. Moreover BAT-AELs related to metal should not be applicable to MBT as MBT does not treat hazardous waste. • (IT 51) For clarification, it is proposed to reword the footnote as follows: "The BAT-AELs may not apply when the substance concerned is not relevant for the treatment process and the waste treated".
EIPPCB assessment	<u>Indirect discharge</u> • The term "receiving water body" is the wording commonly used in other sets of BAT conclusions. • Direct and indirect discharges would indeed need to be clarified. • The aim of having BAT-AELs for indirect discharge is to protect the environment when the downstream WWTP is not designed to treat the pollutants concerned. With this objective in mind, it makes sense to have the same levels as direct discharge. • Of course, if the downstream WWTP is designed to treat the pollutants concerned, having BAT-AELs for indirect discharge may not be needed, which should be better reflected in the BAT conclusions. • Indeed, indirect discharges may be a matter of contractual relations between the waste treatment plant and the downstream WWTP but there may be situations in

	which the downstream WWTP cannot treat the pollutants concerned. <u>Threshold</u> • See the assessment in the previous section and the assessment related to WBLW plants. <u>Monitoring</u> • See the assessment in the previous section. <u>General considerations</u> • See the assessment in the previous section. <u>THC and HOI</u> • See the assessment in the previous section. <u>Metals</u> • See the assessment in the previous section. <u>Footnote 2</u> • See the assessment in the previous section.
EIPPCB proposal	• See the proposals in the previous section.

1.9 Emissions to soil and groundwater

<table>
<tr><td>Location in D1</td><td>Section 6.1.7 – page 900 – BAT 20</td></tr>
<tr><td>Current text in D1</td><td>

BAT 20. In order to prevent emissions to soil and groundwater from waste treatment, BAT is to use all of the techniques given below.

<table>
<tr><th colspan="2">Technique</th><th>Description</th></tr>
<tr><td>a</td><td>Sealed surface and retention volume</td><td>The surface of the whole waste treatment area (e.g. waste reception, handling, storage, treatment and dispatch areas) is sealed (e.g. concrete base). Each storage tank for liquids is located in a liquid-proof retention area.</td></tr>
<tr><td>b</td><td>Adequate drainage infrastructure</td><td>The waste treatment area is connected to a drainage infrastructure.
Run-off water falling on the treatment area is collected in the drainage infrastructure along with tanker washings, occasional spillages, drum washings, etc. and returned to the waste treatment plant or collected in an interceptor. Interceptors with an overflow to sewer have automatic monitoring systems, such as pH checks, which can trigger the shutting down of the overflow.</td></tr>
<tr><td>c</td><td>Design and maintenance provisions to allow detection and repair of leaks</td><td>Vessels and pipework are located above ground or a secondary containment of underground components is put in place.
Regular monitoring for potential leakages is carried out. When underground pipework is used, it is equipped with suitable inspection channels.</td></tr>
<tr><td>d</td><td>Security basin</td><td>A basin used to collect surges that may be contaminated, e.g. firefighting water. The discharge of waste water from this basin to a receiving water body or to the sewer is only possible after further appropriate measures are taken (e.g. control, treat, reuse).</td></tr>
</table>

</td></tr>
<tr><td>Summary of comments</td><td>

<u>Entire BAT</u>

- (AT 60, DE 519, FEAD 251, EFR 56, SE 84) The applicability of different techniques should be mentioned, considering e.g. the lack of space, the risk posed, design constraints.
- (AT 61, FEAD 94, CEFIC 28, ERFO 9) The techniques are very extensive and should be used on a case-by-case basis, so "all the techniques" should be replaced by "one or a combination of techniques".
- (UK 269) Add "surface water" in addition to soil and groundwater.
- (FEAD 151) A difference between the type of waste and the amount of leachate should be made. Also, retrofitting of the existing installations could cause problems or is only possible on a limited basis.
- (CEFIC 29) This BAT should be applicable to liquid waste only.
- (ES_C 19, EFR 175) The cost of this BAT would be excessive for existing plants and the applicability should be restricted to new plants.
- (ES_A 37) The cost of this BAT would be excessive for existing plants so a footnote should be included: "This BAT will only be applicable in case there is a risk of soil and groundwater pollution".
- (EBA 80) The BAT should consider the peculiarity of vegetal waste which does not require such stringent techniques.
- (SE 84) The list of techniques should be optional and allow other efficient techniques to be applied.

<u>Technique a</u>

- (BE 53, FR 246, EUCOPRO 29, HWE 57) To avoid different interpretations, the term "sealed surface" should be defined.
- (SE 159, SE 160, ECN 158, MWE 146, NL 12) Technique a should consider the type of waste treated (liquid, inert or hazardous) and the risk posed (e.g. location,

</td></tr>
</table>

	water quality, presence of a receiving water body, groundwater situation). • (EFR 57, 58) Add "generally applicable" in an "applicability" column. • (UK 270) "Liquid-proof retention area" could be understood as a measure applied to each individual tank instead of a collective measure. • (BE 52) All waste (with the exception of the inert) and not only tanks must be stored on a liquid-proof floor. • (IT 54) Not only storage tanks for liquids should be located in liquid-proof retention areas, but also process tanks/units. <u>Technique b</u> • (SE 184) "Interceptor" should be defined. • (EEB 243, ECN 139) Interceptors and automatic monitoring system should not be applicable to biological treatment, considering the little risk posed. • (IE 62, NL 13) Applicability depends on the risk posed by the waste treated, in particular on the sewer. • (EFR 59, EFR 138, EFR 145, UK 271, FR 175) In some industries, it is not pH checks but conductivity checks or float switches that can trigger the shutting down of the overflow. • (FR 175) Drainage is used when there is no sealed surface. Otherwise it is collection of water from sealed surface and the term should be changed accordingly. • (FR 175, EFR 60) The applicability to existing plants may be constrained by the configuration of the water circuits. This would be consistent with the applicability defined by BAT 13 for the segregation of different water streams in the water and drainage system. • (FEAD 96, UK 272) Automatic monitoring systems are used for overflows to surface water rather than overflow to the sewer, and therefore the description should read as follows: "Interceptors with an overflow to "surface water" may have automatic monitoring systems,...". • (ESRG 17) It is unclear, under the heading of Emissions to soil and groundwater, why the automatic monitoring systems are being specified for emissions to the sewer, therefore the sentence should be deleted. <u>Technique c</u> • (EEB 244, BE 78, ECN 140) The measures should be reordered logically, i.e. 1/ monitoring, 2/vessels and pipework above the ground or secondary containment, 3/ when there is no secondary containment or adequate control system for leakage detection, and 4/ when underground pipework is used, it is equipped with suitable inspection channels. • (FR 71, FR 174) The applicability of technique c should consider the risk of freezing. It should not be applicable to biogas pipework for which inspection channels are not commonly used. • (EFR 61, 62) Add "generally applicable" in an "applicability" column. • (ESRG 18, DK 12) The need for inspection channels of underground pipes should be applicable only if there is a risk posed and not for instance in the case of pipes carrying drinking water or in the case of sewers. • (CEWEP 109) Inspection channels may not be applicable for existing plants. • (SE 161) Pipes above ground are not to be recommended in cold conditions and the related sentence should be deleted. Also, "inspection channel" should be defined. <u>Technique d</u> • (EEB 245, ESRG 16, UK 273, FEAD 97, ECN 141, DK 123) "Security basin" is not clear and should be replaced by "tertiary containment". • (EEB 245, ECN 141, DK 123) Security basin may not be applicable to biological treatment (none of the existing biological treatment plants for source-separated biowaste have implemented such an extra basin). • (NL 14) The applicability of the technique should be based on the risk posed by the treated waste. • (EFR 176, ES_A 38, ES_C 21) Fire-fighting water is not a good example of the water collected in a security basin because it is not polluted (it is stored in containers and drums) and represents a volume of water too big to be collected in a waste water system. Therefore firefighting water should be deleted.

	• (EUROMETAUX 14, EFR 63, EFR 64) This technique could not be applicable to small existing plants. It should be generally applicable to new plants and applicable to existing plants within the constraints given by the configuration of the water circuits, in line with BAT 13 about segregation.
EIPPCB assessment	<u>Entire BAT</u> • There are indeed applicability restrictions to some of the techniques listed which need to be mentioned (see below). • The selection of a technique may depend on the risk posed which in turn also depends on the waste treated. These factors however do not correspond to technical or economic restrictions to the applicability of the technique and would be better mentioned in the description of the techniques when relevant. More generally speaking, considering the revised wording of the techniques and the revised applicability restrictions, all techniques are to be applied. • Some comments reveal the close connection between BAT 13 and BAT 20, as some techniques of BAT 20 also allow the prevention or reduction of emissions to surface water or sewage. Merging BAT 13 and BAT 20 would improve consistency and clarity. <u>Technique a</u> • The wording "sealed surface" may indeed be unclear. • The retention area could indeed be common to all tanks and not specific to each individual tank. • Indeed, not only tanks but also wastes are located in a liquid-proof area: this is covered by the first sentence of technique a. • Indeed, it makes sense that all tanks containing liquid are located in a retention area and not only storage tanks. • Considering the revised wording of technique a, a concrete base and a retention volume are generally applicable to avoid uncontrolled emissions to water, whatever the type of waste. • No information is available on technical or economic restrictions to the applicability of technique a. <u>Technique b</u> • It is not clear why the wording "drainage" is not correct. • It indeed makes sense to have the same applicability for technique 20b as for technique 13b, which is closely related. • Indeed, it is not only pH checks that can trigger the interceptor overflow shutdown and the overflow from the interceptors could indeed be discharged to surface water too. However, the point of this technique is the drainage and not the interceptor which, as such, does not prevent emissions to water. • Technique b (and BAT 20) is now proposed to be under the heading "Emissions to water". <u>Technique c</u> • Regular monitoring to detect leaks is to be carried out in all cases, which could indeed be clarified by moving the related sentence to the beginning of the text. • Not all components are to be above ground, as there may be limitations in terms of weather conditions (frost) or absence of risk posed for the environment by the fluid carried in the pipes (for instance drinking water). • There are indeed technical limitations to the installation of above-ground components, and to the installation of secondary containment and inspection channels in the case of existing plants, for reasons of space and costs. • As for the inspection of underground components, the text should indeed be in line with the EFS BREF and allow for a risk-based inspection programme, which may require inspection channels. <u>Technique d</u> • The term "security basin" does indeed lack clarity; however, the term "tertiary containment" would also need to be defined in the BAT conclusions and to be related to the primary and the secondary containments. It is useful to note that the

	CWW BREF also contains a similar BAT (BAT 9) with an accepted wording. • As for firefighting water and the risk-based approach, the wording of the CWW BREF indeed seems more appropriate. • For existing plants, the installation of this buffer storage needs to consider the configuration of the water circuits and the space availability.
EIPPCB proposal	• To mention the applicability of each technique. • To change the wording "sealed surface" in technique a. • To clarify that the retention area is a collective measure in technique a. • To specify that technique a is generally applicable. • To remove "interceptor" from technique b. • To add an applicability restriction for technique b. • To change the description of technique c and add an applicability restriction. • To change the description of technique d and add an applicability restriction. • To add technique b from BAT 23 (see the assessment of BAT 23) • To add a new technique a2 for the prevention of water ingress in the storage and treatment area (see the assessment of BAT 23). • To merge BAT 20 and BAT 13.

1.10 Storage and handling

1.10.1 Techniques for the prevention or reduction of the environmental risk associated with the storage of waste

<table>
<tr><td>Location in D1</td><td>Section 6.1.10 – page 902 – BAT 23</td></tr>
<tr><td>Current text in D1</td><td>
BAT 23. In order to prevent or, where that is not practicable, to reduce the environmental risk of the storage of waste, BAT is to use all of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a</td><td>Storage location</td><td>Storage is located away from watercourses</td><td>Generally applicable to new plants.</td></tr>
<tr><td>b</td><td>Storage design</td><td>This includes:
• Measures are taken to prevent, detect and mitigate overflows from tanks and vessels. Vessel overflow pipes are directed to a contained drainage system (i.e. the relevant bund area or another vessel).
• Tanks and vessels are isolable.</td><td rowspan="3">Generally applicable.</td></tr>
<tr><td>c</td><td>Storage capacity</td><td>Measures are taken to avoid storage/accumulation of waste, such as:
• a waste acceptance (see BAT 2) plan is used;
• the maximum waste storage capacity is clearly established and communicated;
• the quantity of waste stored is regularly verified against the maximum allowed storage capacity.</td></tr>
<tr><td>d</td><td>Safe storage operation</td><td>This includes:
• equipment used for loading, unloading and storing waste is clearly documented and labelled;
• waste segregation measures are taken (see BAT 2);
• substances known to be sensitive to heat, light, air, water, etc. are protected from such ambient conditions;
• containers and drums are fit for purpose and stored securely.</td></tr>
<tr><td>e</td><td>Storage of laboratory smalls</td><td>Dedicated area is used for sorting and repacking laboratory smalls</td><td>Only applicable for plants storing laboratory smalls.</td></tr>
</table>
</td></tr>
<tr><td>Summary of comments</td><td>
<u>All BAT</u>
• (CEFIC 32) Delete BAT because it is a double regulation with the REF BATC and repeats points from BAT 1 and BAT 20.
• (AT 64, AT 65, ECN 145, DK 124, DK 125, SE 205) Replace "this includes" in techniques b and d with "such as" or "it may include" as the bullets listed in the description of the techniques do not necessarily have to be fulfilled all together.
• (DK 126, SE 207, ECN 147, NL 15) It should be mentioned that the selection of measures may depend on the risk identified.
• (EEB 131) BAT 23 should be complemented taking into account the extensive D1 Section 2.3.13.2. Also, current BAT 24-27 should be considered.
• (ES_A 112) Include in BAT 23 techniques for the storage of non-hazardous waste such as piles, bunkers, etc.
• (CEFIC 56) Replace "all techniques" with "one or a combination of".
• (ECN 143, SE 204) Techniques a and b should be merged in BAT 20 because they
</td></tr>
</table>

	are water- and soil-related techniques. <u>Technique a</u> • (EEB 248, SE 204, ECN 144, FEAD 14) The term "away" should be specified. • (FEAD 14) Protection of surface water can also be achieved in other ways, not necessarily by locating storage away from a watercourse. Change to: storage must be designed in a way that prevents pollution of surface water. • (IE 46) Storage should also be away from sensitive receptors <u>Technique b</u> • (UK 277, SE 206, ECN 146) The word "isolable" is not clear. • (IE 8, IE 47) Add techniques to 1/ prevent rainwater ingress into the storage and 2/collect and treat run-off and leachate from the storage. • (BE 51) Add indoor storage of waste which can leak harmful substances / cause leaching. <u>Technique c</u> • (EEB 117, DE 424) The measures mentioned should be taken to avoid inadequate storage of waste. • (AT 63) The thermal load of waste to be stored needs to be taken into account to calculate the maximum storage capacity and this should be reflected in the technique. • (UK 278) The quantity of waste stored should be regularly verified against the maximum allowed process capacity. • (FR 109) The term "communicated" should be clarified as follows: "communicated to the competent authority." <u>Technique d</u> • (IE 9, IE 48) Fire prevention and waste labelling should be added. • (UK 279) Add that 1/waste is regularly inspected to check it remains secure; and 2/ appropriate time limits for wastes are established and adhered to.
EIPPCB assessment	<u>All BAT</u> • It is not clear what exactly the overlaps are. • The lists of measures given in techniques b and d do not intend to be inclusive or exhaustive. This should be clarified by changing the wording "this includes…". • BAT 23 gives a list of techniques which are neither prescriptive nor exhaustive. The selection of techniques is up to the operator and the responsible authority. • BAT 23 concerns the storage of all kinds of waste and not only hazardous waste. The measures are given as examples (which should be clarified by the use of "measures such as…" and waste piles are now proposed to be mentioned in technique b. • The revised wording "measures such as…" gives more flexibility to the selection of techniques (which are neither prescriptive nor exhaustive) and it does not seem necessary to modify the BAT statement. • Section 2.13.2 of the BREF is indeed very extensive and it is not the intention of the BAT conclusions to repeat all the detailed possible measures mentioned in the BREF. However, most of the existing BAT 24 to 27 are covered by the revised BAT conclusions: in BAT 23 but also in BAT 8, 9, 10 and 20. • Technique a is no longer directly connected to emissions to water and therefore does not fit in BAT 20 (see below). Technique b is indeed related to emissions to water and may have a wider scope than only storage (for instance, it may also concern process tanks and vessels). It could therefore be moved to BAT 20 to improve readability and consistency. • Although no comments were made on this point, BAT 23 and BAT 24 are about waste stream management and would be better placed under this section. <u>Technique a</u> • The term "away" is indeed vague and not of much use to the permit writer. Likewise, the addition of the term "sensitive receptors" will not add precision. Moreover, the BREF does not contain further information on this technique. Finally, more generally speaking, the siting of the plant may be considered in other frameworks such as environmental impact assessments. On the other hand, it may be helpful to include

	the limitation of double waste handling, which is described in the BREF. <u>Technique b</u> • The word "isolable" needs to be clarified. • The prevention of rainwater ingress in waste storage is indeed relevant to reduce the volume of contaminated run-off water. As the aim of such a technique would to reduce the volume of waste water generated, it is better suited in BAT 20. Moreover, this technique may concern other areas besides just the storage area. • The collection and treatment of run-off water or leachate is already covered by BAT 20 (segregation of water streams in the drainage system). <u>Technique c</u> • As waste storage is part of the waste treatment process, the avoidance of waste storage cannot be an objective. The wording therefore needs to be changed. • The thermal load is indeed one aspect to be considered to set the maximum storage capacity, with regards to the risk of fire, and may be a useful example for the permit writer. • If the process capacity is exceeded, the excess waste will be stored in the storage area, which may induce additional nuisances or risks. The aim of this technique is to set a maximum storage capacity so that these induced nuisances or risks are limited. Of course, the storage capacity should be consistent with the process capacity. • The communication between the operator and the authority is not in the scope of the BAT conclusions. The word "communicated" in this context means that the maximum storage capacity is clearly known by the staff concerned. The word should be changed as it may be misleading. <u>Technique d</u> • Waste tracking is already part of BAT 2. However, the minimisation of the waste residence time is mentioned in the BREF and could be usefully mentioned in technique c. • Fire protection and prevention is already addressed, whilst more generally, in BAT 22. • Regular inspections are indeed needed to ensure that the waste remains secure, as they are needed for all the activities carried out on the site. These inspections are already covered by BAT 1 (EMS). <u>Technique e</u> • Although there is no comment on this technique, the applicability as proposed in D1 is not relevant as it is not an applicability restriction.
EIPPCB proposal	• To replace the wording "this includes…" in techniques b and d. • To modify technique a, replacing the location of the storage away from watercourses with the limitation of double handling of waste. • To complete the descriptions of techniques b and c. • To remove examples of techniques which are already mentioned in BAT 2. • To move technique b into BAT 20 (which is also proposed to be merged with BAT 13, see the assessment of BAT 20 later in this document). • To add a new technique in BAT 20 for the prevention of water ingress in waste storage and treatment areas. • To remove the applicability of technique e and instead complete the description. • To move BAT 23 and BAT 24 below BAT 2.

1.10.2 Techniques for the reduction of the environmental risk associated with the handling of waste

<table>
<tr><td>Location in D1</td><td>Section 6.1.10 – page 903 – BAT 24</td></tr>
<tr><td>Current text in D1</td><td>BAT 24. In order to reduce the environmental risk associated with the handling of waste, BAT is to use the following technique.
<table>
<tr><th colspan="2">Technique</th><th>Description</th></tr>
<tr><td>a</td><td>Handling systems and procedures</td><td>This includes:
• handling of waste is carried out by qualified and trained staff;
• transfers and discharges of waste are duly documented and validated prior to execution;
• measures are taken to ensure couplings are correctly fitted when connecting hoses or pipes;
• measures are taken to prevent, detect and mitigate spills;
• technical and, if relevant, construction precautions are taken to protect human health and the environment when mixing or blending wastes, depending on the composition and consistency of the wastes to be mixed or blended (e.g. vacuuming dust-like wastes).</td></tr>
</table></td></tr>
<tr><td>Summary of comments</td><td>• (EEB 132) BAT 24 should be complemented taking into account the extensive D1 Section 2.3.13.3. Also, current BAT 28 and 31 should be considered.
• (UK 280) This section is a brief summary of Section 2.3.13.3 but misses much of the detail therein. It is proposed to include all of the detail in Section 2.3.13.3 or refer to procedures as per BAT 2.
• (EUCOPRO 31, EUCOPRO 33) "This includes" should be replaced by "this may include" and "the following technique" by "one or a combination".
• (UK 280, FEAD 153) This technique should be moved to BAT 2 as it is related to waste stream management.
• (CEFIC 33) Delete BAT 24 because it has no positive impact on the environment.
• (SE 85, DK 127, ECN 148) The technique applicability should consider a risk-based approach.
• (EUCOPRO 32) It should be mentioned in the applicability that the techniques should be adapted according to the configuration of the site (new or existing plants).
• (FR 111) The protection of human health should be done in conformity with the related regulation.
• (DK 54) Add a technique to prevent mixing or blending of hazardous waste with not-hazardous waste.
• (DK 127, ECN 148) Delete the example in brackets because it cannot be applied in the case of shredding, screening, turning that takes place in outdoor composting.</td></tr>
<tr><td>EIPPCB assessment</td><td>• Section 2.13.3 of the BREF is indeed very extensive and it is not the intention of the BAT conclusions to repeat all the detailed possible measures mentioned in the BREF. However, most of the existing BAT 28 to 31 are covered by the revised BAT conclusions: in BAT 24 but also in BAT 8, 9, 10 and 20 to 23.
• There is only one technique described (technique b) so the wording "one or a combination" is not appropriate. Replacing "this includes" with "this may include" is not necessary, considering the addition to the risk-based approach in the technique description (see below).
• BAT 2 is more about the principles of the waste stream management. BAT 24 aims at giving some more practical techniques related to waste handling as BAT 23 gives some for waste storage.
• Concerning the risk-based approach for the technique applicability, handling procedures are generally applicable but the content and extent of the procedure may depend on the risk posed, as in BAT 2.
• It is not clear how BAT 24 has no positive impact on the environment.
• There is no information available about the limitation of applicability to new plants.
• Mixing of different types of waste is addressed in BAT 2 (waste segregation).
• The reference to human health and environmental protection is not necessary as the</td></tr>
</table>

	BAT statement specifies that the aim of the technique is to reduce the environmental risk associated with the handling of waste. • The example in brackets is clearly an example and does not need to be applied in all cases. Deleting this example would undermine the clarity of the technical and design precautions mentioned. • Although no comments were made on this point, BAT 23 and BAT 24 are about waste stream management and would be better located under this section.
EIPPCB proposal	• To focus on the implementation of handling procedures, mentioning the most important points and leaving the details (such as couplings correctly fitted) in Section 2.3.13 of the BREF. • To add in the technique description a reference to the risk-based approach. • To move BAT 23 and BAT 24 below BAT 2. • As there is only one row in the table proposed in D1, to write BAT 24 in plain text.

1.11 Mechanical treatment of waste

1.11.1 Section 6.2

Location in D1	Section 6.2 – page 904-907
Current text in D1	Not applicable
Summary of comments	• (EEB 140) Add a specific section and corresponding BAT conclusion(s) for the mechanical treatment of waste with calorific value, regarding in particular the implementation of an output quality assurance system when preparation of waste to be used as a fuel is carried out. More specifically, relevant BAT from the current WT BREF (2006) should be kept (i.e. BAT 117-130). • (MWE 148) Clarify in the general statement of Section 6.2 that the BAT conclusions in Section 6.2 do not apply to mechanical preparation of waste as a part of the biological treatment of waste such as open composting plants.
EIPPCB assessment	• In the current WT BREF, BAT conclusions related to the preparation of waste to be used as a fuel relate to: o compliance of the output with the requirements of the user of the output (current BAT 117, 118, 119), which is now partly covered by the modified BAT 2; implementation of appropriate abatement techniques (current BAT 120), which are included in specific BAT conclusions in D1; and compliance with safety rules when treating hazardous waste (current BAT 121), which, as such, is outside the BAT conclusions' scope. Specifically for the preparation of solid waste fuels, BAT conclusions in the current BREF relate to: o sorting of the waste input (current BAT 122, 123, 124), which is dealt with in BAT 2 of D1; o using a suitable combination of shredder systems and pelletisers (current BAT 125), which is more related to process steps than techniques to prevent/reduce emissions; o considering emissions and flammability hazards when processing the waste (current BAT 126), which is dealt with in BAT 2 of D1 (pre-acceptance and acceptance procedure); o considering carrying out mixing/blending in closed areas with appropriate atmosphere control systems (current BAT 127), and using bag filters for the abatement of particulates (current BAT 128), which is dealt with especially in BAT 2, BAT 10, and BAT 25 of D1 (waste compatibility assessment, containment and collection of diffuse emissions, reduction of dust emissions to air from mechanical treatment of waste). As for the existing BAT 129 and 130, they concern liquid fuel. • Regarding the implementation of an output quality management system, see assessment of BAT 2 in Section 1.4 • Additionally, it is noted that data on emissions of organic compounds arising from the mechanical treatment of waste with calorific value have been collected: among the 33 plants that participated in the data collection, 6 provided organic compound concentration values (Plants 277, 278, 280, 361_363, 425_426, and 615), from seven points of emission. The reported abatement techniques are mainly activated carbon, and/or a biofilter. Thermal oxidation and wet scrubbing were each reported once. It is relevant to set a BAT-AEL for organic compounds emissions to air. • When indicated, the standard used for monitoring is mainly EN 12619 which relates to volatile organic compounds. Among the concentration values reported from seven emission points, two are slightly above 30 mg/Nm^3: Plant 278 with 18–31 mg/Nm^3, and Plant 280 with 32–36 mg/Nm^3 (reported as the yearly average of continuous measurement). For the latter, it is not clear what the reported standard used (EN 14818) refers to. As for the lower end, Plant 425-426 equipped with activated carbon and thermal oxidation, reported a concentration value of 11.5 mg/Nm^3. • As BAT 25 applies to all mechanical treatment without further specification, there may indeed be some confusion with MBT or pretreatment as part of the biological

	treatment, and this should be clarified.
EIPPCB proposal	• To add a new BAT 29ter and associated emission level (range of 10-30 mg/Nm^3) for the reduction of channelled emissions to air of organic compounds from the mechanical treatment of waste with calorific value. • To clarify the scope of Section 6.2 in the introductory text.

1.11.2 Emissions to air

1.11.2.1 Techniques for the prevention or reduction of dust emissions to air

<table>
<tr><td>Location in D1</td><td>Section 6.2.1.1 – page 904 – BAT 25</td></tr>
<tr><td>Current text in D1</td><td>

BAT 25. In order to reduce dust emissions to air, BAT is to use one or a combination of the techniques given below.

<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a</td><td>Cyclone</td><td rowspan="3">See Section 6.6.1.</td><td>Generally applicable.</td></tr>
<tr><td>b</td><td>Wet scrubber</td><td>Not applicable to mechanical treatment of mercury-containing equipment.</td></tr>
<tr><td>c</td><td>Fabric filter</td><td>Not applicable to exhaust air ducts directly connected to the mill for mechanical treatment in shredders of metal waste.</td></tr>
<tr><td>d</td><td>Water injection into the shredder mill</td><td>The shredded material is made damp by injecting water into the mill. The amount of water is regulated in relation to the amount of energy consumed by the main motor.
The airflow that contains residual dust is directed to cyclone(s) and/or wet (venturi) scrubber</td><td>Only applicable to mechanical treatment in shredders of metal waste in combination with techniques (a) and/or (b), within the constraints imposed by local meteorological conditions (low temperature).</td></tr>
</table>

</td></tr>
<tr><td>Summary of comments</td><td>

<u>Whole BATC</u>

- (CEWEP1, CEWEP10, ESWET18, SE86, NL16, DE298, FEAD102, CEFIC34, MWE147) Clarify that this BAT applies only to channelled emissions to air.

<u>Cyclone</u>

- (EEB5, BE48, DE370) A cyclone alone cannot be considered BAT, as also shown by the data collection.

<u>Fabric filter</u>

- (EEB49, DE371) Fabric filters should be generally applicable as the data collection shows that some fabric filters are directly connected to the mill exhaust.
- (FI29) Add the following applicability restriction "Not applicable for shredders of metal waste due to fire risks".

<u>Water injection</u>

- (ES_C36, EFR190) There may be no water available in some countries in summertime.

<u>Additional techniques</u>

- (EEB50, DE372) In order to abate VOC emissions, add as technique e. activated carbon adsorption in combination with other dust abatement techniques, as it is shown in Table 3.1.
- (UK281) Add as technique e. HEPA filter for waste containing carcinogenic fibres, e.g. asbestos or refractory ceramic fibres, and add as technique f. sulphur-impregnated carbon for waste containing mercury.

<u>Additional BAT</u>

- (DE267) Add a new BAT 26a in Section 6.2.2.1 for the prevention/reduction of VOCs, PCDD/F, PBDD/F and mercury emissions, together with associated BAT-AELs. PCDD/F can be contained in brominated flame retardants on a base of polybrominated diphenylethers (PBDE) as a contamination or it can be formed by its thermic degradation. Table 3.4 shows that, from 10 measurement values of dl-PCB in

</td></tr>
</table>

	the flue-gas of 3 different shredding plants, 9 exceed the value of 0.1 ng TEQ/Nm^3. Finally, as for mercury, Table 3.6 shows the mercury emissions of different plants. Except one, all values are below 7 µg/Nm^3. 70% of the plants were below 5 µg/Nm^3 (see also Figure 3.1.4). As there is no coherence between mercury emissions and dust emissions, e.g. see Plant # 364-1 or Plant # 95, a BAT-AEL for mercury has to be established.

EIPPCB assessment	<u>Whole BATC</u>
	• It is needed to clarify in the BAT statement that both collection and treatment of emissions to air are BAT. This is done by referencing BAT 10d (see the assessment related to BAT 10). Once the emissions are collected, they are of course channelled and the abatement techniques are applied to these channelled emissions.
	
	<u>Cyclone</u>
	• Indeed, plants equipped with a cyclone alone (e.g. plant 136) show higher dust concentration values in emissions to air. Cyclones are generally used as preliminary separators for coarse dust.
	
	<u>Fabric filter</u>
	• Because of the risk of deflagrations in a shredder of metal waste (and especially when shredding EoLV), a fabric filter is not applicable to exhaust air ducts directly connected to the shredder. This applicability restriction is specified in BAT 25. However, for other mechanical treatments where there is no such risk of deflagration (such as mechanical treatment of waste with calorific value) or for exhaust air ducts not directly connected to the shredder (connected e.g. to conveyor, density separator), a fabric filter is applicable.
	• Indeed, two plants reported emission points equipped only with a fabric filter. They relate to exhaust air ducts not directly connected to the shredder:
	  o Plant 464_4: emission point at separation process step; and
	  o Plant 364_365_2: emissions from density separator.
	
	<u>Water injection</u>
	• The techniques listed and described in these BAT conclusions are neither prescriptive nor exhaustive. Other techniques may be used that ensure at least an equivalent level of environmental protection in the event that water is not available. However, drought is also a local climatological constraint.
	• The combination of water injection with cylone(s) and/or a wet scrubber is a description rather than an applicability restriction
	
	<u>Additional techniques and additional BAT</u>
	• This BAT relates to dust emissions from all mechanical treatment processes not combined with biological treatment. Other emissions are dealt with in each specific mechanical process, such as HEPA filtering for the mechanical treatment of mercury-containing WEEE.
	
	<u>Wet scrubber</u>
	• The applicability restriction proposed in D1 is not necessary as BAT 30, which applies specifically to the mechanical treatment of mercury-containing equipment, does not mention the use of a wet scrubber.

EIPPCB proposal	• To refer to BAT 10d in the BAT statement. • To modify the description and applicability restriction of cyclone. • To modify the applicability restriction of water injection. • To modify the applicability restriction of wet scrubber.

1.11.2.2 BAT-AELs for dust emissions to air

<table>
<tr><td>Location in D1</td><td>Section 6.2.1.1 – page 904 – BAT 25 – Table 6.5</td></tr>
<tr><td>Current text in D1</td><td>
<table>
<tr><th>Parameter</th><th>Unit</th><th>BAT-AEL
(Average of samples obtained during one year)</th></tr>
<tr><td>Dust</td><td>mg/Nm^3</td><td><2–5 ([1])</td></tr>
<tr><td colspan="3">([1]) When a fabric filter cannot be applied in shredders of metal waste for safety reasons, the higher end of the range is 10 mg/Nm^3.</td></tr>
</table>
</td></tr>
<tr><td>Summary of comments</td><td>
<u>Sampling</u>

(EEB69) Add how many samples per year so it is not a trade-off point by permitting.

<u>Dust</u>

(ERFO7) Reconsider the BAT-AEL taking into account measurements including inaccuracy and spreading and explain the methodology.
(EFR234) 1/ Installation of additional/new abatement techniques, such as fabric filters would have significant cross-media effects including increased risks of accident (risks of explosion, risk for the safety and the integrity of the installation). 2/ The BAT-AELs proposed for dust are not consistent with the data collection phase and with the additional data collected by EFR ESG/EuRIC. 3/ Costs associated with compliance with the proposed BAT-AELs would be excessive.
(AT66) Based on the data collection, the range should be <2–10 mg/Nm^3.
(ERFO8, DE9, DE96) Based on the data collection, the range should be 2–10 mg/Nm^3.
(FR366) Fabric filter is not the main abatement technique so the BAT-AEL should be 2–10 mg/Nm^3, and in a footnote: if fabric filters are used the higher end should be lowered to 5 mg/Nm^3.
(UK284, UK_A139) Range should be 2–10 mg/Nm^3 because the reference method for measuring dust was validated for an ELV of 10 mg/m^3. In order to meet the limit of detection requirements of the method for an ELV of 2 mg/m^3, the sample time would have to be extended significantly beyond the 30 minutes that the method was validated for. This also applies to other BATs which have dust BAT-AEL limits of less than 10 mg/Nm^3.
(FEAD101, PL17) Based on the data collection, the upper end of the range should be 10 mg/Nm^3.
(MWE149) The upper end of the range should be 10 mg/Nm^3 as is the case in Austria.
(EFR235) The proposed BAT-AEL shows a significant discrepancy with the data submitted by the industry on BATIS and the additional data collected and presented by EFR ESG / EuRIC, as well as with what can be technically achieved. It is more appropriate to propose a 95th percentile of the average measurements, i.e. 15 mg/Nm^3 with a fabric filter and semi-wet processing.
(SE187) Add a footnote that, in Nordic conditions in the winter months, < 10 mg/Nm^3 is not possible to obtain because water use is not feasible at low temperature. Suggested level of 15 mg/Nm^3.
(EERA52) The range should be 1.3–18.7 mg/Nm^3, based on BDSV document.
(ES_A 39, ES_C 23) The range should be <15–20 mg/Nm^3, in coherence with the state of art of the shredder industry and considering the economic impact of the proposed BAT-AEL.
(DK61) Based on the data collection, the BAT level should be a BAT-AEPL of 10 mg/m^3 and a BAT-AEL of 20 mg/m^3. This could be supplemented with a term to constantly check the efficiency of the air cleaning system.

<u>Additional parameters</u>

(DE267, EEB184) BAT-AELs are proposed for additional parameters (see also Section 1.11.3):

</td></tr>
</table>

Parameter	Unit	BAT-AEL
Volatile organic compounds (VOC)	mg/Nm^3	30–50
Polybrominated dibenzodioxins/ dibenzofurans (PBDD/F	ng/Nm^3	<0.1
PCDD/F and dl-PCB	ng/Nm^3	<0.1
Mercury	µg/Nm^3	1–5

- (EEB186) Add BAT-AEL for TOC (1–10 mg/Nm^3).
- (DK63) Suggest a BAT-AEL or BAT-AEPL for PCB and BAT-AEL or BAT-AEPL for PCDD/PCDF based on Plant #95:

Parameter	Unit	BAT-AE(P)L
PCB	mg/Nm^3	<0.1
PCDD/F	mg/Nm^3	<0.1

Footnote

- (EEB2, EEB51) Delete the footnote. With pressure relief equipment, plants can be equipped with a fabric filter that can still be used after a shredding mill, usually after a cyclone.
- (ES40, ES_C24) In the footnote, 10 mg/Nm^3 should be replaced with 30 mg/Nm^3, in coherence with the state of art of the shredder industry and considering the economic impact of the proposed BAT-AEL.
- (EFR236) The proposed BAT-AEL shows a significant discrepancy with the data submitted by the industry on BATIS and the additional data collection and presented by EFR ESG / EuRIC, as well as with what can be technically achieved. It is more appropriate to propose a 95th percentile of the average measurements, i.e. 30 mg/Nm^3 with dry processing.
- (DK17) Considering the low added value for environmental protection and data from Plant #95, the footnote should be revised as follows: "When a fabric filter cannot be applied in shredders of metal waste for safety reasons, or for existing plants using a wet scrubber to reduce dust emissions, the higher end of the range is 20 mg/Nm^3".
- (UK 282, DE 425) The footnote should also consider restriction for the use of a fabric filter due to technical reasons, in addition to safety reasons, such as moisture content of waste gas or large volume of waste gas.
- (EEB185) Add a footnote "The lower range can be achieved by fabric filter as a stand-alone technique or in combination with other techniques."

EIPPCB assessment

Sampling

- The monitoring frequency is given in BAT 4, and indications on averaging periods and sampling are given in the General considerations section of BAT conclusions.

Whole table

- For the assessment related to individual parameters below, it should be kept in mind that the averaging period is proposed to be modified (see the assessment of the General considerations). This needs to be reflected in the table.

Dust

- Of the 61 emission points from mechanical treatments of waste (i.e. shredding of metal waste, shredding of equipment containing VHCs/VFCs, mechanical treatment of waste with calorific value, mechanical treatment of mercury-containing WEEE) for which dust concentration values were provided, the highest come from the mechanical treatment in shredders of metal waste. Of the 40 dust concentration values reported by shredder plants of metal waste, 14 are above 5 mg/Nm^3, which is the dust concentration level generally achievable with a fabric filter as was already recognised in several BREFs and BAT conclusions.
- However, as mentioned in Section 1.11.2.1 above, a fabric filter is not applicable to the exhaust air duct directly connected to the shredder of metal waste because of safety issues. According to the information provided, this is the case for five plants,

	where a dust emission concentration of 10 mg/Nm^3 seems achievable: o Plant 28_1 is equipped with a cyclone and a wet scrubber (dust concentration values around 70 mg/Nm^3 in 2012, and around 13 mg/Nm^3 in 2013); o Plant 95 is equipped with a wet scrubber (concentration values decreasing from 20 mg/Nm^3 in 2010 to 1.3 mg/Nm^3 in 2012); o Plant 289 is equipped with a cyclone and a wet scrubber (concentration value range of 9.5–15 mg/Nm^3); o Plant 455_1 is equipped with a cyclone and a wet scrubber (concentration value range of 5–11 mg/Nm^3); o Plant 25 is equipped with a cyclone and a wet scrubber (concentration value range of 4.5–10 mg/Nm^3). In five other cases, it is not clear whether or not the reported dust concentration values relate to the exhaust air duct directly connected to the shredder: o Plant 136 is equipped only with a cyclone (concentration value of 9.5 mg/Nm^3 in 2010, 86 mg/Nm^3 in 2011, and 3.6 mg/Nm^3 in 2012); o Plant 571 is equipped with a wet scrubber and reported two concentration values in 2012 (35 mg/Nm^3 and 13 mg/Nm^3); o Plant 441, retrofitted in 2010 and 2011, is equipped with a wet scrubber (concentration values decreased from 14 mg/Nm^3 to 4 mg/Nm^3 between 2010 and 2012); o Plant 464_5 is equipped with a cyclone only (dust concentration around 10 mg/Nm^3); o Plant 286, which did not report information on the implemented abatement technique (dust concentration 6 mg/Nm^3). • All of the other 26 reported dust concentration values are equal to or lower than 5 mg/Nm^3. • According to the information summarised above, and since BAT 25 applies to all mechanical treatment of waste not combined with biological treatment, it seems adequate to set a BAT-AEL of 5 mg/Nm^3, and to allow 10 mg/Nm^3 when there is a risk of deflagration impeding the use of a fabric filter. • Additional data on dust emissions were provided by industry (including from the shredding of cooling appliances), showing that 22 of the 47 reported dust concentration values are equal to or lower than 5 mg/Nm^3, and 29 are below 10 mg/Nm^3. Among these 29 plants, 8 are equipped with a fabric filter (in combination with other techniques), the others are equipped with a cyclone and/or wet scrubber, or did not provide information. However, no clear indication is given on whether or not the emissions arising from shredders of metal waste relate to the exhaust air duct directly connected to the shredder. <u>Additional parameters</u> • This BAT relates to dust emissions from all mechanical treatment processes not combined with biological treatment. Emissions of VOCs, dioxins and PCBs are dealt with in each specific mechanical process section. • Concerning mercury, it should not be present in the waste input of shredders (except in dedicated processes mentioned in BAT 30 and the related BAT-AEL) as equipment containing mercury is collected separately according to the WEEE Directive and components containing mercury should be removed as far as possible according to EoLV Directive. Noted that the application of BAT 2 and, specifically for mechanical treatments, of BAT 26 should also prevent such incidents occurring. <u>Footnote</u> • According to the assessment for dust emissions above, it is proposed to keep the possibility for a higher end of the range at 10 mg/Nm^3 when a fabric filter is not applicable.
EIPPCB proposal	• To leave the BAT-AEL range and the footnote of Table 6.5 of D1 as they are.

1.11.3 Mechanical treatment in shredders of metal waste

1.11.3.1 General environmental performance

Location in D1	Section 6.2.2.1 – page 905
Current text in D1	Not applicable
Summary of comments	Additional BATC and/or techniques (see also Section 0) • (EEB 182, DE 378, 520) Add a new BAT conclusion related to the monitoring of dl-PCB and PCDD/F in the vicinity of the plant because such contaminations are mainly caused by diffuse emissions for which monitoring is usually not possible. • (BE 79) Add injection of activated carbon in the dust collector as a technique to abate PCBs and dioxins because it is applied with success at Galloo plants. This technique should not be considered an emerging one. • (EUROMETAUX 10) Add a new BAT conclusion related to metal recovery and prevention of waste generation. • (EEB 55) Add specific techniques to achieve proper acceptance, handling and storage procedures, as described in the document dated June 2014 (Section 5.1.3 – Table 8) provided by the subgroup on mechanical treatment in shredders of metal waste. • (BE 79) Add a new BAT conclusion (and corresponding information) about investigation at source of the factors that determine the distribution of PCBs and dioxins from raw materials. Additional parameters (see also Section 1.11.2.2) • (AT 68) Add VOCs as a parameter to be measured (7–20 mg/Nm^3, up to 50 mg/Nm^3 for low VOC loads): the reported data show that VOCs are emitted by shredders, and otherwise the requirements would be less strict than in the current BREF (2006). • (EEB 184) Add BAT-AELs for PCDD/F, PBDD/F, dl-PCB, mercury. See Section 1.11.2.2 together with comment DE 267. • (EEB 225) Add a BAT-AEL range for dust expressed as a specific load (0.1–7 g/t) because in some cases, due to the high flow of exhaust air, installations with low dust concentrations show high loads of dust in emissions to air.
EIPPCB assessment	Additional BATC and/or techniques • BAT conclusions, including on monitoring, can be set only inside or at the installation's boundaries. • Injection of activated carbon and ultrafiltration is indeed implemented in Plant 54 located in Belgium. According to EFR, this is the only plant in Europe fitted with this technique. However, although the list of techniques in BAT conclusions is neither prescriptive nor exhaustive, this specific technique could indeed be moved from the "emerging techniques" section to the "techniques to be consider in the determination of BAT" section in the BREF. • Metal recovery is indeed the main purpose of the shredding of metal waste, and one of the main sources of revenue of the sector. Sorting techniques (or process steps) are described at a general level, and the overall environmental performance of waste treatment is dealt with in BAT 2, especially in the new technique c1 related to the implementation of an output quality management system. It is therefore unnecessary to set a specific BAT for mechanical treatment in shredders of metal waste for metal recovery. • Acceptance, handling and storage, and prevention of diffuse emissions that can arise from handling and storage, are dealt with at a general level, e.g. in BAT 2, BAT 10, BAT 23 and BAT 24. • The presence of PCBs in the raw material is now covered by BAT 26, in addition to general BAT 1 and BAT 2. Additional parameters • Concerning VOCs, of 32 shredding plants that participated in the data collection, 10 reported concentration values for VOCs in emissions to air (expressed as TOC or

	TVOC), from 14 points of release. Of these 10 plants, one (Plant 364 located in Italy) is equipped with an activated carbon filter aiming in particular at reducing VOC emissions. Although it is the only plant in Europe fitted with this technique according to EFR, Plant 25 indicated that activated carbon has been successfully tested in 2010 but it is not clear whether this technique is implemented nowadays. Plant 54 also reported being equipped with activated carbon, but VOC emissions are not monitored. Four plants (including Plant 25) out of the 10 that reported concentration values are fitted with a wet scrubber that may also be efficient to abate VOC emissions, although dust is the main targeted pollutant. Plant 25 indicates in the questionnaire that compliance with the limit value regarding VOC emissions was achieved by reducing the feeding rate of EoLVs (down to around 20 pieces/h), feeding them together with other wastes, and by pretreating the packaging material in the on-site shearing machine. It seems then that VOC emissions can also be reduced by the adequate management of the waste input (pre-acceptance and acceptance). It seems therefore relevant to monitor TVOC emissions from shredders in order to verify that the implemented procedures are efficient. • PCDD/F and PCBs are not used or "intentionally produced" in the mechanical treatment in shredders of metal waste (as mentioned in Annex C – Part III of the Stockholm convention). It seems that the best way to deal with this issue is to ensure that no or as little as possible of these substances enter the process. Moreover, PCDD/F and PCBs tend to bond to dust, meaning that a well-controlled level of dust emissions, i.e. dust emissions within the proposed BAT-AEL ranges, would also help to maintain PCDD/F and PCB emissions at a low level. It is therefore unnecessary to set specific BAT-AELs on PCCD/F and PCBs, but it could be relevant to monitor these emissions in order to verify the efficiency of the dust abatement techniques, except when it can be demonstrated that PCCD/F and PCBs are not present in the waste gas. • Concerning a BAT-AEPL for specific dust load, although it is recognised that dilution of the exhaust air should be avoided, it seems very difficult to accurately determine a BAT-AEPL because of potential uncertainties, for instance regarding the real amount of waste shredded during the dust measurement. Moreover, it should be noted that the plants with the highest loads have reported dust concentrations above 10 mg/Nm^3. Therefore it does not seem necessary to have a second BAT-AEL expressed as a load. • Concerning mercury, see Section 1.11.2.2.
EIPPCB proposal	• To move ultrafiltration from "Emerging techniques" to 'Techniques to consider in the determination of BAT" in the BREF. • To add monitoring of TVOC emissions to air from mechanical treatment in shredders of metal waste in BAT 4. • To add monitoring of PCB emissions to air from mechanical treatment in shredders of metal waste, subject to its presence in the waste gas, in BAT 4.

<table>
<tr><td>Location in D1</td><td>Section 6.2.2.1 – page 905 – BAT 26</td></tr>
<tr><td>Current text in D1</td><td>

BAT 26. In order to improve the general environmental performance, and to reduce the risk of accidents and incidents, BAT is to use the technique given below.

<table>
<tr><th colspan="2">Technique</th><th>Description</th></tr>
<tr><td>a</td><td>Acceptance of waste input</td><td>This includes:
a. set up and implement a detailed baled material inspection procedure before shredding;
b. remove and return to the owner dangerous items (e.g. gas cylinders, dirty drums, EoLVs with dangerous parts) left in the waste stream by mistake;
c. reception and acceptance of drums and containers only when accompanied by a certificate of cleanliness.</td></tr>
</table>

</td></tr>
<tr><td>Summary of comments</td><td>

<u>Entire BATC</u>

- (FEAD 103) Remove BAT 26 because it does not provide any further value to the general sections on acceptance (BAT 2 and Section 2.3.2).

<u>BAT statement</u>

- (DE 529) Add in the statement that the objective of the BAT is also to prevent emissions and contaminations of the shredder output fractions (and not only to reduce the risk of accidents and incidents).

<u>Description</u>

- (EEB 181) Add a new point: reduction of the number of deflagrations to zero. According to the reported data (Table 3.11 in D1), this is achieved by 42% of the shredding plants.
- (IE 14) In point c) consider changing "certificate of cleanliness" to "declaration of cleanliness".
- (IE 38, UK 285, DE 530, AT 67) Add the detection of radioactive materials, and the management procedure when radioactive materials are detected.
- (BE 46) Add explicit reference to waste contaminated with PCBs.
- (FR 73, AT 69, UK 286, EFR 65, 154) Add management and safe disposal of unwanted dangerous items when it is not possible to return them to the owner
- (EERA 53) Delete the return of unwanted materials to the owner because it is often not possible and is only a commercial matter: what is important is not to shred these unwanted items.
- (UK 287, DE 531) Add screening procedures such as inspection pre- and post-tipping, depollution screening before shredding, screening procedure for hazardous components in WEEE.
- (DE 532) Explicitly mention the refusal of contaminated waste input such as refrigerators, non-depolluted WEEE, non-depolluted EoLVS.
- (EERA 35) Add a technique related to the depollution of EoLVs and WEEE in accordance with:
  - Annex I (3) to Directive 2000/53/EC on End-of-Life Vehicles;
  - Annex VII (1) to Directive 2012/19/EC on WEEE;
  - EN50625 series standards give specific guidance on the treatment of WEEE, according to Article 8 of the WEEE Directive (EC mandate M518).
- (ES_C 22, EFR 178) Specify that inspection of the baled material should be done visually.

</td></tr>
<tr><td>EIPPCB assessment</td><td>

<u>Entire BATC</u>

- This BAT is in addition to the generic BAT 2 to clarify specific issues linked to the mechanical treatment in shredders of metal waste, which may lead to uncontrolled (diffuse) emissions.

<u>BAT statement</u>

- Indeed, the BAT would also prevent emissions and contamination of the shredder output fractions. It was concluded at the kick-off meeting to exclude from the scope

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</table>

	output quality issues. The implementation of an output quality management system has been added in BAT 2. However, BAT 26 goes beyond acceptance procedures because it relates to the prevention of emissions due to accidents and incidents. This should be reflected in the BAT statement. <u>Description</u> • The reduction of the number of deflagrations is dealt with in BAT 27 of D1 by implementing specific procedures. See the assessment of BAT 27 and the proposal for rewording its statement. • Indeed, detection and appropriate management of radioactive materials at the entrance of the installation are important. • Specifically mentioning PCBs, non-depolluted EoLVs and WEEE as waste input to be removed before shredding, as well as their adequate management, would indeed enhance clarity. • EoLVs and WEEE depollution is covered by other pieces of legislation (EolV or WEEE directive) The BAT conclusions do not aim at repeating existing legislation. • Inspections of the baled material can be done visually, but also with detectors, e.g. for radioactivity screening.
EIPPCB proposal	• To complement and clarify the objective of the BAT in the statement. • To clarify the wording of the description. • To complement and clarify the examples of unwanted materials to be removed before shredding (including e.g. radioactive materials). • To add management of these unwanted materials. • As there is only one row in the table proposed in D1, to write BAT 26 in plain text.

1.11.3.2 Diffuse emissions to air and deflagrations

<table>
<tr><td>Location in D1</td><td>Section 6.2.2.2 – page 905 – BAT 27</td></tr>
<tr><td>Current text in D1</td><td>
BAT 27. In order to prevent or reduce deflagrations and related diffuse emissions, BAT is to use both of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th></tr>
<tr><td>a</td><td>To use pressure relief equipment</td><td>In order to control deflagrations, pressure relief dampers are installed. They are equipped with rubber flaps preventing diffuse emissions in normal operation.</td></tr>
<tr><td>b</td><td>To set and implement procedures to reduce the number of deflagrations</td><td>This includes:
• a protocol containing appropriate actions and timelines;
• a protocol for conducting deflagration monitoring;
• a protocol for response to deflagration incidents;
• a deflagration reduction programme designed to identify the source(s), and to implement elimination and/or reduction measures (e.g. inspection of waste input and management of prohibited materials);
• a review of historical deflagration incidents and remedies and the dissemination of deflagration knowledge.</td></tr>
</table>
</td></tr>
<tr><td>Summary of comments</td><td>
<u>Additional BATC and/or techniques</u>
• (EEB 286, UK 288) Add a new technique: pre-shredding with applicability that may be restricted:
  ○ (EEB 286) to waste input having the potential to cause deflagrations, such as EoLVs or waste containing explosive or flammable substances;
  ○ (UK 288) to the cases when techniques a and b are proven to be insufficient.
• (IT 55) Add a new technique: temperature relief equipment, connected to the fire system, in order to sprinkle water in case of overheating during the shredding operation. This technique allows the reduction of the amount of water used since the water injection occurs only in case of danger of fire and explosion (see attachment to the comment).
• (EUROMETAUX 18) Add techniques such as suitable surface pavement, regular cleaning of surfaces to prevent dust formation, dust suppression systems (misting or water spraying), enclosure/hoods at conveyer transfer points.
• (DE 377, 521, EEB 57, 121) Add techniques related to the prevention/reduction of diffuse emissions (see attachment to the comments), and specify which of them are mandatory and which are optional, because this would also prevent dl-PCB contamination in the vicinity of the plant.
• (BE 45) Add a new BAT conclusion related to the prevention of diffuse emissions from storage (e.g. SLF, SHF) in closed or semi-closed containers.

<u>BAT statement/Description of technique</u>
• (FR 77) In the statement, instead of prevention/reduction of deflagrations and related diffuse emissions, change the purpose of the BAT to prevent/reduce damage to equipment. Indeed, pressure relief equipment does not prevent diffuse emissions; on the contrary, poorly maintained equipment may increase diffuse emissions.
• (EEB 56, DE 380) Complete the description of technique b's third bullet point with examples such as gas cylinders, or contaminated materials such as non-depolluted or poorly depolluted EoLVs and containment drums.
• (FR 78, UK 289, ES_C 25, EFR 181) Rubber flaps do not prevent diffuse emissions. Remove the sentence.
</td></tr>
</table>

	• (EFR 66) Change the description of technique a to read: in order to control deflagrations, pressure relief dampers are commonly installed, with rubber flaps that aid in preventing diffuse emissions in normal operation. Note that the type of pressure relief equipment is integral to the metal waste shredder design. Whilst most shredders of metal waste have pressure relief equipment, not all are designed with rubber flaps.
EIPPCB assessment	<u>Additional BATC and/or techniques</u> • Of the 31 shredding plants that participated in the data collection, only three (Plants 29, 364, and 571) reported being equipped with a slow-running pre-shredder. According to the questionnaires, no deflagration occurred in these plants during the three reference years (2010-2012). This would confirm that this is efficient to prevent deflagrations. It should be noted however that Plant 571 was commissioned in 2012, and that the pre-shredder was installed in 2013 in Plant 364. The description of pre-shredders reported in Section 3.1.1 of D1 and the information provided by the corresponding comments do not seem sufficient to set a specific BAT. Instead, the preliminary shredding of waste at low speed can be added to the list of measures for preventing deflagrations. • According to the document provided as an attachment to the comment, temperature relief equipment allows the minimisation of water consumption because water is injected into the mill only when the temperature increases. • In order to avoid repetition, general BAT conclusions on prevention/reduction of diffuse emissions (BAT 10) and on storage and handling (BAT 23 and BAT 24) are proposed. BAT 27 is about techniques specific to the mechanical treatment in shredders of metal waste. <u>BAT statement/Description of technique</u> • The BAT concerns the prevention of diffuse emissions, for which the reduction of the number of deflagrations is relevant. The text of technique a may be confusing as it refers to the use of pressure relief which by itself does not prevent deflagration. However, pressure relief equipment helps mitigate the consequences of deflagrations.
EIPPCB proposal	• To reword the BAT statement and technique description in order to limit the objective of this BAT to the prevention of deflagration. • To mention preliminary shredding of waste at low speed in the list of measures for preventing deflagration. • To modify the description of technique a, and to move this technique to after technique b.

1.11.4 Mechanical treatment in shredders of equipment containing VFCs or VHCs

1.11.4.1 Techniques for the prevention or reduction of VOC emissions to air

<table>
<tr><td>Location in D1</td><td>Section 6.2.3.1 – page 906 – BAT 29</td></tr>
<tr><td>Current text in D1</td><td>

BAT 29. In order to prevent or, where that is not practicable, to reduce VOC emissions to air, BAT is to use one of the techniques given below.

<table>
<tr><th colspan="2">Technique</th><th>Description</th></tr>
<tr><td>a</td><td>Removal of VOC from the shredding area and treatment by cryogenic condensation</td><td>Waste gas containing VFCs/VHCs is extracted from the shredding area, and inert gas (e.g. N_2) is blown in to reduce the O_2 concentration below 4 vol-%. This waste gas is then sent to a cryogenic condensation unit where it is liquefied (see description in Section 6.6.1.). The liquid gas is stored in tanks for further treatment. The inert gas is recovered and reused to reduce the O_2 concentration.</td></tr>
<tr><td>b</td><td>Removal of VOC from the shredding area and treatment by adsorption</td><td>Waste gas containing VFCs/VHCs is extracted from the shredding area and led into adsorption filters (see description in Section 6.6.1.). The spent activated carbon is regenerated by means of heated air pumped into the filter to evaporate trapped VFCs/ VHCs. After the filter, the gas is compressed and cooled in order to liquefy the VFCs/VHCs. The liquefied gas is then stored in tanks. The emitted gas is usually led back into the adsorbing filter in order to recover any residual VFCs/VHCs.</td></tr>
</table>

</td></tr>
<tr><td>Summary of comments</td><td>

<u>Entire section</u>

- (EEB 58, DE 426) Reword the heading of the section to clarify that the treatment is a combination of physical, chemical and mechanical processes.
- (AT 71) Add HCFC to the heading of the section because it is a substance that can be found in the equipment concerned.
- EEB (93) Clarify that the techniques also reduces VHC and VFC emissions to air.
- (DE 427) Clarify that, in this document, VFC is used as a collective term for halogenated hydrocarbons which contain the element fluorine, in particular chlorofluorocarbons (CFC), hydrochlorofluorocarbons (HCFC) or hydrofluorocarbons (HFC).
- (EERA 44) For consistency, use VFC/VHC instead of VOC.

<u>Entire BATC</u>

- (SE 188) Clarify that this BAT conclusion and the BAT-AELs apply only to channelled emissions.
- (DE 501) The monitoring should be defined: continuous measurement for VFC emissions. BAT-AELs should be derived from half-hourly averages.
- (EFR 141, EFR 143, EFR 237, EFR 238) For both techniques a and b, make a clear differentiation between the removal of VFCs and the removal of VHCs because recognition of the substitution benefits of VFCs by VHCs is necessary; otherwise, who would consider substitution worthwhile if there is no benefit in practice?

<u>Additional BAT and/or technique</u>

- Depollution rate:
  - (AT 73, EERA 43) Add a new BAT (and the corresponding section in the BREF) regarding management of residues, and set BAT-AELs for residual content of VFC/VHC and CFC, HFC, HCFC in the degassed compressor oil, in the residual (non-degassed) compressor oil, in recovered insulation material, and for residual PU content in metals and in plastics, in line with the relevant standards (i.e. EN 50574 and future EN 50625).
  - (EEB 95, DE 386) Add a new BAT on the removal rate of the oil and refrigerant mix from the cooling circuit and compressor, for which a BAT-AEL could be set at 99 %, because an inappropriate degassing step can lead to emissions of VFCs and/or

</td></tr>
</table>

	VHCs. o (DE 386) In the event that a BAT-AEL on the removal rate of the oil and refrigerant mix from the cooling circuit and compressor cannot be set on the basis of the data provided and of a calculation method, add a new BAT to ensure that collection of the oil and refrigerant mix is as complete as possible. o (UK 290, FEAD 137) Add a technique regarding the degassing step as described in Section 3.2.3 of D1 (so that e.g. 99 % of the oil and refrigerant is removed from the compressor and cooling circuit, the concentration of the refrigerant remaining in the oil is < 0.2 % by weight), and the related monitoring (using e.g. mass balance) of the degassing efficiency. o (EFR 155) For VHC equipment only, add foam capturing process as a technique for removal of VHC-containing components and treatment by foam incineration. <u>Diffuse emissions</u> • (DE 430, DE 433) Add a new technique on the collection of refrigerants and their proper disposal to avoid VFC/VHC emissions. • (DE 387, EEB 99) Add a new BAT on the devices to be used for the degassing process step, such as service hoses access port, approved piercing piers, drill heads. • (DE 429) Add a new technique for the prevention and reduction of VFC/VHC emissions by means of design techniques and operating measures (e.g. installation constructed and operated so that emissions of VFC/VHC are prevented or reduced, and proceed to regular check). • (DE 388, EEB 100) Add a new BAT indicating that the shredding step and the blowing agents removal should be done in an automatic and encapsulated system. <u>Energy consumption</u> • (EEB 97, DE 389) Add a new BAT on specific energy consumption, for which the BAT-AEL range could be 0.1–0.2 MWh/t waste treated. <u>Prevention of explosion</u> • (EEB 98, DE 390) In addition to generic BAT 22, add a new BAT on prevention of explosion specific to the treatment of equipment containing VFCs or VHCs. <u>End-of-pipe techniques</u> • (UK 293, SE 179, EERA 40, EFR 69) Add catalytic oxidation technique because it is used at least in (UK 293, EFR 69) one plant in the UK (European Metals Recycling Ltd - Darlaston, West Midlands), in (SE 179) one Stena plant located in Sweden (Halmstadt) since more than 10 years ago, and (SE 179) more recently in another Stena plant located in Germany (Baumholder), and therefore is not an emerging technique. • (UK 291) Add oxidation techniques (catalytic and thermal oxidation). • (ES_C 38, EFR 192) Add combination of cyclones and wet scrubbers that can be used to reduce emissions from the mill. <u>Technique description</u> • (FR 351) Describe separately the techniques concerning the collection of VOCs, and the ones concerning the treatment. • (EERA 37, EERA 38, EERA 41, EERA 42) Text for description is vague or incomplete: replace "waste gas" with "process gas", and "shredding area" with "step 1 and step 2 process gas". <u>Technique a</u> • (UK 292, EERA 36, DE 434) Describe separately the techniques related to preventing explosion and the techniques related to reducing VOC emissions to air because the explosion risk needs to be controlled when treating hydrocarbon-containing equipment regardless of the technique used to reduce VOC emissions. • (EEB 268) Set a minimal condensation efficiency to be achieved. • (EEB 269) Remove the reference to the shredding area because VOCs/VHCs/VFCs should be captured whatever the source of emissions. • (ES_C 27, EFR 182) Replace the terms "shredding area" with "mill" because only the mill should be under inert atmosphere.

	Technique b • (DE 428) Reword to indicate that the liquefied gas is stored in a pressure vessel. • (EEB 270) Remove the reference to the shredding area because VOCs/VHCs/VFCs should be captured whatever the source of emissions. • (ES_C 28) Replace the terms "shredding area" with "mill" because only the mill should be under inert atmosphere. • (EERA 39) Clarify that cryogenic condensation is sometimes used for the regeneration of gas. • (DE 499) Reword the last sentence as follows: The gas that is emitted from the desorption of the filter is usually led back into the adsorbing filter in order to further minimise the emissions of VFCs/VHCs. • (ES_C 49, EFR 194) Clarify that the activated carbon can also be regenerated externally.
EIPPCB assessment	Entire section • The main treatment of equipment containing VFCs or VHCs is shredding. Physical and chemical aspects of the process (such as condensation, adsorption) are more related to the treatment of the remaining VFCs or VHCs contained mainly in the polyurethane (PUR) foam, the purpose of which is to avoid these substances being released without control into the environment via emissions to air and to water, or via the shredded solid outputs (e.g. plastics, metals, foam). • Mentioning VFCs and VHCs in the heading of the section might be confusing and lead to misinterpretation of the waste treatment process/waste input stream combination concerned by the BAT conclusion. Indeed, VHCs for instance are not limited to refrigerant fluids, but may also include fluids potentially present, e.g. in poorly or non-depolluted EoLVs. It would therefore be clearer to refer to the mechanical treatment in shredders of WEEE containing refrigerants. • Indeed, VFCs include chlorofluorocarbons (CFC), hydrofluorocarbons (HFC), hydrochlorofluorocarbons (HCFC) and VHCs include hydrocarbons (such as cyclo-pentane) that are used as refrigerants in refrigeration equipment. A definition would enhance clarity. Entire BATC • It is needed to clarify in the BAT statement that both collection and treatment of emissions to air are BAT. This is done by referencing BAT 10d (see the assessment related to BAT 10). Once the emissions are collected, they are of course channelled and the abatement techniques are applied to these channelled emissions. • Monitoring of emissions air is defined at a general level in BAT 4. • Although the benefits of substitution of VFCs by VHCs are recognised, the treatment of equipment containing VHCs also requires caution, e.g. regarding the explosion risk. Furthermore, it is not clear what the differences between the two alternative proposals are. Additional BAT and/or technique • The removal rate and depollution monitoring of equipment containing VFCs or VHCs are fundamental aspects of relevant standards (EN 50574 and EN 50625). In this specific section, the proposed BAT conclusions deal with emissions and the potential environmental impact arising from IED installations that perform depollution and shredding of such equipment. No data were provided on the depollution rate through the questionnaires. However, the implementation of an output quality management system that was added in BAT 2 would allow verification of the proper depollution of the equipment concerned. • No data and technical information on the foam-capturing process were provided. Diffuse emissions • Collection and treatment of emissions before release is dealt with at a general level in BAT 10. The BAT conclusions do not aim at giving a step-by-step procedure to treat WEEE containing refrigerants, which is already given in existing standards. However, it would indeed enhance clarity to consider both collection of and treatment of waste gas as BAT. This is done by adding a reference to BAT 10d in the BAT statement. • The use of appropriate materials and high-integrity equipment to prevent or reduce diffuse emissions is described at a more general level in BAT 10, technique b. Further

	details in the description of this technique would enhance the clarity. Energy consumption • See the assessment related to BAT 7. Prevention of explosion • Prevention of explosion is partly covered in the D1 text by the use of inert gas. However, the D1 text may be confusing as it is improperly addressed in a technique aiming to abate emissions. Having two different techniques would improve clarity. End-of pipe techniques • Through the comments on D1, catalytic oxidation was indicated as a technique used at least in the UK, Sweden and Germany. However, no additional technical information was provided. In BAT conclusions, techniques are neither prescriptive nor exhaustive. Because catalytic oxidation was not reported via the data collection and no related operational data and information were provided, it is not possible to define this technique as BAT. The description of the technique is kept in the corresponding section of the BREF. • A combination of a cyclone and wet scrubber to reduce dust emissions is dealt with at a general level for the mechanical treatment of waste in BAT 25. Technique a • The current wording of technique a indeed covers two different ideas (capture of emission and prevention of explosion), which may cause confusion. • The wording of the technique needs indeed to be clarified. However, the wording "waste gas" is kept for consistency with the rest of the BAT conclusions. • No information on the minimum condensation efficiency was provided through the data and information collection. However, optimisation of condensation efficiency should result from air emission abatement, and removal efficiency as defined in current standards. Technique b • Indeed, activated carbon can also be regenerated externally. However, the technique generally comprises two activated carbon filters so that they can be regenerated internally without stopping the process. • The wording of the technique needs indeed to be clarified. However, the wording "waste gas" is kept for consistency with the rest of the BAT conclusions.
EIPPCB proposal	• To reword the heading of the section as BAT for mechanical treatment in shredders of WEEE containing refrigerants. • To refer to BAT 10d in the statement. • To mention relevant standards in the "Applied processes and techniques" section of the BREF. • To focus the description of the technique on the treatment of emissions. • To add a definition of VFCs and VHCs. • To add BAT 29bis on prevention of explosions. • To complement the description of technique a in BAT 10 related to the prevention of diffuse emissions (limit the number of potential diffuse emissions sources).

1.11.4.2 BAT-AELs for VOC emissions to air

<table>
<tr><td>Location in D1</td><td>Section 6.2.3.1 – page 906 – BAT 29 – Table 6.6</td></tr>
<tr><td>Current text in D1</td><td>
<table>
<tr><th>Parameter</th><th>Unit</th><th>BAT-AEL
(Average of samples obtained during one year)</th></tr>
<tr><td>TVOC</td><td>mg/Nm^3</td><td>2–15</td></tr>
</table>
</td></tr>
<tr><td>Summary of comments</td><td>
<u>Additional parameter</u>

(EEB 92) Add a BAT-AEL for VFCs, set at 0.01–0.5 mg/Nm^3, unless a better performance can be ensured, because the proposed range would lead to VFC emissions of around 20–150 mg/Nm^3 if no other carbon-containing gas is in the exhaust air (as, for instance, there is only 9% carbon in R11). This BAT-AEL should be set with regard to Annex VII to Regulation 1005/2009 which requires a minimum VFC destruction efficiency of 99.99 %.
(DE 384, 431, 498) Add a BAT-AEL range for VFCs, set at 1–14 mg/Nm^3, and for HCFC. TVOC is not the adequate parameter.
(AT 72) Add a BAT-AEL range for the sum of CFC, HFC and HCFC. Set the range at 0.3–20 mg/Nm^3 with the use of the monitoring standard TS 50574-2.
(DE 385, 432, 498) Add a BAT-AEL range for dust specific for this process/waste stream combination, set it at 0–3 mg/Nm^3, because the exhaust gas is different compared to plants that treat other waste types.

<u>BAT-AEL range</u>

(AT 70) It is not clear how the BAT-AEL has been derived, especially the lower end of the range. Set the BAT-AEL range at 3–50 mg/Nm^3 which would be compliant with the current BREF (2006) for low VOC flow.
(ES_A 41, ES_C 29) The BAT-AEL range is too low and should be set at 20–50 mg/Nm^3 which corresponds to the state of the art in the shredder industry.
(DE 383, DE 384) It is not clear how the BAT-AEL range has been derived. TVOC is not the adequate parameter.
(FEAD 104) The upper end of the range is too low and should be 100 mg/Nm^3 for TVOC, and 20 mg/Nm^3 for TOC as in the current BREF (2006).
(EFR 157, EFR 183) The upper end of the range for TVOC is too low and should be set at 50 mg/Nm^3 when using the additional technique suggested in comment EFR 155 (i.e. removal of VHC-containing components and treatment by incineration) for the treatment of VHC-containing equipment.

<u>Applicability</u>

(DK 93) Clarify that the BAT-AEL does not apply when the exhaust air is directly connected to waste incineration.

</td></tr>
<tr><td>EIPPCB assessment</td><td>
<u>Additional parameter</u>

Often plants receiving equipment containing VFCs also receive equipment containing VHCs. TVOC is the relevant parameter for measuring VHC emissions to air. As for VFCs, there is no EN standard for measuring CFC, HFC, or HCFC emissions to air (TS 50574-2 is a technical specification related to collection, logistics and treatment requirements for end-of-life household appliances containing volatile fluorocarbons or volatile hydrocarbons). NIOSH 1006 (gas chromatography), X43-319 (Stationary source emissions – Guide for sampling and analysis of volatile organic compounds), IR spectroscopy or IR photo-acoustic are reported as being used for CFC measurements in emissions to air. However, adding a specific BAT-AEL for VFCs seems appropriate.

<u>Whole table</u>

For the assessment below, it should be kept in mind that the averaging period is proposed to be modified (see the assessment of the General considerations). This needs to be reflected in the table.

<u>BAT-AEL range</u>

Of the seven plants performing mechanical treatment of equipment containing VFCs or

</td></tr>
</table>

	VHCs that participated in the data collection, six provided data on CFC emissions to air, one also provided data on HFC emissions, and no data were provided on HCFC emissions: o Plant 458 reported CFC concentration values of 12 mg/Nm^3 in 2010, and 1.5 mg/Nm^3 in 2011 and 2012 respectively. o Plant 470 reported a CFC concentration value of at least 10 times higher than the concentration values reported by the other plants (one measurement in 2012 – plant equipped with cryogenic condensation). o Plant 629, also equipped with cryogenic condensation, reported HCFC concentration values of around 11 mg/Nm^3 arising from step 1 of the process (recovery of refrigerants) and CFC concentration values ranging from 0.5 mg/Nm^3 to 16 mg/Nm^3 from step 2 (recovery of blowing agents). It is mentioned that emission peaks of CFC have been reduced to 0.5 mg/Nm^3 since additional active carbon filters were put in place in 2010. o Plant 630 reported the same minimum, average and maximum concentration values for each of the three reference years, so they do not seem to be measured values. o As for the lowest CFC concentration values, Plant 636 reported 0.01 mg/Nm^3 in the questionnaire whereas the graphs of continuous measurements provided by this plant show a minimum concentration value of around 0.2 mg/Nm^3. • Volatile organic compound concentration values were provided by four plants: one provided emissions data on VOCs and NMVOC, two on NMVOC, and one on TOC. NMVOC does not seem to be an appropriate parameter; however, it can be assumed that the emitted volatile organic compounds do not contain methane. For two plants that reported NMVOC concentration values, it is indicated in the questionnaire that the real values are below the reported ones (20 mg/Nm^3 and 50 mg/Nm^3). These data have therefore not been taken into consideration. Plant 138 reported NMVOC concentration values decreasing from 34 mg/Nm^3 to 5 mg/Nm^3 over the three-year reference period. It is not clear why the upper level of the BAT-AEL range for TVOC should be increased. Three plants reported minimum concentration values around 3 mg/Nm^3. The lower end of the BAT-AEL could therefore be increased from 2 mg/Nm^3 to 3 mg/Nm^3 • Although VFCs are organic compounds (and as such are included in VOCs), it is recognised that the response of FID used for VOC measurements may vary significantly depending on the waste gas composition, and may therefore give unreliable results when measuring VFCs. This is also true within the family of VFCs, for instance between CFC and HCFC. Since CFC concentration values have been provided by six plants and HFC by only one, it therefore seems more appropriate to set a BAT-AEL for this specific parameter than on VFCs in general. According to the information provided, the BAT-AEL range for CFC could be 0.5–10 mg/Nm^3. • As other VOCs are also likely to be emitted when the treated equipment contains VHCs, it seems appropriate to also keep a BAT-AEL on TVOC emissions. • Annex VII to Regulation 1005/2009 lists the (approved) destruction technologies referred to in Article 22(1), i.e. once controlled substances have been removed from refrigeration equipment for example. • Dust emissions are dealt with, at a general level for mechanical treatment, in BAT 25. The techniques applied are a bag/fabric filter, and activated carbon filter that may also retain dust. <u>Applicability</u> • BAT-AELs apply to emissions to the environment.
EIPPCB proposal	• To add a BAT-AEL range for CFC: 0.5–10 mg/Nm^3. • To change the lower end of the BAT-AEL range for TVOC to 3 mg/Nm^3. • To add "one or both techniques" in the BAT statement as the use of activated carbon together with cryogenic condensation may reduce the CFC emission peaks.

1.11.5 Mechanical treatment of mercury-containing equipment

1.11.5.1 Techniques for the prevention or reduction of mercury emissions to air

<table>
<tr><td>Location in D1</td><td>Section 6.2.4.1 – page 907 – BAT 30</td></tr>
<tr><td>Current text in D1</td><td>

BAT 30. In order to prevent or, where that is not practicable, to reduce mercury emissions to air, BAT is to use the technique given below.

<table>
<tr><th colspan="2">Technique</th><th>Description</th></tr>
<tr><td>a</td><td>Collection at source followed by abatement and surveillance of mercury emissions</td><td>This includes all of the following:
• Processes used to treat mercury-containing equipment are enclosed, under negative pressure and connected to a Local Exhaust Ventilation system (LEV).
• Extracted air from the processes is treated by dedusting techniques such as cyclones, fabric filters, HEPA filters as well as activated carbon filters (see Section 6.6.1).
• Treated air is either released outside the buildings or recycled.
• The air flow from the Local Exhaust Ventilation system (LEV) and mercury concentration in the LEV extracted air are monitored to enable the assessment of the effectiveness of the LEV performance.
• Mercury levels in ambient air are measured regularly around the processes to detect potential mercury leaks.</td></tr>
</table>

</td></tr>
<tr><td>Summary of comments</td><td>

<u>Entire Section 6.2.4.1</u>

• (AT 74, EEB 101, FR 250, EERA 45, DE 524, EURITS 56, HWE 59) Align BREF and BATC structures either by moving this BAT 30 to Section 6.4 BAT conclusions for physico-chemical treatment of waste (as points 6.4.7, 6.4.8 or 6.5) or by moving a part of Section 5.8 of the BREF to Chapter 3.

<u>Scope of the section</u>

• (EEB 136, DK 153, DE 522) It should be clarified for which kind of mercury-containing waste/equipment this BAT has to be applied.
• (CEFIC 36) Add applicability "this BAT Conclusion is only applicable for waste contains more than XX mg/kg DS Mercury"; otherwise it would cover almost everything.
• (DK 62, FI 30) The applicability should reflect that shredders for mixed metal waste cannot use a fabric filter for safety reasons (because of the deflagration risk).

<u>Entire BATC</u>

• (CEWEP 2, SE 189, DE 301, CEFIC 35) Clarify that this BAT applies only to channelled emissions to air.

<u>Additional BAT and/or techniques</u>

• (EEB 139, EEB 162) Add additional BAT on other processes of treatment of mercury-containing waste and include a mercury removal rate for each technique.
• (AT 76) Add BAT on "management of residues" and respectively a BAT-AEL for residual contents of Hg in recovered materials (in line with EN 50625-2-1:2014 Collection, logistics and treatment requirements for WEEE - Part 2-1; EN 50625-2-2:2015 Treatment Requirements for Lamps). Indeed, for prevention of Hg emissions, it is also of relevance to set standards for their removal from the recovered material.
• (EERA 46) Diffuse emissions from fractions after the treatment may be high and should be considered (refer to limit values for treatment of lamps and flat panel displays given in EN 50625 series standards).

</td></tr>
</table>

	• (EURITS 65) Add additional BAT or techniques about fractions separation, thermal treatment of fractions and diffuse Hg emissions during transport and storage of Hg-containing fractions. • (CEWEP 101) Add additional BAT as mentioned in (EURITS 65) and the following: Shredding and sending the mixed fractions containing mercury for recovery in salt mines is not regarded as high quality recycling. • (CEWEP 102, EURITS 83) Add additional BAT or techniques about mercury flow analysis. • (CEWEP 103, EURITS 82) Add additional BAT or techniques about performing all activities which can lead to diffuse Hg emissions in an enclosed building, in negative pressure, and with abatement of the extracted air with an activated carbon filter, about workers' protection and about industrial hygiene measurement programme. • (EEB 59) Add additional technique about storing Hg-containing waste in closed containments and closed buildings. <u>Second bullet point</u> • (EEB 60, DE 392) Activated carbon adsorption is used in combination with dust abatement techniques as mercury is often emitted in its gaseous form (elemental or oxidised). • (AT 77) To avoid misunderstanding, replace "Extracted air from the processes is treated by dedusting techniques such as cyclones, fabric filters, HEPA filters as well as activated carbon filters (see Section 6.6.1)" with "Extracted air from the processes is treated by dedusting techniques such as cyclones, fabric filters, HEPA filters and by activated carbon filters (see Section 6.6.1)". • (BE 44) A cyclone is not considered an equivalent for a fabric filter, or a HEPA filter. <u>Fifth bullet point</u> • (AT 78) Not only the Hg concentration in ambient air, but also the Hg content in the exhaust air after abatement should be measured regularly in order to detect potential malfunction of the filters.
EIPPCB assessment	<u>Entire Section 6.2.4.1</u> • Ideally, the structure of the BATC should indeed reflect the structure of the BREF. However, in Section 5.8.2.2 of the BREF, the only technique to be considered is related to the mechanical treatment whereas Section 5.8.2.1 describes chemical, thermal and mechanical processes. Therefore moving Section 5.8.2 into Chapter 3 (mechanical treatment) would not be a solution either. As for moving BAT 30 into Section 6.4 of the BAT conclusions, it should be kept in mind that the BATC are aimed to be a self-standing document and, as a result, it may not be obvious to the reader why a mechanical treatment is mentioned in this section. • The existing proposal is not perfect but the non-alignment of the two structures (BREF and BATC) does not impair the understanding of the document. <u>Scope of the section</u> • In relation also to the comments on the location of this BAT in the BAT conclusions and which kind of treatment is concerned by this BAT, it is indeed necessary to clarify the scope of this BAT and to make explicit that this BAT concerns the treatment of WEEE, such as lamps and flat panel displays. It would also mean that this BAT does not need to mention the quantity of mercury the waste should contain. • The risk of deflagration impeding the use of a bag filter is covered by BAT 25. <u>Entire BATC</u> • The reference to channelled emissions would indeed enhance clarity. However, it is proposed to change the table of D1 to text. By doing this, it is clear in the statement that the BAT relates to channelled emissions. <u>Additional BAT and/or techniques</u> • Some information can be found in Section 5.2.8.1 of the BREF about both applied processes and efficiency rates. Moreover, a lot of information is also given in the CEN standards concerned (50625 series) and it is not necessary to repeat this information in the BATC, or appropriate as it could lead to contradictions. It may be useful however to add references to these CEN standards in Section 5.2.8 of the

	BREF. Finally, the proposed BAT 2 now addresses this issue as well as the material flow analysis. • Concerning the recovery in salt mines, the BATC do not aim to give indications on the waste streams. • Concerning the activities to be carried out in an enclosed building, they are already covered by BAT 30. As for the proposals related to industrial safety, they are of course very relevant but are covered by other legislation (see the Scope). • Concerning the prevention/reduction of diffuse emissions, e.g. when storing mercury-containing waste, this is dealt with by BAT 10, in particular technique d. <u>Second bullet point</u> • The wording of D1 is indeed ambiguous as to the activated carbon adsorption being used in addition to the dust abatement technique. • Indeed, a cyclone is not equivalent to a fabric filter or to a HEPA filter, and is mainly used as preliminary separator for coarse dust. This is clarified in BAT 25a. • As for the combination of abatement techniques used for mechanical treatment of mercury-containing WEEE, it is clear that BAT 25 is applicable to the mechanical treatment of waste when it is not combined with biological treatment, and that BAT 30 applies to the mechanical treatment of WEEE containing mercury in addition to BAT 25. <u>Third bullet point</u> • Although not mentioned in the comments, this bullet point does not seem to have an added value as it is obvious that, in any case, one of the two options is used. <u>Fifth bullet point</u> • The measurement of the Hg concentration in the exhaust air after the abatement techniques is of course needed and is covered by BAT 4 on monitoring and by the associated BAT-AEL.
EIPPCB proposal	<u>Scope</u> • To specify the type of waste concerned in the heading of the section, in the BAT, the BAT-AEL and throughout the BATC. <u>Entire BATC</u> • To clarify in the BAT statement that this refer to channelled emissions. • As there is only one row in the table proposed in D1, to write BAT 30 in plain text. <u>Additional BAT and/or technique</u> • To reword the statement of BAT 10 to ensure the reduction of diffuse emissions of substances other than dust, VOCs or odorous substances. <u>Second bullet point</u> • To reword the second bullet point to make it clear that extracted air is treated by dust abatement techniques and activated carbon adsorption. • To reword the description of BAT 25a regarding the use of cyclones. <u>Third bullet point</u> • To delete the third bullet point.

1.11.5.2 BAT-AELs for mercury emissions to air

<table>
<tr><td>Location in D1</td><td>Section 6.2.4.1 – page 907 – BAT 30 – Table 6.7</td></tr>
<tr><td>Current text in D1</td><td>
<table>
<tr><th>Parameter</th><th>Unit</th><th>BAT-AEL
(Average of samples obtained during one year)</th></tr>
<tr><td>Mercury (Hg)</td><td>µg/Nm^3</td><td>2–7</td></tr>
</table>
</td></tr>
<tr><td>Summary of comments</td><td>

(FEAD 106) Keep consistency between the table caption and the description of the section.
(EEB 61) The upper end of the range should be 6 µg/Nm^3 according to the data collection.
(AT 75) Change the range to 2–30 µg/Nm^3, as it is not clear how the proposed range was derived.
(ES 97, FEAD 105) The BAT-AEL should be 33.8 µg/Nm^3 based on the data provided by operators in the course of the data collection exercise (Table 5.209 of D1).

</td></tr>
<tr><td>EIPPCB assessment</td><td>

The caption should indeed reflect the section heading.
For the assessment below, it should be kept in mind that the averaging period is proposed to be modified (see the assessment of the General considerations). This needs to be reflected in the table.
Six plants report values ranging from 5 µg/Nm^3 to 37 µg/Nm^3.The concentration value of 37 µg/Nm^3 reported by Plant 589 corresponds to a measurement done before the activated carbon. Moreover, Plants 588, 589 and 590 do not have emissions to air, but recirculate the exhaust air from the process.
This being considered, the maximum reported Hg concentration value emitted to air is 7.2 µg/Nm^3.

</td></tr>
<tr><td>EIPPCB proposal</td><td>

To modify the caption.
To keep the BAT-AEL range at 2–7 µg/Nm^3 and as an average over the sampling period.

</td></tr>
</table>

1.12 Biological treatment of waste

1.12.1 General environmental performance

<table>
<tr><td>Location in D1</td><td>Section 6.3.1.1 – page 908 – BAT 31</td></tr>
<tr><td>Current text in D1</td><td>BAT 31. In order to minimise the generation of odorous emissions and to improve the general environmental performance, BAT is to use the technique given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th></tr>
<tr><td>a</td><td>Selection of waste input</td><td>Pre-acceptance, acceptance, and sorting of the waste input to enable an appropriate nutrient balance, and to prevent toxic compounds (i.e. toxic in terms of reducing biological activity) entering the biological systems.</td></tr>
</table></td></tr>
<tr><td>Summary of comments</td><td><u>Whole Section 6.3</u>
• (FR177, EURITS57) The title of the section should refer to non-hazardous waste only.
• (DE304, CEFIC37) The title of the section is unclear and could in principle also include waste water treatment.

<u>BAT 31</u>
• (FR 178, UK 294, FEAD 120, ECN 149) This BAT does not bring added value on top of BAT 2 and should be deleted.
• (DK 51) In Section 4.5.1.3 an odour management plan is mentioned and a reference should be made to this section.
• (EEB 165) This BAT conclusion should discriminate between the waste inputs and include concrete and stricter input control requirements for mixed / mechanically separated biowaste.</td></tr>
<tr><td>EIPPCB assessment</td><td><u>Whole Section 6.3</u>
• As decided at the kick-off meeting, the BAT conclusions will never seek to establish whether a waste is hazardous or non-hazardous (see conclusion 1.3 of the KoM).
• The title of the section is indeed ambiguous.

<u>BAT 31</u>
• Indeed, BAT 2 deals with pre-acceptance, acceptance and sorting of waste at the generic level. The aim of BAT 31 is to give further detail as to the important parameters for the biological treatment of waste. The inclusion of an additional parameter (i.e. moisture content, see the assessment related to BAT 35) would also add some value to BAT 31.
• As the BAT conclusions will be a stand-alone document, no reference can be made to the rest of the text. However, it is to be noted that BAT 8 also applies to biological treatment.
• It is recognised that there might be a great variability of waste inputs in MBT plants which also depends on local waste management strategy. However, the information collected via the questionnaires does not allow the discrimination of the waste inputs of MBT plants and it is not clear what "stricter requirements" would be. Nevertheless, it should be noted that acceptance and pre-acceptance of waste as well as the output the quality management system are covered in the modified BAT 2.</td></tr>
<tr><td>EIPPCB proposal</td><td><u>Whole Section 6.3</u>
• To reword the title of Section 6.3.

<u>BAT 31</u>
• To add moisture content as an important parameter (see the assessment of BAT 35 in Section 0).
• To change the format of the BAT into plain text instead of a table.</td></tr>
</table>

1.12.2 Emissions to air

1.12.2.1 Technique for the reduction of channelled emissions to air of odorous substances, H_2S and NH_3

Location in D1	Section 6.3.1.2 – page 908 – BAT 32
Current text in D1	**BAT 32. In order to reduce channelled emissions of odorous substances, H_2S and NH_3, BAT is to use a biofilter (See Section 6.6.1).**
Summary of comments	• (EEB 142, IE 49, FR 180, AT 79) The biofilter alone is not BAT and should be used with a wet scrubber. • (UK 295) BAT is a wet scrubber together with a biofilter or other techniques. • (IE 15, IE 50) Activated carbon adsorption should also be mentioned as a technique to reduce odour emissions. • (BE 39, DK 49, DK 71) Biofilter should not be the only technique mentioned. • (DE 215, DE 443) A biofilter is not suitable to abate NH_3 and H_2S. For these pollutants, an acid scrubber and an alkaline scrubber are needed respectively. • (DE 526, FEAD 252, ECN 150) A biofilter is not necessary when the waste gas is treated with thermal oxidation. • (FR 343) Monitoring of pollutants in an open biofilter is very complex and BAT 32 should give indications on the sampling plan. • (UK 296, UK 297) The raw gas should be monitored for NH_3 and H_2S to guarantee the effectiveness of the abatement. Raw and waste gas should also be monitored for odorous chemicals using GC-MS. • (UK 299) A BAT-AEPL for odour is required to verify the design parameters and objective of the abatement system, i.e. odour concentration (OUe/m^3) should be monitored from the abatement inlet and outlet in order to identify the removal destruction efficiency for the treatment system.
EIPPCB assessment	• NH_3 and H_2S are environmental issues, which are already covered by other BREFs such as NFM and IRPP for NH_3 and NFM for H_2S. • A biofilter is suitable for abating NH_3 according to the following sources: [1] Sniffer report ER36 "Understanding biofilter performance and determining emission concentrations under operational conditions", June 2014 and [2] "Biofiltration for ammonia removal from composting exhaust gases", Estel.la Pagans, Xavier Font, Antoni Sanchez, Chemical engineering journal, 113 (2005) 105–110 • A biofilter is suitable for abating H_2S according to the following sources: [1], [3] "H_2S gas biological removal efficiency and bacterial community diversity in biofilter treating wastewater odour", Ilhem Omri a, Hassib Bouallagui a, Fathia Aouidi a, Jean-Jacques Godon b, Moktar Hamdi, Bioresource Technology 102 (2011) 10202–10209 and [4] "Biofiltration Control of Hydrogen Sulfide /1. Design and Operational Parameters, Y. Yang and E.R. Allen, ISSN 1047-3289 J. Air & Waste Manage. Assoc. 44s 863-868, 1994". • As for other techniques, the data assessment shows that in some cases biofilters are not used to abate odour. In these cases, the techniques used are thermal oxidation, scrubbing (water, acid or alkaline) and activated carbon. Bag filters are also reported but do not seem relevant for odour abatement, and according to [5] "The state of the art of composting" Lebensministerium, Austria, October 2009", scrubbers may have limited applications, because of the short contact time between the waste gas and the scrubbing liquid and because of the limitation to absorb peak loads. [6] "How to comply with your environmental permit. Additional technical guidance for composting and aerobic treatment sector", LIT 8705 version 1.0, UK Environmental Agency, November 2013, mentions that scrubbers should be used in a cascade to treat all types of odorous compounds (basic, acidic, organic compounds). • According to [1], [5] and [6], pretreatment of the waste gas with a water or acid scrubber may be needed prior to the biofilter, in order to reduce the NH_3 concentration and therefore to control the media pH. Acceptable NH_3 concentration values are reported to be 5 mg/Nm^3 (VDI 3477), 5–10 mg/Nm^3 ([1]) and 50 ppm ([8] ÖWAV Regelblatt 513). H_2S is also an important parameter which can reduce the pH in the

	media and should be limited by controlling the aeration in the composting windrow (as mentioned in BAT 33). • As for the design and operation of biofilters, there are indeed a number of important measures which should be mentioned. • According to [7] "N_2O generation resulting from piggery air biofiltration", Chemical Engineering Journal (248) 2014 337-341, E. Dumont a,⇑ , S. Lagadec b, P. Landrain b, B. Landrain b, Y. Andrès, NH_3 biofiltration induces the production of N_2O although no correlation between NH_3 and N_2O could be found. • It is needed to clarify in the BAT statement that both collection and treatment of emissions to air are BAT. This is done by referencing BAT 10d (see the assessment related to BAT 10). Once the emissions are collected, they are of course channelled and the abatement techniques are applied to these channelled emissions. Therefore the word "channelled" is no more appropriate in the BAT statement.
EIPPCB proposal	• To add thermal oxidation, wet scrubbing and activated carbon as techniques. • To associate the use of wet scrubbing with other techniques. • To mention the design and operational measures associated with the use of a biofilter in the "description of techniques" section. • To mention that one of the objectives to limit NH_3 at the inlet of the biofilter is to limit the N_2O formation. • To mention that pretreatment of waste gas may be needed prior to the biofilter. • To refer to BAT 10d in the BAT statement and to remove the word "channelled".

1.12.2.2 BAT-AELs for channelled H_2S and NH_3 emissions to air

<table>
<tr><td>Location in D1</td><td>Section 6.3.1.2 – page 908 – BAT 32 – Table 6.8</td></tr>
<tr><td>Current text in D1</td><td>

Table 6.8: BAT-AELs (BAT-AELs) for channelled NH_3 and H_2S emissions to air from the biological treatment of waste

<table>
<tr><th>Parameter</th><th>Unit</th><th>BAT-AEL
(Average of samples obtained during one year)</th></tr>
<tr><td>NH_3</td><td>mg/Nm^3</td><td>0.1–10</td></tr>
<tr><td>H_2S</td><td>mg/Nm^3</td><td>0.1–1 ([1])</td></tr>
<tr><td colspan="3">([1]) The lower end of the range is associated with the use of a wet scrubber before the biofilter</td></tr>
</table>

</td></tr>
<tr><td>Summary of comments</td><td>

<u>Table caption</u>

- (UK 298) Typo in the table caption.

<u>Whole table</u>

- (EBA 17, 18) Delete NH_3 and H_2S and the complete table because the biofilter does not abate NH_3 and because H_2S is a safety issue but not an environmental issue. Moreover, measurement is not possible for open biofilters. German limit values for NH_3 are 20–30 mg/Nm^3, and for H_2S it is 3 mg/Nm^3.
- (SE 87, SE 166) NH_3 and H_2S are not the relevant parameters, especially for biogas plants, and Table 6.8 should be deleted.
- (AT 84) Delete the BAT-AEL on NH_3 and introduce new technique to measure NH_3 in raw gas before biofilter / RTO to assess the need for acid scrubbing.
- (ECN 151) Delete the BAT-AEL on H_2S and revise the BAT-AEL on NH_3, to also include the monitoring of raw gas and to set the BAT-AEL for waste gas at 5–10 mg/Nm^3. H_2S is hardly measured in Europe and is not a key environmental indicator.
- (AT 41) Delete the BAT-AEL on H_2S. It is relevant for safety in biogas but it is only a small part of odorous substances.
- (FEAD 130) Delete the BAT-AEL on H_2S. H_2S is only a tracer in the biogas and is removed by activated carbon before its thermal use in the CHP. As for NH_3, the range should be up to 30 mg/Nm^3 and national authorities should be given the possibility to set a limit on odour instead, depending on the local conditions.
- (FR 179) H_2S and NH_3 are relevant parameters for health and odour impact and should be kept.
- (FR 368) H_2S is a KEI but the BAT-AEL is not sufficiently supported by data and should be deleted. However, monitoring of H_2S should be kept to collect data for the next review.
- (FR 367) As for NH_3, the lower end is too low, especially for open biofilters where emissions should be considered as diffuse and not channelled. The higher end is also too low and the BAT-AEL should be 5–40 mg/m^3 based on the data collection.
- (DK 89, 90) The BAT-AELs are not reachable for biogas combusted in engines if the biogas has not been upgraded to biomethane.

<u>Footnote</u>

- (FR 191) The footnote should be linked to NH_3 only as the objective of the wet scrubber is to treat NH_3.

<u>Odour</u>

- (IE 16, AT 42, DK 50, DE 444, DE 525, IT 56) Set a BAT-AEL for odour. Proposed values are : <500–6000 OUE/m^3, 300-1000 OUE/m^3, 200–1200 OUE/Nm^3, 200–1500 OUE/Nm^3 and 300–500 OUE/m^3.

</td></tr>
<tr><td>EIPPCB assessment</td><td>

<u>Table caption</u>

- There is indeed a typo.

<u>Whole table</u>

- As for the suitability of a biofilter to treat NH_3 and H_2S, see the previous section.
- Combustion of biogas is outside the scope and therefore the BAT-AELs do not apply.

</td></tr>
</table>

	• For the assessment related to individual parameters below, it should be kept in mind that the averaging period is proposed to be modified (see the assessment of the General considerations). This needs to be reflected in the table. Footnote • See the previous section (5th bullet point) for the comment related to the wet scrubber. NH_3 • Across all biological treatments (aerobic, anaerobic and MBT), there are 49 emission points where NH_3 is monitored. Except Plant 126, all are equipped with a biofilter. • Plants 126 uses only scrubbing as an abatement technique and Plant 111 uses a basic scrubber which does not seem appropriate to reduce NH_3. Plants 62 and 127 treat waste with a high nitrogen content (sludge or animal by-product) which may explain the higher levels of NH_3 (although other plants treating nitrogen-rich waste report much lower emissions). Plant 19 reports one value at 11 mg/Nm^3 and two others below 2 mg/Nm^3, and all other plants report NH_3 emissions below 10 mg/Nm^3 and use a biofilter alone or in combination with acid and/or water scrubbers. • Regarding the lower end of the range, Plant 413 indicates 0, Plant 452 reports using the standard EN 13284 which is normally used for dust monitoring, Plant 382 reports NH_3 as diffuse emissions with a detection limit of 0.2 mg/Nm^3, and the measurement of Plant 17 seems to be an estimation. Plant 338 is using biofilter and reports an emission value of 0.3 mg/Nm^3. H_2S • Across all biological treatments (aerobic, anaerobic and MBT), there are 28 emission points where H_2S is monitored (and which are not connected to combustion or to biogas upgrading). All these emission points are equipped with biofilters. • Regarding the higher end of the range, Plant 460 mentions that the reported values (2 mg/Nm^3) correspond to the detection limit of the method used. Plant 459 reports variable values and seems able to achieve much lower values than the maximum reported, and all other plants use biofilters and report values below 0.6 mg/Nm^3. Odour • Across all biological treatments (aerobic, anaerobic and MBT), there are 51 emission points where odour is monitored. In 27 occurrences, the monitoring is reported to be carried out with the standard EN 13725. The techniques used to abate odour (see also the previous section) are a biofilter, activated carbon, RTO or a wet scrubber (water, acid or alkaline scrubber). The reported values range from 40 OUE/Nm^3 to 31 000 OUE/Nm^3, with the values above 5000 OUE/Nm^3 which seem to correspond to the treatment of sludge or ABP. • There is indeed an EN standard for odour monitoring, unlike for NH_3 and H_2S, and it may be possible to use odour monitoring as a surrogate measurement of odorous compounds, some of which may have an environmental impact beyond the nuisance at the local level. • Based on the data situation and on the correlation between odour on one hand and NH_3 and H_2S on the other hand, a range of 100-400 OUe/Nm^3 seems to correspond to the range proposed for NH_3 and H_2S.
EIPPCB proposal	Table caption • To correct the table caption. Whole table • To clarify in the scope that combustion of biogas is outside the scope. • To keep the upper end of the range unchanged for NH_3. • To change the lower end of the range to 0.3 mg/Nm^3 for NH_3. • To change the BAT-AEL for H_2S to ≤ 0.6 mg/Nm^3. • To remove the footnote on wet scrubber. • To add a BAT-AEL for odour as an alternative to the proposed BAT-AELs for NH_3 and H_2S, with the range 100-400 OU_E/Nm^3 • To add a footnote 5 to BAT 5, so as to allow the monitoring of odour instead of NH_3 and H_2S.

1.12.3 Aerobic treatment of waste

1.12.3.1 General environmental performance

<table>
<tr><td>Location in D1</td><td>Section 6.3.2.1 – page 909 – BAT 34</td></tr>
<tr><td>Current text in D1</td><td>BAT 34. In order to reduce emissions to air and to improve the general environmental performance, BAT is to monitor the process and to control the key process parameters as mentioned below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a</td><td>Aerobic process monitoring</td><td>Proper monitoring and control of key process parameters, including:
• waste input characteristics (e.g. C:N ratio, particle size);
• water content;
• air diffusion through the waste;
• temperature.</td><td>Monitoring of the water content is not applicable to enclosed processes when health and/or safety issues have been identified.</td></tr>
</table></td></tr>
<tr><td>Summary of comments</td><td>Whole section
• (EEB 141) A BAT conclusion regarding the output (compost) quality should be added. Given the fact that the output quality is "out of scope", the conclusion does not have to be prescriptive but to merely point to the establishment of an output quality assurance system.

BAT statement
• (UK 300) Environmental objective of the BAT statement is weak (i.e. "to improve the general environmental performance").
• (FR 186) Some of the parameters are controlled but not really monitored.

Parameters priority
• (EEB 254, ECN 155, MWE 150) As some parameters are monitored and others only assessed, the BAT should be rewritten to give priority to the parameters in this order: temperature, O_2/CO_2, and key process parameters.
• (FEAD 128) The parameters should be given priority in this order: temperature, moisture, waste characteristics. In addition the text in brackets should be deleted as it may be considered prescriptive.
• (DE 219) The parameters should be replaced by temperature, moisture and air supply. Waste input characteristics are not a process parameter and would be better added to BAT 31.

Moisture
• (UK 302) Moisture is critical to the composting process in order to ensure the waste does not dry out. Moisture content should be measured prior to loading and when waste is removed.

Temperature
• (SE 25) An indicative operating temperature range for composting/aerobic treatment should be given as a BAT-AEPL in the range of the range of 55–70 °C.

Air diffusion
• (FR 130) The monitoring of the air diffusion through the waste is only applicable to systems with forced aeration.
• (AT 82, UK 301) Air diffusion cannot be monitored and should be replaced by porosity/structural stability or bulk density.</td></tr>
<tr><td>EIPPCB assessment</td><td>Whole section
• As decided at the kick-off meeting, end-of-waste criteria, product specifications, by-products criteria and acceptance criteria in the downstream utilisation of "output" from waste treatment installations will not be defined in the WT BREF/BATC Scope. However, the implementation of an output quality management system is proposed to</td></tr>
</table>

	be added in BAT 2, which covers this issue (see the assessment related to BAT 2). BAT statement • The environmental objective is very wide because this BAT allows the reduction of emissions to air, emissions to water and the improvement of the process performance. The same wording is used across the BAT conclusions when the environmental benefit concerns several media. • Indeed, some of the parameters are controlled more than actually monitored (for instance air diffusion). Parameters priority • Waste input characteristics are indeed not process parameters as such but would not fit in BAT 31 which is about all biological treatment and not only aerobic treatment. • As for monitoring of O_2 and/or CO_2, see below. • The text in brackets is preceded by "e.g." and is therefore given as an example. • The list of bullet points does not intend to give an order of priority to the parameters to be monitored and/or controlled. However, parameters which may be monitored directly could be grouped together. Moisture • The wording should indeed better reflect the content of Chapter 4 where alternative methods to verify moisture content are given. Temperature • The data collection does not allow a BAT-AEPL to be set. Moreover, if a range is given for temperature, it would be necessary, for the sake of consistency, to give ranges for all other parameters as well (water content, C:H ratio, O_2 concentration, etc.) and these operating data fit better in the BREF. Air diffusion Air diffusion is indeed not monitored directly (unless forced aeration is used) but is instead ensured by controlling other parameters, i.e. porosity and windrow structure. The effectiveness of air supply may be verified by monitoring the windrow turning frequency, or monitoring oxygen and/or CO_2 in the composting waste. There are also surrogate parameters possible in the case of indoor composting systems, such as the temperature of the process air, via temperature sensors within the inlet- and/or exhaust-air pipes of forced aeration systems.
EIPPCB proposal	Parameters priority • For reasons of conciseness, to maintain all key parameters here, including waste characteristics, but to rephrase the statement and the description to make it clear that the parameters also concern waste. • To add a bullet point about aeration. • To move temperature up in the list of parameters to monitor and/or control. Moisture • To amend the applicability restriction. Air diffusion • To rephrase the description of this parameter and add a bullet point about aeration. Whole BAT • As there is only one row in the table proposed in D1, to write BAT 34 in plain text.

1.12.4 Anaerobic treatment of waste

1.12.4.1 General environmental performance

<table>
<tr><td>Location in D1</td><td>Section 6.3.3.1 – pages 909-910 – BAT 35</td></tr>
<tr><td>Current text in D1</td><td>

BAT 35. In order to reduce emissions to air and to improve the general environmental performance, BAT is to monitor the process and to control the key process parameters as mentioned below.

<table>
<tr><th colspan="2">Technique</th><th>Description</th></tr>
<tr><td>a</td><td>Anaerobic process monitoring</td><td>Implement a monitoring system, manual and/or automatic, to:
• ensure a stable reactor operation;
• minimise operational difficulties, such as foaming, which may lead to odour problems;
• provide sufficient early warning of system failures which may lead to loss of containment and, potentially, explosions.
This includes monitoring of key process parameters, such as:
• pH and alkalinity;
• temperature and temperature distribution;
• hydraulic loading rate;
• organic loading rate including total solids and volatile solids fractions;
• concentration of volatile fatty acids (VFA);
• ammonia;
• C:N ratio;
• gas generation and composition;
• gas pressure;
• H_2S concentration in the gas;
• liquid and foam levels.</td></tr>
</table>

</td></tr>
<tr><td>Summary of comments</td><td>

<u>Additional techniques</u>

- (EEB 145) A BAT conclusion should be added regarding the output(s) (digestate, biogas) quality.
- (EEB 146) A BAT conclusion should be added regarding the prevention/control of emissions from the aerobic post-treatment of the digestate. Main sources of air emissions in an AD process (being an enclosed process) are storage/handling of waste and digestate conditioning and post-treatment.
- (EEB 144) A BAT conclusion should be added regarding the safe storage and handling of biogas, as well its pretreatment / cleaning / removal of H_2S.
- (EEB 341) A BAT conclusion should be added regarding the waste input, i.e. to feed dry waste to dry digestion processes while wet digesters should only receive a mixture of waste with a moisture content between 60 % and 99 %.

<u>All parameters</u>

- (EBA 55, FEAD 129, ECN 156) Only the most important parameters should be listed: temperature, hydraulic loading rate, organic loading rate including solids and volatile solids fractions, ammonia if feedstock is high in protein or during malfunction of the process, gas generation and composition, H_2S concentration in the gas, liquid and foam levels if it is not technically controlled.
- (FR 188) Only the most important parameters should be listed: pH and alkalinity, temperature, hydraulic loading rate or residence time, organic loading rate, concentration of volatile fatty acids (VFA), gas generation and composition (CH_4, CO_2, ammonia, H_2S), slurry level, foam formation survey, gas pressure (location to be specified).
- (SE 91) Add monitoring of CH_4 emissions to air from anaerobic digestion.

<u>Early warning</u>

- (EBA 19, DE 176) Not only monitoring can be the solution of minimising operational difficulties but also technical solutions (water traps, flares etc.).

</td></tr>
</table>

	pH and alkalinity • (DK 128, EBA 31, DE 183, ECN 158) pH value and alkalinity should be deleted: it is very important to be measured for the feedstock (and maybe also for the digestate quality) but not necessarily during the process also because of technical problems. Temperature • (FR 16, AT 83, ECN 258, MWE 151) Temperature distribution is not measured at most AD plants and should be deleted. Organic loading rate • (EBA 21, DE 177, ECN 157) Normally the organic loading rate is calculated from standard values and not measured. It should be clarified in the text. Concentration of Volatile fatty acids (VFA) • (DK 129, EBA 22, DE 178, ECN 159) VFA is a good parameter to get a picture of the running AD process once or twice a year, but not always necessary, e.g. if the feedstock does not change, therefore the bullet point should be deleted. Ammonia • (EBA 23, DE 179, ECN 255) Ammonia inhibition might be a problem for AD plants in the case that the feedstock is high in protein. For AD plants using mainly vegetable waste, there is no reason to measure ammonia. This should be reflected in the text. C:N ratio • (DK 130, EBA 30, DE 180, ECN 256) C:N ratio is more relevant for the composting process and should be deleted. Gas pressure • (DK 131, EBA 25, DE 181, ECN 257) Monitoring gas pressure is not necessary if flares and relief pressure valves are in place, therefore the bullet point should be deleted. Liquid and foam levels • (DK 132, EBA 26, ECN 163) If the biomass is not pumped from one vessel to another but just spilled in an overrun, the liquid level does not need to be monitored. Also, if foam traps are installed the foam level is not monitored. This should be reflected in the text.
EIPPCB assessment	Additional techniques • As decided at the kick-off meeting, end-of-waste criteria, product specifications, by-products criteria and acceptance criteria in the downstream utilisation of "output" from waste treatment installations will not be defined in the WT BREF/BATC scope. However, quality management is part of the overall waste stream management (see the assessment related to BAT 2 and to the proposed additional technique BAT 2c1). • Concerning emissions from steps other than the AD process itself, they are covered either by the BAT conclusions related to all biological treatments, to the aerobic process or to diffuse emissions to air and to waste storage and handling. • Safe storage and handling is covered by BAT 23 and BAT 24. It does not seem necessary to add a specific BAT for biogas. As for pretreatment, cleaning, and removal of H_2S from the biogas, see the assessment of the Scope. • The moisture content of the waste input is indeed an important parameter and could be addressed in BAT 31. All parameters, (including pH and alkalinity, ammonia, concentration of VFA, liquid and foam levels) • As mentioned in Chapter 4 of the BREF, the parameters to be monitored or controlled depend on the on the feedstock, the anaerobic digestion system adopted and the use of digestate. It should not be understood that all parameters in the BAT are to be monitored in all cases. The list of parameters needs indeed to be clarified and simplified. • Concerning methane, it is monitored at 15 emission points located in 10 plants of the data collection. Of these, 7 carry out biological treatment of waste (aerobic, AD or

	MBT), which does not show a wide use of CH_4 monitoring. Moreover, channelled emissions of CH_4 are covered by TVOC monitoring and diffuse emissions of CH_4 may be captured by the LDAR mentioned in BAT 11. In conclusion, it does not seem necessary to add CH_4 as a parameter to be monitored. Early warning • There are of course other means of avoiding system failures besides monitoring: water traps, flaring or also pressure relief valves, etc. but protection measures are covered at generic level in BAT 22. BAT 35 is only about monitoring and control. pH and alkalinity • It is indeed the pH/alkalinity of the feed of the digester that can be measured. These parameters are not measured during the process. Temperature • It is indeed the temperature which is measured and not the temperature distribution. Organic loading rate • This parameter is indeed calculated rather than directly monitored. C:N ratio • It relates to composting process, already covered by BAT 34. Gas pressure • As mentioned in BAT 11, flaring is only to be used for safety reasons or for non-routine operating conditions (e.g. start-ups, shutdowns) by using design and plant management techniques, including balancing of the gas system.
EIPPCB proposal	• To remove the temperature distribution and the C:N ratio from the list of parameters. • To adopt a similar wording to BAT 34 in order to clarify that the parameters are to be monitored and/or controlled. • To clarify that the parameters are not all to be controlled in all cases but are rather given as an indication. • To clarify and simplify the list of key parameters in the description of the technique. • To mention the moisture content in BAT 31. • As there is only one row in the table proposed in D1, to write BAT 35 in plain text.

1.12.5 Mechanical biological treatment (MBT) of waste

1.12.5.1 Emissions to air

<table>
<tr><td>Location in D1</td><td>Section 6.3.4.1 – page 910 – BAT 36</td></tr>
<tr><td>Current text in D1</td><td>
BAT 36. In order to prevent or, where that is not practicable, to reduce emissions to air, BAT is to use all of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a</td><td>Separate collection of air flows</td><td>Splitting of the total volume flow that is to be treated into heavily polluted exhaust air and lightly polluted exhaust air.</td><td rowspan="2">Generally applicable to new plants.
Applicable to existing plants within the constraints imposed by the configuration of the air circuits.</td></tr>
<tr><td>b</td><td>Partial reuse of exhaust air in the biological process</td><td>Use the exhausted air from the delivery waste input area (such as low bunkers and underground bunkers with or without mechanical treatment), or reuse the treated air as air supply (process air) for biological degradation.
It may be necessary to condense the water vapour contained in the exhausted air before reuse. In this case, cooling is necessary, and the condensed water is treated before discharge.</td></tr>
</table>
</td></tr>
<tr><td>Summary of comments</td><td>
<u>Entire section</u>

(EEB 147) Given that MBT is a combination of mechanical and biological treatments, the BAT conclusions for the mechanical treatment of waste with calorific value should also apply to MBT. Moreover, it has to be clarified why there is no BAT conclusion for mechanical treatment of waste with calorific value.
(EEB 166) The MBT part is inadequate and should be revised according to the German contribution, because MBT plants treat residual waste of all kinds and origins, thus the requirements regarding their environmental impact should be stricter than the ones for other biological treatments. Complementary measures are needed for input/output control, as well as emissions of toxic/carcinogenic organic substances, greenhouse gases such as N_2O, etc.
(DE 536) Clarify in the title of the section that the sector concerned is MBT of mixed waste.

<u>Entire BATC</u>

(UK 303) This BAT applies to all biowaste treatments where reception halls or process buildings are used. It should be moved under BAT 31 with applicability restricted to waste reception halls and process buildings.
(UK 304, FEAD 125, 126, ECN 164) Techniques a and b are too prescriptive and should focus on an air collection strategy to minimise handling of large volumes of air and optimise performance of abatement and removal of pollutants; it could be changed to only one technique: implement an air collection and treatment strategy to minimise handling of large volumes of air and optimise the use of abatement and removal of pollutants.

<u>Additional BATC and/or techniques</u>

(EEB 155, EEB 163) Add a BATC on a quality assurance system that guarantees the characteristics of the output (compost and/or RDF produced by a MBT plant). See also comment EEB 140 that refers to BAT 117-130 (which relate to "Preparation of waste to be used as a fuel") of the current BREF (2006).
(PL 1) Add a BAT on the output quality before landfilling on parameters such as

</td></tr>
</table>

	oxygen demand, loss of ignition, and organic carbon content. • (AT 86) Add a technique clarifying that MBT has to be carried out in fully enclosed reactors (as already stated in the current BREF), and that emissions from intensive rotting systems should be captured and channelled to an abatement system. <u>Technique a</u> • (FR 347) More flexibility should be given on the design of air flow collection by taking into account not only heavy or light air flow pollution but also air temperature, abatement techniques, and configuration of the air circuits. • (DE 32) Clarify in the description that the lightly polluted waste gas streams should predominantly be reused according to technique b, and that different techniques can be used to treat lightly polluted waste gas when not reused (e.g. biofilter), and highly polluted waste gas (e.g. thermal oxidiser). <u>Technique b</u> • (AT 85) Clarify that the condensed water from cooling of the exhausted air can also be reused, and not only treated and discharged.
EIPPCB assessment	<u>Entire section</u> • Biological treatment of waste with a biodegradable fraction carried out additionally to mechanical treatment is dealt with in the section related to mechanical biological treatment (MBT). The data collection shows that the main impact of mechanical treatment of waste with calorific value is dust and organic compounds emissions to air. Dust emissions are dealt with at a general level in BAT 25 , and a new BAT is proposed regarding organic compounds emissions to air from mechanical treatment of waste with calorific value (see the assessment in Section 0 of this document and BAT 29ter). Dust emissions from MBT are dealt with in BAT 37. • The BAT conclusions cover most of the topics of the document mentioned in EEB 166: optimisation of diffuse emissions to air (BAT 10), optimisation of waste water generation (BAT 13, 14 and ex-BAT 20 in the revised BATC), air emissions management (BAT 36) and air emissions abatement (BAT 37), so it is not clear why the MBT section is inadequate. • It is proposed to clarify in the definitions that MBT is treatment of mixed solid waste so further specification in the title is not necessary. <u>Entire BATC</u> • Indeed, the text used in D1 may be very specific and would benefit from a more generic wording mentioning the inventory of waste gas streams introduced in new BAT 2bis, and then describing the use and treatment of each stream. • In principle, when made even more general, the technique could be used for other waste treatment processes, but the information collection only revealed examples for MBT plants, which are integrated plants with different processes and different levels of waste gas pollution. • As the gas is always treated before release, replacing the terms "air flow" and "exhaust air" with "waste gas" in the description of the techniques would bring clarity. <u>Additional BATC and/or techniques</u> • Quality of output is outside the Scope. However, techniques described, e.g. in BAT 1 (EMS) and BAT 2 (waste stream management), are designed to ensure processes are well managed, thus leading to good control of the output. Additionally, the implementation of an output quality management system has been added in BAT 2. • Enclosure of processes and equipment, and collection and treatment of emissions, are dealt with at a general level in BAT 10, which is also applicable to MBT. <u>Technique a</u> • The air temperature and the pollutant content of the waste gas may indeed limit the reuse of exhaust air. • Further details on the possible reuse and treatment of the different air streams would improve the text. This would however better fit in the description of technique b.

	Technique b • Condensed water can indeed be reused (see BAT 33).
EIPPCB proposal	• To replace the terms "air flow" and "exhaust air" with "waste gas". • To clarify the techniques as being segregation and recirculation of waste gas. • To complete the description of technique a by introducing a reference to BAT 2bis. • To reformulate the description of technique b regarding the recirculation (including its limitation) and the adequate treatment of waste gas. • To add the possibility of recirculating the condensed water.

1.12.5.2 Techniques for the reduction of dust and VOC emissions to air

<table>
<tr><td>Location in D1</td><td>Section 6.3.4.1 – page 910 – BAT 37</td></tr>
<tr><td>Current text in D1</td><td>BAT 37. In order to reduce dust and VOC emissions to air, BAT is to use one or a combination of the techniques given below, in addition to 0.
<table>
<tr><th colspan="2">Technique</th><th>Description</th></tr>
<tr><td>a</td><td>Fabric filter</td><td rowspan="3">See Section 6.6.1.</td></tr>
<tr><td>b</td><td>Wet scrubber</td></tr>
<tr><td>c</td><td>Thermal oxidation</td></tr>
</table></td></tr>
<tr><td>Summary of comments</td><td>Entire BATC
• (EBA 59, ECN 152) Delete or revise BAT 37 because all possible pollutants are burnt by a thermal oxidiser, therefore implementing an additional technique is not relevant.

Applicability
• (IE 55) Clarify that the techniques are also applicable to reduce emissions to air from aerobic biological treatment.
• (FR 344) Add an applicability clarifying that thermal oxidation is limited to the cases when high VOC concentrations have to be reduced due to regulatory reasons. Moreover, the cost-effectiveness and cross-media effects (e.g. energy consumption) of the technique should be assessed in relation to the VOC concentration in the waste gas. Finally, CO, O_2 and NO_X emissions should also be monitored when using thermal oxidation.

Additional techniques
• (IE 5, FEAD 227) Add adsorption using activated carbon because it is a common and effective technique for treating air emissions at waste treatment facilities.
• (IE 17) Add biofilter because it is a common and effective technique for treating air emissions at waste treatment facilities. Also add the following techniques (and include applicability restrictions): cyclonic scrubbers for fine and heavy loads of dust and ammonia, reverse jet cartridge filters for fine dust, carbon filtration in combination with biotrickling filters, biotrickling filters, carbon filters in combination with plasma injection, dry chemical scrubbing, vortex scrubbers, venturi scrubbers.
• (FR 345, FEAD 122) Add biofilter and activated carbon as abatement techniques and delete the reference to BAT 32 in the statement.
• (AT 87) Add biofilter as an abatement technique (even though there is a reference to BAT 32), which, combined with a scrubber system, should be considered BAT without using thermal oxidation. Put thermal oxidation fourth in the table.
• (DE 33) Add biofilter as an abatement technique because the data used for the derivation of the BAT-AEL come predominantly from plants with a combination of biofilter and further cleaning technology.
• (UK 305) Add cyclones which abate dust emissions particularly in wet streams.</td></tr>
</table>

EIPPCB assessment	Entire BATC • Thermal oxidation is not the only option given to abate emissions to air. Moreover, techniques in BAT conclusions are neither prescriptive nor exhaustive. Applicability • The techniques listed are techniques which have been reported by MBT plants and may also treat emissions from the part of the plant carrying out aerobic treatment of waste, but not only that part. In any case, it is proposed to merge BAT 37 with BAT 32, which covers all biological treatments (see below). • The appropriateness of using thermal oxidation (e.g. for heavily polluted air) would be determined on the basis of the inventory of waste gas streams proposed in the new BAT 2bis. No data were provided on NO_X, CO, and O_2 emissions by MBT plants equipped with thermal oxidation. Additional techniques • Indeed, activated carbon was reported as a technique used by two MBT plants, and is relevant for VOC abatement. • Biofilter is listed as BAT at a general level for all biological treatments (BAT 32). However, in order to enhance clarity and avoid repetition in the BAT conclusions, and as additional techniques (such as RTO, wet scrubbing, activated carbon) are proposed to be added at a general level for biological treatments of waste, it is proposed to merge BAT 37 of D1 with BAT 32. • In the questionnaires, cyclones were not reported by MBT plants for dust abatement. However, techniques in BAT conclusions are neither prescriptive nor exhaustive.
EIPPCB proposal	• To merge BAT 32 and BAT 37.

1.12.5.3 BAT-AELs for dust and VOC emissions to air

<table>
<tr><td>Location in D1</td><td>Section 6.3.4.1 – page 911 – BAT 37 – Table 6.9</td></tr>
<tr><td>Current text in D1</td><td>
<table>
<tr><th>Parameter</th><th>Unit</th><th>BAT-AEL
(Average of samples obtained during one year)</th></tr>
<tr><td>Dust</td><td>mg/Nm^3</td><td>2–5</td></tr>
<tr><td>TVOC</td><td>mg/Nm^3</td><td>5–15</td></tr>
</table>
</td></tr>
<tr><td>Summary of comments</td><td>
<u>Entire table</u>

(DE 35) Emission data from MBT plants should be reassessed with the help of additional scientific data and long-term experience from MBT experts.

<u>BAT-AEL range for dust</u>

(EEB 148) According to the provided data, the BAT-AEL range for dust should be revised to 0–2 mg/Nm^3. Moreover, dust emissions from Plant 257-1 should be removed from Figure 4.28 in D1 because it is emissions from RTO for VOC abatement.
(AT 88) Clarify if the BAT-AEL range is justified, and if this is achievable (guaranteed by providers of abatement technique). According to the data collection, the range could be 2–10 mg/Nm^3.
(UK 306) The BAT-AEL range for dust is too low and should be set at 2–10 mg/Nm^3. Note that the reference method for measuring dust was for a concentration of 10 mg/Nm^3. In order to meet the limit of detection requirements of the method for a concentration of 2 mg/Nm^3, the sample time would have to be extended significantly beyond the 30 minutes that the method was validated for.
(ES 113) The BAT-AEL range is too low and should be changed to 5–20 mg/Nm^3 which is more appropriate to the state of the art of MBT plants.
(FEAD 123, ECN 262) The upper end of the BAT-AEL range should be higher and set at 20 mg/Nm^3 because it is achievable by plants equipped with a biofilter.
(MWE 152) The BAT-AEL range is too low, and could be set at 100 mg/Nm^3 for an hourly load $\leq$ 1 kg/h, and 40 mg/Nm^3 for an hourly load > 1 kg/h (in accordance with French regulation).
(DE 35) Dust emissions of a MBT plant are subject to major fluctuations, e.g. depending on waste treated or different operation conditions. With a limited number of periodic measurements, these fluctuations can be taken into account only to a very limited extent. Therefore, it is not reliable to derive BAT-AELs for periodic measurements and emission reduction requirements from continuous measurements without further modifications. There are some mistakes in the selection of plants with periodic measurements: only Plants 017, 019, 037, 127, 337 and 350 are MBT plants. Plants 279 (Mechanical treatment of waste with calorific value), 349 and 452 (Anaerobic treatment of biowaste) should not be taken into account.
(ECN 166) Remove the BAT-AEL range for dust and replace it with a BAT for implementing a complaints management plan, including a reduction programme of dust emissions: measurements of dust emissions to air from MBT have been reported by only two Member States, and operational measures and workers protection are sufficient. Dust measurements are only meaningful for plants using bag/fabric filters or RTO. The different monitoring methods and different waste streams and process configurations do not allow sound BAT-AELs to be derived.

<u>BAT-AEL range for TVOC</u>

(EEB 149) The proposed BAT-AEL range for TVOC should be kept as proposed in D1 because it reflects the achieved performance of BAT, in particular for abating harmful VOCs such as benzene, toluene and xylene.
(FR 346) Clarify (in a footnote) that CH_4 is monitored with TVOC. The results of VOC measurements should be expressed in CH_4 and NMVOC; otherwise the environmental impact of the emissions cannot be properly assessed, and the measures to be taken to reduce them cannot be properly determined.
(FR 369) The proposed BAT-AEL range is only achievable using thermal oxidation, which is contradictory to the statement saying that techniques listed in BAT

</td></tr>
</table>

	conclusion are neither prescriptive nor exhaustive. The BAT-AEL range should also take into account performances of biofilters (which themselves may also generate VOC emissions). • (AT 89) The proposed BAT-AEL range is only achievable using thermal oxidation and should be increased taking into account other abatement techniques: 7–20 mg/Nm^3, up to 50 mg/Nm^3 for low VOC loads as in the current BREF (2006). • (UK 307) The proposed BAT-AEL range is only achievable using thermal oxidation. RTOs may not be BAT due to the high energy consumption and significant cost, especially since the BAT-AEL does not take into account the proximity to sensitive receptors. Cross-media effects and costs should be taken into account when establishing BAT. Clarify that the upper end of the range is 100 mg/Nm^3 when RTO is not applied. • (FEAD 124) The proposed BAT-AEL range is only achievable using thermal oxidation, and not when using a biofilter which is a very commonly used technique at MBT plants. The upper end of the range should be set at 100 mg/Nm^3 for TVOC and 50 mg/Nm^3 for VOCs. • (ES 113) The BAT-AEL range for TVOC is too low. • (ECN 165) Clarify the level of 15 mg/Nm^3 for the upper level of the BAT-AEL range, and why it was decreased in comparison with 50 mg/Nm^3 set in the current BREF (2006). • (MWE 152) The BAT-AEL range for TVOC is too low and could be set at 110 mg/Nm^3 for an hourly load > 2 kg/h (in accordance with French regulation). • (DE 35) Scientific reports in Germany show that, when the untreated waste gas contains high amounts of TVOC, a concentration level of TVOC below 50 mgNm^3 in emissions to air is achievable only with thermal treatment (alone or in combination with another treatment). The low concentration values in emissions to air shown in Table 4.57 of D1 (< 21 mg/Nm^3), achieved without thermal treatment, can only be explained with low TVOC content in the raw waste gas, especially for a plant using only a fabric filter that has no effect on TVOC abatement. The TVOC concentration values reported in Table 4.57 are in the range of inherent TVOC emissions generated by a biofilter (10–20 mg/Nm^3, dependent on the biofilter material), due to biological degradation of the filter material. <u>New parameters</u> • (EEB 151) Add a BAT-AEL range for mercury (Hg), as it is highlighted in BAT 70 and in the recommendations for future work of the current BREF (2006), if needed by means of complementary data collection. Add monitoring of Hg in BAT 4. • (EEB 152) Add a BAT-AEL range for N_2O as it is highlighted in BAT 70 and in the recommendations for future work of the current BREF (2006), if needed by means of complementary data collection. Add monitoring of N_2O in BAT 4.
EIPPCB assessment	<u>Entire table</u> • It is not clear why the entire table should be revised. It is the purpose of the commenting period to collect information from experts with a view to improving the document and the BAT conclusions. • For the assessment related to individual parameters below, it should be kept in mind that the averaging period is proposed to be modified (see the assessment of the General considerations). This needs to be reflected in the table. <u>BAT-AEL range for dust</u> • The highest dust concentration values (up to 24 mg/Nm^3) were reported by Plant 452. The maximum dust load for Plant 452_1 (emissions from the receiving hall) is 10 times higher than Plant 350_1 which also relates to the receiving hall. Moreover, it can be noted that this plant is equipped with a biofilter only, the functioning of which can be disturbed by a high dust load. Plant 239 reported a maximum concentration value of around 9 mg/Nm^3 (continuous measurement) with 97th percentile at 5 mg/Nm^3 as a maximum. All the other reported dust concentration values are lower than 5 mg/Nm^3.. • According to standard EN 13284-1 (determination of low range mass concentration of dust - Part 1: Manual gravimetric method), the method has been validated, with special emphasis around 5 mg/m^3, on an average half-hour sampling time. • Figure 4.27 and Figure 4.28 of D1 show the reported concentration levels for

	dust emissions to air from MBT plants, both for periodic and continuous measurements. It was confirmed that Plant 452 is a MBT plant. Plant 349 has been moved to anaerobic treatment of waste, and Plant 279 to mechanical treatment of waste with calorific value. • Implementing a complaints management plan could indeed be useful to build a good relationship with the neighbourhood, but might not be sufficient to prevent dust emissions. Several plants (e.g. 19, 37, 127, 337, 452, and 573) located in Austria, France, Italy, Spain, Poland, equipped with a wet scrubber and/or biofilter reported dust emissions to air. <u>BAT-AEL range for TVOC</u> • In the data collection, 38 % of the 21 plants that reported VOC concentration values (expressed either as TOC or as TVOC) were monitored according to EN 12619, or with the FID method. This shows that the measured parameter tends to be TVOC (i.e. without particulates) rather than TOC. For one plant, EN 13284 is mentioned, which might be an error since it relates to the monitoring of dust in emissions to air. Two plants (37 and 17_1) also reported CH_4 concentration values. TVOC includes CH_4 and NMVOC. The NMVOC concentration can be calculated on the basis of measured TVOC and CH_4 concentrations. • TVOC concentration values below 15 mg/Nm^3 were also reported by plants not equipped with a thermal oxidiser (e.g. 17_1, 37, 266, 257_2, 452_1). It is recognised however that waste input types entering MBT plants may be different, depending for example on local waste management strategy, thus influencing emission characteristics, and techniques to implement. No information on organic content in the raw waste gas was provided via the questionnaires, although generally biofilters apply in a VOC concentration range of 200–2000 mg/Nm^3 in the raw gas, with an abatement efficiency ranging from 75 % to 95 % (see the CWW BREF Section 3.5.1.3.1). Plant 239, treating mainly household waste collected in plastic bags and bins, reported concentration values showing a high variability of emissions (continuous measurements) with a maximum average concentration value of 42 mg/Nm^3 in 2012, and the corresponding 97th percentile at 21 mg/Nm^3. For both Plants 239 and 19, the VOC load is around 3 kg/h. Plant 452_3, equipped with a biofilter alone, reported highly variable concentration values: around 27-28 mg/Nm^3 in 2011 and around 0.9 mg /Nm3 in 2012. Plant 19 reported a TVOC concentration value of 31 mg/Nm^3 in 2010, and lower than 20 mg/Nm^3 in 2011 and 2012. All the other reported organic compounds concentration values are lower than 20 mg/Nm^3. <u>New parameters</u> • Hg concentration values were reported by one plant (573). Indeed, there was an error in D1 as the concentration value reported by Plant 628 relates to N_2O emissions. MBT plants are not fitted to treat mercury-containing wastes so these should therefore not be directed to, or accepted by, these plants. Waste input acceptance is dealt with at a general level (BAT 2 of D1). • The proposed BAT 32 takes into account the potential generation of N_2O in a biofilter with regard to NH_3 content in the influent. Setting a new BAT-AEL and defining specific monitoring for N_2O therefore seems unnecessary.
EIPPCB proposal	• To leave the BAT-AEL range for dust as it is. • To increase the upper end of the BAT-AEL range for TVOC up to 20 mg/Nm^3. • To merge table 6.9 with table 6.8 as BAT 32 and BAT 37 are proposed to be merged (see the assessment related to BAT 37)

1.13 Physico-chemical treatment of waste

1.13.1 General comments on physico-chemical treatment of waste

Location in D1	Section 6.4 – pages 911-920
Current text in D1	Whole section
Summary of comments	• (ES 6, 54) Add a BAT conclusion for the decontamination of equipment containing Sulphur Hexafluoride (SF_6). • (SE 8) Without graphs in Section 5 of the BREF, it is not easy to compare the proposed BAT-AELs with performances of plants and implemented abatement techniques. Moreover, applicability restrictions are missing for a number of techniques. • (HWE 82) The specific BAT Conclusions and BAT-AELs set for VOC emissions to air should be replaced by a generic one by aggregating the few data provided for each treatment process. Moreover, concentration limits without any reference to total flow are not reliable (see also comments EURITS 75 and FEAD 141 in Section 2.1.2). Finally, the hazardousness of different VOCs should be considered. • (HWE 83) In addition to the generic BAT conclusion mentioned above, a specific one should be elaborated in order to take into account diffuse emissions in accordance with BAT 5.
EIPPCB assessment	• SF_6 is mainly of concern for its greenhouse effect. The proposed process description has been added in the BREF. However, considering that only one plant carries out this process in Europe (the other plants recovering SF_6 are reported to use a servicing cart instead) and that most of the techniques proposed are related either to diffuse emissions (covered in BAT 10) or to health and safety, it does not seem necessary to add a specific BAT conclusion on decontamination of equipment containing SF_6. • Graphs were made available for the webinars and the different BAT-AELs for TVOC are assessed and explained in the following sections. Based on this assessment, it seems relevant not to make a common BAT-AEL for all waste treatments, but only for those treatments which have similarities in terms of processes, waste treated and abatement techniques. • Based on the data collection, it was not possible to set BAT-AELs for specific VOCs. • As for the consideration of waste gas flows and loads, see the assessments in the following relevant sections. • All BATs dealing with abatement of emissions to air now make reference to BAT 10d which concerns the containment and collection of diffuse emissions (see the assessment of BAT 10).
EIPPCB proposal	• Make a common BAT-AEL for TVOC from re-refining of waste oil, regeneration of spent solvents and PCT of liquid waste with calorific value. • See the other proposals in the following sections.

1.13.2 Physico-chemical treatment of solid and/or pasty waste

1.13.2.1 General environmental performance

<table>
<tr><td>Location in D1</td><td>Section 6.4.1.1 – page 912 – BAT 38</td></tr>
<tr><td>Current text in D1</td><td>

BAT 38. In order to improve the general environmental performance, BAT is to use the technique given below.

<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a</td><td>Acceptance procedures of solid and/or pasty waste to be treated</td><td>Acceptance procedures include controlling:
• the waste input content of e.g.:
o organics,
o solid cyanides,
o oxidising agents,
o mercury;
• H_2 emissions when fly ashes or air pollution control (APC) residues are mixed with water.</td><td>Controlling H_2 emissions is only applicable when the fly ashes or APC residues contain carbonate.</td></tr>
</table>

</td></tr>
<tr><td>Summary of comments</td><td>

General comments

- (DE 306, CEFIC 38) Clarify that this chapter belongs to the treatment of flue-gas cleaning residues by adding: "the following BAT Conclusions describe the BAT for the treatment of flue gas cleaning residues and similar solid and/or pasty waste". Otherwise, other wastes could fall under this section, in particular those that are used as secondary raw material in the chemical industry.
- (CEWEP 98, EURITS 79) Add a new BAT on reduction of raw material consumption by substitution of additives/reagents by waste.
- (CEWEP 99, 100, EURITS 80, 81) Add new BATs on the characteristics of the waste input (content of organic compounds below 6 %, immobilisation factor of metals, salts content characteristics (such as chlorine salt)) linked with the possibility of the pollutant to be immobilised, to prevent "false" immobilisation.
- (FEAD 52) In view of avoiding repetition, BAT 38 should be deleted as it does not provide any further value to the general sections on acceptance: its requirements remain under BAT 2 and are explained in Chapter 2.

Technique

- (BE 41) Include pre-acceptance procedure.

Description

- (DK 56) Remove solid cyanides from the list of parameters to be controlled in the waste input, as it is not set with specification and reasoning in Section 5.1.4.1.1.
- (EURITS 77) Clarify the description by indicating that acceptance procedures "restrict" (and not only control) the waste content input of the listed parameters.
- (DE 59, EEB 118) Add pH value and heavy metals content in the list of parameters.
- (EURELECTRIC 5) Controlling H_2 emissions when fly ashes are mixed with water should be deleted because they are not commonly measured and would cause additional unnecessary costs.
- (BE 42) Include controlling the release of VOCs and odorous substances.

Applicability

- (FR 252, EURITS 58, HWE 60) Clarify the applicability of the immobilisation process regarding organic compounds content in the waste input (which should be below 6 %), and the potential impact of H_2 emission when treating APCr with sodium bicarbonate.
- (UK 308) Reword the applicability that should read *Controlling H_2 emissions in fly ashes or APC residues* because all metals in APC residues (including lime APC) that react with water produce H_2.
- (AT 90, CEWEP 60) Reword the applicability which should read "Controlling of H_2

</td></tr>
</table>

	emissions is only applicable when the fly ashes or APC residues contain metallic Aluminium and when they can get wet" because H_2 is produced when metallic aluminium reacts with water.
EIPPCB assessment	<u>General comment</u> • Treatment of air pollution control (APC) residues is indeed part of this section, but other waste input types are also concerned. However, direct recovery (i.e. without pretreatment) of waste as a substitute for raw materials in installations performing activities covered in other BAT conclusions is explicitly excluded from the WT BATC Scope. • Reduction of raw material by substituting reagents/chemicals by waste, which is not specific to this process, is dealt with in BAT 16 as a general BAT conclusion (Section 2.7 of this BP). • Knowledge of the characteristics of the waste input is dealt with by pre-acceptance and acceptance procedures/analysis (see BAT 2 - Section 1.4 of this BP). It would be impossible to list exhaustively the characteristics of waste input to be analysed for all waste treatment processes. However, the list of waste input characteristics to be controlled could be extended to a limited number of relevant parameters. Additional information on immobilisation factor and salt characterisation are more related to process control than techniques to prevent/reduce emissions. • The characteristics of a waste input to ensure it can be efficiently treated by solidification or stabilisation are specific. Disregarding them could lead to unwanted environmental impacts, or could pose safety issues (e.g. in the case of H_2 emissions). <u>Technique</u> • It is indeed useful to add pre-acceptance in order to ensure the compatibility of the waste with the waste treatment. <u>Description</u> • Controlling the solid cyanides content of the waste input is already in the current BREF and the list of parameters to be controlled is only an example. However, as no further information is provided in the BREF, the parameter could be deleted. The list may be completed however by other parameters such as metals or salts which can give an indication of the potential of the waste for immobilisation. • The acceptance procedure aims to confirm the characteristics of the waste as identified at the pre-acceptance stage, and therefore helps to ensure that no unsuitable wastes are accepted which could lead to adverse reactions or uncontrolled emissions during treatment. The restriction on waste characteristics is more relevant at pre-acceptance stage. Although it is worth controlling the organics content of the waste input, the commonly adopted related criterion (< 6 %) is linked to the acceptance of the further destination of the output (e.g. landfill), which itself is outside the WT BREF Scope. It is the same for the immobilisation factor which is linked to the potential lixiviation of pollutants at the output destination. This is dealt with in BAT 2 where the implementation of an output quality management system is proposed to be added. • Controlling the H_2 potential is carried out in order to avoid risk of explosion so it does not appear that the associated cost is unnecessary. Moreover, it is done systematically at pre-acceptance level before backfilling according to the contribution provided by the subgroup on physico-chemical treatment of waste (ref. [146] in the BREF), so it does not seem uncommon. Odour and diffuse emissions are dealt with at a general level in BAT 8, and channelled emissions of organic compounds from physico-chemical treatment of solid and/or pasty waste are dealt with in BAT 39. <u>Applicability</u> • The applicability restriction is only about the technique and not the process. It cannot therefore define which waste can be treated by which process. This is dealt with via pre-acceptance/acceptance procedures at a general level. • H_2 emissions are due to hydrolysis of substances, e.g. aluminium, when APCr are mixed with water. This should be verified before treatment (pre-acceptance and acceptance) in order to ensure the proper control of the process (safety). Therefore, as is the case for the content of organic compounds in the waste input, this is dealt with via pre-acceptance/acceptance procedures at a general level. As a result, the

	applicability restriction is no longer necessary.
EIPPCB proposal	• To keep the BAT on substitution of raw material at a general level. • To add pre-acceptance in the description of the technique. • To modify the description of the technique, and to complement the list of waste input characteristics to be restricted/controlled, but not to specify waste input criteria (e.g. TOC content) . • To remove the applicability restriction. • As there is only one row in the table proposed in D1, to write BAT 38 in plain text.

1.13.2.2 Techniques for the reduction of dust, VOC and NH_3 emissions to air

<table>
<tr><td>Location in D1</td><td>Section 6.4.1.2 – page 912 – BAT 39</td></tr>
<tr><td>Current text in D1</td><td>BAT 39. In order to reduce dust, VOC and NH_3 emissions to air, BAT is to use one or a combination of the techniques given below.
<table>
<tr><th></th><th>Technique</th><th>Description</th></tr>
<tr><td></td><td>Fabric filter</td><td rowspan="4">See Section 6.6.1.</td></tr>
<tr><td></td><td>Wet scrubber</td></tr>
<tr><td></td><td>Biofilter</td></tr>
<tr><td></td><td>Adsorption</td></tr>
</table></td></tr>
<tr><td>Summary of comments</td><td><u>Statement</u>
• (CEFIC 39, DE 308, HWE 61, ESWET 19, CEWEP 3, CEWEP 11, SE 93) Clarify that this BAT applies only to channelled emissions to air.
• (ES 27, UK 309, FEAD 53) Remove the parameters (dust, VOC, NH_3) from the BAT statement because the use of the techniques should be considered at a more general level to reduce emissions to air.

<u>Techniques</u>
• (IE 53, UK 311) The list of techniques is too limited. VOC abatement techniques are provided in several BAT conclusions (e.g. BAT 39, 41, and 43) but are not consistent. Moreover, it should be considered that waste facilities may carry out a number of processes that could use common infrastructure.
• (UK 310) Add catalytic and thermal oxidation, consistently with BAT 41 and 43</td></tr>
<tr><td>EIPPCB assessment</td><td><u>Statement</u>
• It is needed to clarify in the BAT statement that both collection and treatment of emissions to air are BAT. This is done by referencing BAT 10d (see the assessment related to BAT 10). Once the emissions are collected, they are of course channelled and the abatement techniques are applied to these channelled emissions.
• This BAT is set for the pollutants covered by the BAT-AELs

<u>Techniques</u>
• As stated in the General considerations of the BAT conclusions, the techniques listed are neither prescriptive nor exhaustive. Waste facilities may indeed carry out a number of processes that could use common infrastructure. Even though other techniques can abate VOC emissions, the techniques listed in BAT 39 of D1 reflected the ones that were reported via the questionnaires for plants performing PCT of solid and/or pasty waste: neither catalytic nor thermal oxidation was reported as an abatement technique in plants performing PCT of solid and/or pasty waste</td></tr>
<tr><td>EIPPCB proposal</td><td>• To add in the statement a reference to BAT 10d.</td></tr>
</table>

1.13.2.3 BAT-AELs for dust, VOC, and NH_3 emissions to air

<table>
<tr><td>Location in D1</td><td>Section 6.4.1.2 – page 912 – BAT 39 – Table 6.10</td></tr>
<tr><td>Current text in D1</td><td>
<table>
<tr><th>Parameter</th><th>Unit</th><th>BAT-AEL
(Average of samples obtained during one year)</th></tr>
<tr><td>Dust</td><td rowspan="3">mg/Nm^3</td><td>2–5</td></tr>
<tr><td>TVOC</td><td>2–15</td></tr>
<tr><td>NH_3</td><td>0.1–5</td></tr>
</table>
</td></tr>
<tr><td>Summary of comments</td><td>
<u>Dust</u>
• (EFR 131) The proposed upper end of the range is too low and should be set at 10 mg/Nm^3.
• (ES 98, FEAD 55) The proposed upper end of the range is too low and should be set at 20 mg/Nm^3, as in the current BREF (2006).
• (AT 91) Clarify if the BAT-AEL range is justified, as the data in Table 5.17 show dust ranges from 0.5 mg/Nm^3 to 18 mg/Nm^3. Change the range to <5–10 mg/Nm^3.

<u>Volatile organic compounds</u>
• (EURITS 59) Change TVOC to VOCs, or specify applicability as below.
• (EURITS 59, DE 16, ES 89, EEB 119, FEAD 54) Specify that BAT-AELs for TVOC may not apply to PCT prior to landfilling of hazardous waste or backfilling, because there should be no volatile organics in waste treated in these specific processes.
• (DE 16) Clarify the provided emissions concentration levels in Section 5.1.4.2 - Techniques to consider.
• (HWE 63) Remove the BAT-AEL for TVOC and set only one general BAT-AEL for VOC emissions.
• (ES 99) The proposed upper end of the range is too low and should be set at 20 mg/Nm^3. Additionally, clarification should be given on the use of VOCs, TVOC, TOC throughout the BREF.
• (AT 92) Clarify if the BAT-AEL range is justified as data in Table 5.17 show ranges for only two plants. Change the range to 7–20 mg/Nm^3, the upper end of the range may be extended to 50 mg/m^3 for low VOC loads as in BAT 41 of the current BREF (2006).
• (FEAD 64) Clarify if the BAT-AEL range is justified as data in Table 5.17 show ranges for only three plants, with concentration values expressed in mg/Nm^3 or ppm of TOC or TVOC. Change the range to 10–20 mg/Nm^3, as in the current BREF (2006).

<u>Ammonia</u>
• (EURITS 59, HWE 62) Specify that the BAT-AEL for NH_3 may not apply to PCT prior to landfilling or backfilling because there are only diffuse NH_3 emissions, for which BAT 10 applies.
• (DE 17, FEAD 60) Specify that the BAT-AEL for NH_3 only applies when sludge or other solid waste with the potential for NH_3 release is treated.
• (ES 100, FEAD 65) The proposed upper limit is too low and does not reflect the real performance of the operators. It should be set at 30 mg/Nm^3.
• (AT 93) Clarify if the BAT-AEL range is justified as it is not visible from the data given in Table 5.17. Moreover, it has to be assessed if it would make sense to delete BAT-AEL for NH_3 and introduce a new BAT: to measure NH_3 in raw gas for assessing the need for an acid scrubber system (see comment AT 84).
</td></tr>
<tr><td>EIPPCB assessment</td><td>
<u>Whole table</u>
• For the assessment related to individual parameters below, it should be kept in mind that the averaging period is proposed to be modified (see the assessment of the General considerations). This needs to be reflected in the table.

<u>Dust</u>
• Of the 31 points of release reported from 15 plants, 25 are equipped with a fabric
</td></tr>
</table>

	filter. Of the 15 plants, four (228, 475, 427, 613), of which two (228 and 613) are equipped with a fabric filter, reported maximum dust concentration values above 5 mg/Nm^3: o While the data provided by Plant 228 shows that, in most cases, dust concentration levels lower than 5 mg/Nm^3 are achieved, it is not clear why this is not the case for Plant 613. Indeed, this concentration is generally achievable with a fabric filter. o The dust concentration values reported by Plant 427 and Plant 475, which are both equipped with a wet scrubber, show that a level lower than 5 mg/Nm^3 is also achievable. o All the other reported dust concentration values are below 5 mg/Nm^3. <u>Organic compounds</u> • Of the 25 plants carrying out physico-chemical treatment of solid and pasty waste, only three (475, 495, and 569) reported data on organic compounds, expressed in ppm for Plant 495. The standard/method used for VOC measurements reported by Plants 475 and 495 is EN 12619/FID, for which filtration of the sample is necessary. Therefore, in this case, only the volatile compounds concentration, and not particulates, is measured. Plant 569 reported using standard EPA 21 for VOC measurements (determination of VOC leaks from process equipment, therefore used for diffuse emissions), and at the same time having a alkaline oxidative scrubber (for channelled emissions), which is not consistent. • According to the collected data, it seems that VOCs is not a generic parameter for this type of waste treatment although they can be emitted in some cases (e.g. when treating (oily) sludge or dredging spoil). Therefore it is proposed to keep the monitoring of TVOC emissions, but not to set a BAT-AEL. • As for the waste input, Plants 475 and 569 reported treating, among other wastes, (oily) sludge, contaminated soils, dredging spoil. Plant 495 reported treating air pollution control residues (APCr, which contain less than 1 % TOC and no VOCs according to the information provided), and waste inorganic acid. It seems to confirm that the relevance of VOCs as a parameter to monitor is dependent on the waste input type (e.g. waste with organic content such as sludge). <u>Ammonia (NH_3)</u> • Of the four plants (15, 340, 348, 551) that reported NH_3 concentration values (which correspond to 7 points of emissions), two (15 and 340) reported treating, among other wastes, sludge, one (348) reported treating drilling mud, and one (551) reported treating APCr. It seems to confirm that NH_3 as a parameter is relevant only for plants treating sludge for example. • As for organic compounds, it seems that NH_3 is not a generic parameter for this type of waste treatment although it can be emitted in some cases (e.g. when treating (oily) sludge or dredging spoil). Therefore it is proposed to keep the monitoring of NH_3 emissions, but not to set a BAT-AEL.
EIPPCB proposal	• To keep the BAT-AEL range for dust, expressed as an average over the sampling period. • To remove the BAT-AELs for TVOC and NH_3. • To keep the monitoring of TVOC and NH_3, and to clarify in BAT 4 that it applies when the parameters have been identified as relevant, based on the inventory of the waste gas mentioned in BAT 2bis.

1.13.3 Re-refining of waste oil

1.13.3.1 Technique for the reduction of VOC emissions to air

<table>
<tr><td>Location in D1</td><td>Section 6.4.2.2 – page 913 – BAT 41</td></tr>
<tr><td>Current text in D1</td><td>BAT 41. In order to reduce VOC emissions to air, BAT is to use the technique given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th></tr>
<tr><td>a</td><td>Thermal oxidation</td><td>See Section 6.6.1. The waste gas may also be fed into a process furnace or a boiler.</td></tr>
</table></td></tr>
<tr><td>Summary of comments</td><td>• (DK 148) Add other techniques, such as activated carbon, ozone.
• (FEAD 67, 229) Add other techniques such as wet scrubber, cryogenic condensation, adsorption.
• (SE 190) Clarify that the BAT apply to channelled emissions to air.</td></tr>
<tr><td>EIPPCB assessment</td><td>• Techniques are neither prescriptive nor exhaustive. Thermal oxidation is the main technique reported to abate VOC emissions. However, other techniques have been reported via the questionnaires (e.g. wet scrubber, activated carbon) by plants performing re-refining of waste oils, but without data on concentration values of volatile organic compounds in emissions to air. Cryogenic condensation may also be used but has not been reported.
• It is confirmed that this BAT applies to channelled emissions to air. It is needed however to clarify in the BAT statement that both collection and treatment of emissions to air are BAT. This is done by referencing BAT 10d (see the assessment related to BAT 10). Once the emissions are collected, they are of course channelled and the abatement techniques are applied to these channelled emissions.</td></tr>
<tr><td>EIPPCB proposal</td><td>• To add wet scrubber and activated carbon in the list of techniques.
• To add in the BAT statement a reference to BAT 10d.</td></tr>
</table>

1.13.3.2 BAT-AELs for VOC emissions to air

<table>
<tr><td>Location in D1</td><td>Section 6.4.2.2 – page 913 – BAT 41 – Table 6.11</td></tr>
<tr><td>Current text in D1</td><td><table><tr><th>Parameter</th><th>Unit</th><th>BAT-AEL
(Average of samples obtained during one year)</th></tr><tr><td>TVOC</td><td>mg/Nm^3</td><td>5–15</td></tr></table></td></tr>
<tr><td>Summary of comments</td><td>• (GEIR 97) BAT Conclusions should be derived by the assessment of data from plants applying similar re-refining processes.
• (HWE 64) Delete this BAT-AEL and replace it with a generic BAT-AEL on VOCs.
• (AT 94) Clarify if this BAT-AEL is justified because it has been derived from only four plants. Change the range to 7–20 mg/Nm^3 with the upper end up to 50 mg/Nm^3 for low VOC loads, as it is in the current BREF (2006).
• (FEAD 68) If the parameter TVOC is kept, change the BAT-AEL to 0.1 kg TVOC/tonne of waste oil treated. If the parameter is VOCs, the upper end of the range should be 20 mg/Nm^3.</td></tr>
<tr><td>EIPPCB assessment</td><td>• The BAT-AELs have been derived on the basis of the data provided. It is not clear why the range or the unit of measurement of VOC emissions should be modified.
• As mentioned before in this document (see Section 0), it is proposed to establish one common BAT-AEL for similar waste treatment processes, namely re-refining of waste oil, PCT of waste with calorific value and regeneration of spent solvents. This will also allow to have a larger sample of data to set the BAT-AEL. See the assessment in Section 1.13.5.2 related to regeneration of spent solvents for further details on the BAT-AEL.</td></tr>
<tr><td>EIPPCB proposal</td><td>• To delete the BAT-AEL.
• To replace it with a common BAT-AEL for re-refining of waste oil, PCT of waste with calorific value and regeneration of spent solvents</td></tr>
</table>

1.13.4 Physico-chemical treatment of waste with calorific value

1.13.4.1 Techniques for the reduction of VOC emissions to air

<table>
<tr><td>Location in D1</td><td>Section 6.4.3.1 – page 914 – BAT 43</td></tr>
<tr><td>Current text in D1</td><td>BAT 43. In order to reduce VOC emissions to air from plants performing physico-chemical treatment of liquid and semi-liquid waste with calorific value, BAT is to use one or a combination of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th></tr>
<tr><td>•</td><td>Adsorption</td><td rowspan="3">See Section 6.6.1.</td></tr>
<tr><td>•</td><td>Thermal oxidation</td></tr>
<tr><td>•</td><td>Wet scrubber</td></tr>
</table></td></tr>
<tr><td>Summary of comments</td><td><u>General comments</u>
• (CEWEP 12) Define more extensively what PCT of waste with calorific value is. There is a need to differentiate clearly PCT of waste with calorific value from mechanical treatment of waste with calorific value. All kinds of waste may have a calorific value.
• (CEFIC 40, DE 310, CEWEP 104) Clarify to which type of waste (waste for the production of RDF, liquid and semi-liquid hazardous waste for the production of substitute fuel) this BAT conclusion applies, in order to avoid waste that is used as secondary raw materials in the chemical industry falling under this conclusion.
• (EEB 164) Include BAT 117-130 of the current BREF (2006) on preparation of waste to be used as fuel, especially those dealing with hazardous waste.
• (SE 191) Clarify that this BAT applies to channelled emissions to air, and to continuous processes only.

<u>Techniques</u>
• (EUCOPRO 34, FR 119, FEAD 69) Cryogenic condensation, which is applied in Plant 450, should be added as abatement technique.
• (ESRG 22) Enlarge the list of techniques to the full list of Section 6.6.1.</td></tr>
<tr><td>EIPPCB assessment</td><td><u>General comments</u>
• Mechanical treatment and PCT of waste with calorific value are dealt with separately in the BREF and the BAT conclusions.
• As per conclusion 2.1 of the kick-off meeting, the BAT conclusions are structured according to the combination of the main process categories with an associated main type of waste stream. The preparation of waste to be used as fuel is covered partly in mechanical treatment, partly in biological treatment, and partly in physico-chemical treatment.In the case of BAT 43, as mentioned in the statement; it concerns only liquid waste and semi-liquid waste (the latter being however not clear). This should be reflected in the heading, thus allowing the BAT statement to be modified.
• As per conclusion 1.6 of the kick-off meeting, direct recovery of waste (which can be waste used as secondary materials) in IED installations covered in other BREFs is excluded from the WT BREF scope.
• Concerning BAT 117-130 of the current BREF:
  ○ Existing BAT 117 to 128: see the assessment of Section 6.2 in Section 0 of this background paper.
  ○ Existing BAT 129 and 130: these two BAT are "applied processes and techniques" to reduce the content of solids in the liquid fuel and therefore concern the output quality, which is not in the scope of the BATC. However, the output quality management is part of the overall waste stream management (see the assessment related to BAT 2).
• The emissions to air concerned are indeed channelled but the operation of processes in batch is not incompatible with this BAT: when the process is not operating, there are no emissions from the process to be monitored, and when the process is operating, the emissions to air are continuous.</td></tr>
</table>

	• It is needed to clarify in the BAT statement that both collection and treatment of emissions to air are BAT. This is done by referencing BAT 10d (see the assessment related to BAT 10). Once the emissions are collected, they are of course channelled and the abatement techniques are applied to these channelled emissions. <u>Techniques</u> • According to the data collection, of the 15 plants performing PCT of waste with calorific value, one (Plant 450) is equipped with cryogenic condensation, and has been since 2013 (basic scrubber until 2012). The reported TOC concentration value is 36.7 mg/Nm^3, for one measurement in 2012 (3 one-hourly samples). • Techniques listed in BAT conclusions are neither prescriptive nor exhaustive.
EIPPCB proposal	• To add cryogenic condensation as an abatement technique. • To add in the heading of the section the word "liquid" • To add in the statement a reference to BAT 10d.

1.13.4.2 BAT-AELs for VOC emissions to air

<table>
<tr><td>Location in D1</td><td>Section 6.4.3.1 – page 914 – BAT 43 – Table 6.12</td></tr>
<tr><td>Current text in D1</td><td>
<table>
<tr><th>Parameter</th><th>Unit</th><th>BAT-AEL
(Average of samples obtained during one year)</th></tr>
<tr><td>TVOC</td><td>mg/Nm^3</td><td>5-15</td></tr>
</table>
</td></tr>
<tr><td>Summary of comments</td><td>
<u>Parameter: TOC, VOCs or TVOC</u>

(EURITS 60, ES 101) The parameter should be VOC and not TVOC.
(CEWEP 104) The parameter should be TOC and not TVOC which is only part of TOC.
(FEAD 70) It should be assessed whether the parameter should be VOC or TVOC.
(HWE 65) Delete this table and set one BAT-AEL for VOC emissions covering all waste treatment processes.
CEWEP (104) It is not clear why there should be different BAT-AELs for VOC for different processes (e.g. mechanical and physico-chemical) producing waste to be used as a fuel.

<u>BAT-AEL</u>

(EUCOPRO 35) The proposed BAT-AELs are too low; both the waste input characteristics and the process should be taken into account when setting the BAT-AELs.
(AT 95) Clarify if the BAT-AEL range is justified: this could be 7–20, and up to 50 for low VOC load (as BAT 41 of the current BREF 2006).
(ES 101, FEAD 70) The BAT-AELs should be higher and specified by technique (i.e. different BAT-AELs for each of the following: adsorption, thermal oxidation, wet scrubbing, cryogenic condensation).

</td></tr>
<tr><td>EIPPCB assessment</td><td>
<u>Parameter: TOC, VOCs or TVOC</u>

According to the data collection, the reported standards or methods used for VOC measurements are EN 13256 (four plants, of which two reported also using EN 12619), EN 12619 (four plants, of which two reported also using EN 13256), and FID (two plants). Standard EN 12619 superseded EN 13256 in 2013. However, in both standards, the method to be used is FID, for which filtration of the sample is necessary. Therefore only volatile compounds concentration, and not particulates, is measured.

<u>Whole table</u>

For the assessment below, it should be kept in mind that the averaging period is proposed to be modified (see the assessment of the General considerations). This needs to be reflected in the table.

<u>BAT-AEL</u>

21 emission points report VOC emission to air. Two of these emission points (Plants 507 and 508) carry out treatment of infectious waste by thermal screw, which is not representative of the process concerned by this BAT-AEL.
The emission values range from 7.7 mg/Nm^3 to 319 mg/Nm^3.
As mentioned before in this document (see Section 0), it is proposed to establish one common BAT-AEL for similar waste treatment processes, namely re-refining of waste oil, PCT of waste with calorific value and regeneration of spent solvents. This will also allow to have a larger sample of data to set the BAT-AEL. See the assessment in Section 1.13.5.2 related to regeneration of spent solvents for further details on the BAT-AEL.

</td></tr>
<tr><td>EIPPCB proposal</td><td>

To keep TVOC as the parameter.
To delete the BAT-AEL
To replace it with a common BAT-AEL for re-refining of waste oil, PCT of waste with calorific value and regeneration of spent solvents

</td></tr>
</table>

1.13.5 Regeneration of spent solvents

1.13.5.1 Techniques for the prevention or reduction of VOC emissions to air

<table>
<tr><td>Location in D1</td><td>Section 6.4.4.2 – page 915 – BAT 45</td></tr>
<tr><td>Current text in D1</td><td>

BAT 45. In order to prevent or, where that is not practicable, to reduce VOC emissions to air, BAT is to use a suitable combination of the techniques given below.

<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a</td><td>Recirculation of waste gas from solvent regeneration process in steam boiler</td><td>Collected waste gas is cooled and chilled to condense and partially separate solvents. This waste gas with remaining solvents is fed to the steam boiler supplying the plant. If the steam boiler is not in operation or the waste gas volume would exceed the steam boiler air demand, the pretreated waste gas is treated by activated carbon filters before release.</td><td>Not applicable to the treatment of halogenated solvent wastes, in order to avoid generating and emitting PCBs.</td></tr>
<tr><td>b</td><td>Condensation/ Cryogenic condensation</td><td>See Section 6.6.1 for the description of the techniques. Adequate control of condenser parameters is essential to minimise VOC emissions from the condenser vents. Condenser (cooling) failure results in an automatic process shutdown.</td><td>Generally applicable.</td></tr>
<tr><td>c</td><td>Activated carbon adsorption</td><td>See Section 6.6.1 for the description of the technique.</td><td>There may be limitations to the applicability of the technique due to safety reasons (e.g. activated carbon beds tend to self-ignite when loaded with ketones).</td></tr>
<tr><td>d</td><td>Wet scrubber</td><td>See Section 6.6.1 for the description of the technique.</td><td>Generally applicable.</td></tr>
</table>

</td></tr>
<tr><td>Summary of comments</td><td>

<u>Entire BATC</u>

- (CEFIC 42, DE 314, CEWEP 4, SE 192) Make clear that this BAT applies to channelled emissions only.
- (FEAD 138) Replace "suitable" with "one or an appropriate combination of techniques".

<u>Technique a</u>

- (DK 95) Replace technique name with incineration.
- (FR 259, EURITS 62, HWE 68) Technique a is forbidden in some countries because it goes against incineration obligations.
- (FEAD 216) Add vapour balance in the list of techniques.

<u>Technique b</u>

- (FR 260, EURITS 63, HWE 69) Replace technique name with "secondary" condensation.

</td></tr>
<tr><td>EIPPCB assessment</td><td>

<u>Entire BATC</u>

- It is needed to clarify in the BAT statement that both collection and treatment of emissions to air are BAT. This is done by referencing BAT 10d (see the assessment related to BAT 10). Once the emissions are collected, they are of course channelled and the abatement techniques are applied to these channelled emissions.

</td></tr>
</table>

	• The wording should indeed be consistent throughout the BATC. From the data collection, however, it seems that at least two techniques are always needed. <u>Technique a</u> • The word "incineration" is more commonly used for waste incineration and gaseous effluents are excluded from the scope of WFD . • It is not very clear why the technique is forbidden in some countries but it seems in fact to be an implementation issue and the techniques are neither prescriptive nor exhaustive. Moreover, the applicability restriction clearly mentions when this technique is not to be used. • Vapour balance is not specific to solvent regeneration and is mentioned in the BREF (Section 2.3.13.1) as a technique for the prevention or reduction of the environmental consequences of accidents and incidents when handling waste and also in the EFS BREF. • The wording of technique a as proposed in D1 is very detailed and pertains more to engineering considerations. <u>Technique b</u> • It is supposed that "secondary condensation" means condensation as an abatement technique in addition to the condensation used in the distillation process. However, if used, it would need to be defined in the BAT conclusions and this specification does not seem necessary. • The wording of technique b as proposed in D1 (now technique c) is very detailed and pertains more to engineering considerations.
EIPPCB proposal	• To add in the BAT statement a reference to BAT 10d. • To replace "suitable" with "a combination". • To simplify the wording of techniques a and c (ex b).

1.13.5.2 BAT-AELs for VOC emissions to air

<table>
<tr><td>Location in D1</td><td>Section 6.4.4.2 – page 915 – BAT 45 – Table 6.13</td></tr>
<tr><td>Current text in D1</td><td>
<table>
<tr><th>Parameter</th><th>Unit</th><th>BAT-AEL (Average of samples obtained during one year)</th></tr>
<tr><td>TVOC</td><td>kg per tonne of spent solvent treated</td><td>0.02-0.36</td></tr>
</table>
</td></tr>
<tr><td>Summary of comments</td><td>

(DE 440, AT 96) It is not clear how this BAT-AEL was derived. The BAT-AEL should be expressed in mg/Nm^3.
(FR 33) The BAT-AEL should be expressed in mg/Nm^3. The proposed unit depends too much on the volatility of incoming waste and cannot be used in the management of the plant.
(AT 96) Change the BAT-AEL on TVOC to the concentration range 7–20 (50) mg/m^3 (the higher end of the range can be extended to 50 mg/m^3 for low VOC loads, see BAT 41 in the 2006 BREF).
(HWE 70) Delete this BAT-AEL and replace it with a generic BAT-AEL on VOC.

</td></tr>
<tr><td>EIPPCB assessment</td><td>

For the assessment below, it should be kept in mind that the averaging period is proposed to be modified (see the assessment of the General considerations). This needs to be reflected in the table.
There are six plants in the data collection carrying out regeneration of spent solvents, with capacities ranging from 10 t/day to 270 t/day.
There is no information about the end-of-pipe abatement techniques used by Plants 447 and 420 (although the process-integrated condensation could also be considered an abatement technique). The other plants report using a wet scrubber, activated carbon and/or condensation.
The concentration of organic compounds for this type of waste treatment process varies from 5 mg/Nm^3 to 133 g/Nm^3. Such a wide range led to propose a BAT-AEL expressed in kg per tonne of spent solvent treated. However, following the webinars held in September 2016 and after a new assessment, this unit would allow a bench marking between plants but do not reflect really the efficiency of the abatement techniques. Moreover, as mentioned before in this document (see Section 0), it is proposed to establish one common BAT-AEL for similar waste treatment processes, namely re-refining of waste oil, PCT of waste with calorific value and regeneration of spent solvents. This will also allow having a larger sample of data to set the BAT-AEL.
The plants with the higher concentration of organic compounds in the emissions to air are the plants regenerating spent solvents. However these high concentrations correspond to relatively low loads and these loads decrease over time to reach levels close or below 1 kg/h (as maximal loads). This may be due to retrofitting over the years; for instance for plant 169, the most recent retrofits are a VOC vapour cooling system (-5 °C) installed in 2013 and a post-condenser (-5 °C) on the vacuum pump circuit installed in 2014. The other plants with a maximal load over 1 kg/h are plant carrying out PCT of waste with calorific value. The maximal concentrations reported by these plants range from 32 mg/Nm^3 to 319 mg/Nm^3 in TVOC. Most of these plants however seem to be able to achieve much lower levels, below 30 mg/Nm^3, which are levels expected when regenerative thermal oxidisers are used (according to the CWW BREF, the level of emissions of organic compounds associated with RTO is <1-20 mg/Nm^3 as TOC).
The lowest TVOC concentration is 5.1 mg/Nm^3 reported by plant 160C, equipped with thermal oxidation.

</td></tr>
<tr><td>EIPPCB proposal</td><td>

To delete the BAT-AEL
To replace it with a common BAT-AEL for re-refining of waste oil, PCT of waste with calorific value and regeneration of spent solvents, with a range between 5 and 30 mg/Nm^3 of TVOC, which applies only when the load is above 1 kg/h.

</td></tr>
</table>

1.13.6 Physico-chemical and/or biological treatment of water-based liquid waste

1.13.6.1 General comments

Location in D1	Section 6.5.1 – page 920
Current text in D1	Not applicable
Summary of comments	General comments • (BE 58, BE 60, BE 61, BE 62) Add a BAT on process monitoring: o For physico-chemical treatment, monitoring of e.g. the efficiency of hazardous substances removal (also in case of use of activated carbon), monitoring both total and dissolved COD in the influent and in the effluent at least once per week, visual monitoring of the effluent clarity. o For biological treatment, monitoring of the proper functioning of specifically the nitrification (amount of ammonium daily to weekly). o A structured and expert monitoring system is needed, by which relevant data of the determined process parameters are centralised and interpreted. • (BE 59) Add a BAT on inhibition assays to be performed in order to ensure that the stream is not inhibitory for the biological treatment. • (FR 265, EURITS 67, HWE 74) Add a BAT on specific pre-acceptance procedures (laboratory-scale tests to predict the performances of the treatment, e.g. on breaking of emulsion and biodegradability) in order to prevent receiving waste not treatable by the process, leading to non-adapted treatment. • (CEFIC 47) Clarify that the treatment of water-based liquid waste in WWT plants covered by the CWW BREF is not part of this BAT conclusion.
EIPPCB assessment	General comments • Process monitoring is part of the environmental management system (EMS) defined in BAT 1 of D1, in which implementation of procedures on efficient process control is explicitly mentioned in point IV f. Because the scope and the level of detail of the EMS will be related to the nature, scale and complexity of the installation, and the range of environmental impacts it may have, and determined also by the type of wastes processed for example, it would be impossible to list each and every possible case, which can additionally evolve over time. However, the establishment of an inventory of waste water streams introduced in the new BAT 2bis, the implementation of an output quality management system that has been added in BAT 2, and the monitoring of key process parameters for relevant emissions to water introduced in the new BAT 3bis should also address this issue. • Pre-acceptance and acceptance procedures are also defined at a general level, for the same reason as the one indicated for process monitoring. However, further indication could indeed be given regarding the characteristics of the waste input in terms of bioeliminability and suitability for emulsion breaking. • The WT BAT conclusions concern only the activities defined in the Scope, specified in Annex I to Directive 2010/75/EU.
EIPPCB proposal	• To create a new BAT 52bis with details on the pre-acceptance and acceptance procedures.

1.13.6.2 Techniques for the reduction of channelled HCl, NH_3, and VOC emissions to air

<table>
<tr><td>Location in D1</td><td>Section 6.5.1 – page 920 – BAT 52</td></tr>
<tr><td>Current text in D1</td><td>BAT 52. In order to reduce HCl, NH_3 and VOC channelled emissions to air, BAT is to use one or a combination of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th></tr>
<tr><td>a</td><td>Adsorption</td><td rowspan="3">See Section 6.6.1.</td></tr>
<tr><td>b</td><td>Wet scrubber</td></tr>
<tr><td>c</td><td>Biofilter</td></tr>
</table></td></tr>
<tr><td>Summary of comments</td><td><u>General comments</u>
• (BE 40) Clarify which emissions should be channelled, and thus sucked off.
• (UK 320) Remove reference to the parameters in the BAT statement, as well as in the title of Table 6.14 because it is redundant with the indication in the table.

<u>Comments on techniques</u>
• (IE 6, UK 321, FEAD 230) Add thermal oxidation as a technique.
• (UK 318) Remove the techniques because this is about a wet process for which it is not clear how abatement techniques help.</td></tr>
<tr><td>EIPPCB assessment</td><td><u>General comments</u>
• As described in D1 (Table 5.179), emissions to air can originate from devices used, for example, for emulsion breaking, centrifugation, evapo-condensation and other reactors used in the process. It is needed however to clarify in the BAT statement that both collection and treatment of emissions to air are BAT. This is done by referencing BAT 10d (see the assessment related to BAT 10). Once the emissions are collected, they are of course channelled and the abatement techniques are applied to these channelled emissions. Therefore the word "channelled" is no more appropriate in the BAT statement
• This BAT is set for the pollutants contained in the BAT-AELs.

<u>Comments on techniques</u>
• Indeed, thermal oxidation allows the abatement of VOCs, etc. Although the list of techniques in BAT conclusions is neither exhaustive nor prescriptive, it is noted that thermal oxidation was reported to be used (e.g. Plant 401-404).
• The listed techniques are about abatement of channelled emissions to air, e.g. from storage tanks.</td></tr>
<tr><td>EIPPCB proposal</td><td>• To add thermal oxidation in the list of techniques.
• To add in the BAT statement a reference to BAT 10d and to remove the word "channelled".</td></tr>
</table>

1.13.6.3 BAT-AELs for HCl, NH_3, and VOC emissions to air

<table>
<tr><td>Location in D1</td><td>Section 6.5.1 – page 920 – BAT 52 – Table 6.14</td></tr>
<tr><td>Current text in D1</td><td>
<table>
<tr><th>Parameter</th><th>Unit</th><th>BAT-AEL (Average of samples obtained during one year)</th></tr>
<tr><td>Hydrogen chloride (HCl)</td><td rowspan="3">mg/Nm^3</td><td>1–3 ([1])</td></tr>
<tr><td>Ammonia (NH_3)</td><td>0.1–5</td></tr>
<tr><td>TVOC</td><td>3–20</td></tr>
<tr><td colspan="3">([1]) This BAT-AEL does not apply if only biological treatment is carried out.</td></tr>
</table>
</td></tr>
<tr><td>Summary of comments</td><td>
<u>General comments</u>

(FR 263, SE 194, FEAD 79) Clarify that BAT-AELs apply only to channelled emissions.
(UK 319) Consistently with other BAT, a footnote should be added to clarify that the monitoring may not apply when the substance concerned is not present in the waste to be treated or generated.
(DE 398) Add a new BAT-AEL for low air flow (e.g. lower than 5 000 Nm^3/h, as is defined as low air flow in the German clean air act) expressed in load (e.g. 0.1–0.5 kg/h TVOC).
(DE 402) The upper levels of the BAT-AEL ranges are too low. German plants complying with the abatement techniques proposed as BAT show emission levels above these levels.

<u>Volatile organic compounds</u>

(AT 98) Clarify if the BAT-AEL range for TVOC is justified, as Table 5.178 shows a TVOC range of 1.9–84 mg/m^3. Change the range to 7–20 mg/Nm^3 with the upper end up to 50 mg/Nm^3 for low VOC loads, as it is in the current BREF (2006).
(EURITS 66) The parameter should be VOC instead of TVOC.
(FEAD 75) From the data collection, the upper level of the BAT-AEL range should be higher, and could be set at 100 mg TVOC/Nm^3, and 50 mg VOC/Nm^3.
(FEAD 75) Clarify which of TVOC, VOC, or TOC parameter is relevant, as these are confusingly interchanged within the BREF.
(HWE 72, HWE 73) Remove the specific BAT-AEL for TVOC, and set a generic one for physico-chemical treatments. Moreover, there are inconsistencies between the information given in Section 5.7 and the proposed BAT-AEL range, such as using both parameters TOC and VOC in the text and the table, and information missing on the method used to analyse VOC. It is not clear how this range has been derived.

<u>Hydrogen chloride</u>

(AT 99) Clarify if the BAT-AEL range for HCl is justified, as Table 5.178 shows a HCl range of 0.0005–11.3 mg/m^3.
(ES 102, FEAD 74) From the provided data, the upper level of the BAT-AEL range should be higher, and could be set at 5 mg/Nm^3.

<u>Ammonia</u>

(AT 100) Clarify if the BAT-AEL range for NH_3 is justified, as Table 5.178 shows a NH_3 range of 0.00005–20 mg/m^3.
(MWE 154) The BAT-AEL should be set at 10 mg/Nm^3: there is no reason why this BAT-AEL should be different of the one set for biological treatment of waste. Setting a range is not needed.

</td></tr>
<tr><td>EIPPCB assessment</td><td>
<u>General comments</u>

Indeed, as BAT 52 of D1 applies to channelled emissions to air, the emission levels associated with this BAT also apply for channelled emissions to air..
The BAT-AEL indeed makes sense only if the substance concerned may be emitted. However, this does not depend only on the waste content, but also on chemical reactions that may occur due to specific process conditions (e.g. temperature linked to VOC emissions), and on reagents that may be used for the treatment. This is now

</td></tr>
</table>

	reflected in the proposed BAT 2bis and should also be reflected in the BAT-AELs. • Of the three plants located in Germany for which additional data on HCl, NH_3 and TVOC emissions have been provided as an attachment to the comment DE 402, two (Plants B and C) comply with the proposed BAT-AELs. It is not clear from this perspective why these BAT-AELs are considered too low. • For the assessment related to individual parameters below, it should be kept in mind that the averaging period is proposed to be modified (see the assessment of the General considerations). This needs to be reflected in the table. <u>Volatile organic compounds</u> • Of the 41 plants treating WBLW that participated in the data collection, 18 provided concentration values of organic compounds, from 25 points of emissions. The monitoring standards EN 13526 and EN 12619, by means of which total volatile organic compounds is measured, were reported by 5 plants. The other the reported monitoring standards are EN 13649 in one case (measurement of individual organic compounds), EN 14662 in one case (measurement of benzene), EN 13528 in one case (relates to ambient air quality), and VD 3496 in one case (measurement of nitrogen compounds). Three plants reported NMVOC concentration values. • The maximum reported concentration value of 130 mg/Nm^3 from Plant 217 is due to OTNOC. Without OTNOC, the concentration is around 40 mg/Nm^3 in 2011, and around 60 mg/Nm^3 in 2013, with a load below 0.2 kg/h in both cases. • Plant 151 indicated that, since activated carbon adsorption was installed in 2013, emissions are below the limit of detection. • Plant 569 reported either continuous or periodic monitoring for emissions to air. It is not very clear what these data correspond to. The highest concentration value (periodic monitoring) is 40 mg/Nm^3, whereas the concentration values reported for continuous monitoring are around 0.6 mg/Nm^3. • Plant 140 reported a NMVOC concentration value around 50 mg/Nm^3, measured by an internal method in 2013, coming from the physico-chemical treatment of organics, centrifugation, evapo-condensation and from the transfer station. • Plant 461 reported emissions coming from sludge drying chambers, which is a very specific process. Additionally, the reported standard (EN 13528) relates to ambient air quality and diffusive samplers for the determination of concentrations of gases and vapours. • Plant 03, equipped with a biofilter, wet scrubbing system, and, for tank vents, activated carbon adsorption, reported TOC concentration values going from 5 mg/Nm^3 to 43 mg/Nm^3. • Additionally to the concentration values obtained by internal monitoring (around 30–35 mg/Nm^3), Plant 149-150 also reported concentration values obtained during external tests in 2011 and 2012, of around 15–25 mg/Nm^3. • Except for Plant 140 and Plant 149, the emission load is lower than 0.5 kg/h. although the emissions concentration may range 2-43 mg/Nm^3 by plants equipped with the adequate abatement technique. This should be taken into account when setting the BAT-AEL. • It is not clear why the lower end of the range should be 7 mg/Nm^3. <u>Hydrogen chloride</u> • Of the 41 plants treating WBLW that participated in the data collection, 14 provided HCl concentration values, from 16 points of emission. The reported monitoring standard is EN 1911 in 4 cases, and VDI 3496 in one case (measurement of nitrogen compounds). • Plant 06 has a capacity that is below the IED threshold. • Plant 140 reported concentration values for 2013 (several measurements per working day – average 11 mg/Nm^3), with no indication of the standard or method used. This plant is equipped with a wet scrubber only. • Plant 217 reported additional data for 2013 at 11 mg/Nm^3, although this plant also shows that 3 mg/Nm^3 is achievable (2011 data). • Plant 471 did not report the use of an abatement technique for emissions to air. • Plant 401-404, which is equipped with a basic scrubber, acid scrubber, and thermal oxidation, reported a maximum concentration value of 4.8 mg/Nm^3. • All the other reported HCl concentration values are lower than 5 mg/Nm^3.

	Ammonia • It is not clear why the upper end of the BAT-AEL range should be set at 10 mg/Nm^3. • Of the 41 plants treating WBLW that participated in the data collection, 10 reported NH_3 concentration values in emissions to air, some of them having more than one point of release. The highest reported value (around 30 mg/Nm^3) was reported by Plant 461 carrying out drying of sludge, which is a very specific process, and from an emission point with no abatement technique. The concentration value reported by Plant 322 (i.e. 20 mg/Nm^3) is an estimation based on measurements performed with a Drägger device; it is reported that this concentration value maybe lower. All the other reported concentration values are below 1.5 mg/Nm^3. • As for the lower end of the range, Plant 550 reported 0 mg/Nm^3 (below the limit of detection), with measurements done by in-house methods, and Plant 317 reported 0.3 mg/Nm^3 measured by VDI 3496. • According to the collected data, it seems that NH_3 is not a generic parameter for this type of waste treatment although it can be emitted in some cases. Therefore it is proposed to keep the monitoring of NH_3 emissions, but not to set a BAT-AEL.
EIPPCB proposal	• To ensure consistency in the document, with regards to the use of the parameter for volatile organic compounds. • To change the averaging period to average over the sampling period. • To keep TVOC as the parameter to be monitored. • To increase the upper end BAT-AEL range for TVOC up to 45 mg/Nm^3 when the load is lower than 0.5 kg/h.. • To change the upper end BAT-AEL range for HCl to 5 mg/Nm^3, expressed as an average over the sampling period. • To remove the BAT-AEL range for NH_3, but to keep the monitoring of this parameter. • To add a footnote in the table mentioning that the BAT-AELs apply only if the substance is identified as relevant in the waste gas • To add the similar footnote in BAT 4.

1.13.6.4 BAT-AELs for emissions to water

Summary of comments	See comments related to BAT-AELs for emissions to water (Tables 6.3 and 6.4 in D1)
EIPPCB assessment	Of the 41 plants treating WBLW that participated in the data collection, 12 reported discharging directly to the environment. Plants 140 and 156 carry out the treatment of inorganics and the treatment of organics in two separate lines. Information and data have been provided for the outlet of each of these treatment processes, which are discharged to the environment at the same emission point. These data and information were useful to better understand the performance of each process; however, the assessment of the performance of the plant as a whole is based on concentration values at the point of discharge. Additionally, it should be noted that, for all the parameters below, the averaging period is proposed to be changed from monthly average in D1 to daily average in the case of continuous discharge, and in the case of batch discharge as an average value over the release duration taken as a flow-proportional composite sample, or grab sample taken before discharge. The assessment below takes these changes into account. <u>COD/TOC (direct discharge)</u> • Of the 12 plants WBLW plants discharging directly to the environment, 5 plants provided COD concentration values (of which one also provided TOC), and 8 TOC concentration values. Eight plants treat inorganics which are by nature poorly biodegradable. When information was provided, this is confirmed by the BOD_5/COD ratio ranging from 0.01 to 0.05 in five cases (for Plant 449 this ratio is around 0.5). The reported sampling method is mainly 24-hour flow-proportional composite sampling, with a short-term average. When indicated, the standard used is EN 1484 for TOC, and NEN 6633 (NL) or DS 217 (DK) for COD. • The highest COD concentration values (above 300 mg/l) were reported by three plants (Plants 90, 393 and 392), equipped with nitrification/denitrification and biological treatment techniques; this seems to confirm the competition between abatement of biodegradable organic compounds and of nitrogen compounds. • The highest TOC concentration values (above 100 mg/l) were reported by plants (fitted with a biological treatment step) that generally achieve an abatement efficiency of around 95 % or more (e.g. Plants 140, 423). • It is noted that the influent may have a very high content of COD/TOC, and that the reported concentration values in the effluent sometimes show a high variability (e.g. Plant 192). It is relevant to consider this when setting the BAT-AELs, when a high abatement efficiency is achieved (above 95 %). • Because preliminary steps such as emulsion breaking or evapo-condensation have by nature a high organic compounds abatement efficiency, it is proposed not to take them into account for the calculation of the TOC/COD abatement efficiency. <u>TSS (direct discharge)</u> • Of the 12 plants directly discharging to the environment, 9 provided TSS concentration values. The reported sampling method is mainly 24-hour flow-proportional composite sampling, with a short-term average. When indicated, the standards used are EN 872, DIN 3840, IRSA 2090, NEN 6621, and NF T 90-105 • In several cases, the reported TSS concentration values show a high variability (e.g. Plants 144, 192, 392, 393). However, the 97th percentile of the values (or the majority of the sample concentration values) are lower than 60 mg/l for plants equipped with abatement techniques that are considered BAT (e.g. filtration, sedimentation, flocculation). <u>HOI/THC (direct and indirect discharge)</u> • Of the 41 plants treating WBLW, 18 reported THC concentration values, and 7 reported HOI concentration values. The reported sampling method is mainly 24-hour flow-proportional composite sampling, with a short-term average. When indicated,

the standards used are ÖRNOM 6608, IRSA 5160, NF T 90-114 for THC, and EN 9377 for HOI.

- Regarding THC, the highest concentration values were reported by Plants 04 and 192 treating mainly inorganics, which do not report being equipped with techniques to abate hydrocarbons, such as oil separation or centrifugation. Plant 217 reported maximum concentration values decreasing from 13 mg/l in 2010 to around 5 mg/l in 2012, and also reported HOI concentration values below 5 mg/l in 2014 and 2015. Plant 156 is equipped with appropriate abatement techniques and reported a maximum concentration value of 6 mg/l in 2012, with the 97th percentile at 3 mg/l.
- As for HOI, the highest (and highly variable) concentration values were reported by Plants 421 and 423, which treat drilling muds. Plant 153 reported a maximum concentration value of 18 mg/l in 2010, decreasing to 2 mg/l in 2012, and with the 97th percentile below 5.5 mg/l. Plant 215 reported a maximum concentration value of 17 mg/l in 2015, with a median (17 measurements) below 5 mg/l. In most cases, the reported THC and HOI concentration values are lower than 10 mg/l.

<u>Nitrogen compounds (direct discharge)</u>

- Of the 12 plants directly discharging to the environment, 9 plants, all equipped with biological treatment, reported concentration values for nitrogen compounds (expressed as Total N, TKN, NH_3-N and NO_2/NO_3). The reported sampling method is 24-hour flow-proportional composite sampling in five cases, and grab sampling in three. Standards used are mainly EN 13395 for Total N, different national standards for TKN, EN 11732, ISRA 4030, DS 241 for NH_3-N, and EN 13395 and national standards for NO_2/NO_3. It should be noted that, of the 17 plants that reported treating acids (among other types of waste), only 2 provided information on nitrogen compounds emissions to water. Total N, TKN, NH_3-N and NO_2/NO_3 are obviously not equivalent.
    - Total N: Four plants (of which two also reported NH_3-N, two also TKN, and one also NO_2/NO_3). Three of these plants are equipped with a nitrification/denitrification step. The highest concentration values were reported by Plant 392 and Plant 393 which treat landfill leachate. For these three plants, the abatement efficiency ranges were 75–90 %.
    - TKN: Three plants (of which two also reported Total N, one also NH_3-N, and one also NO_2/NO_3). The highest concentration value was reported by Plant 140 (194 mg/l), with the 97th percentile around 120 mg/l. This plant also reported concentration values for NO_2/NO_3 at a maximum of 35 mg/l, corresponding to a maximum TKN concentration value of around 90 mg/l. The additional information provided in 2016 shows a very high content of nitrogen compounds in the waste input, especially the inorganics (up to 2 g/l for Total N, TKN and NH_3-N, and up to 8.8 g/l for NO_2/NO_3), and salinity ranging 0.5–1 % for organics, and 3–5 % for inorganics. According to the information provided, the abatement efficiency for TKN can be estimated to be around 90 %.
    - NH_3-N: Six plants (of which two also reported Total N, one also TKN, and two also NO_2/NO_3). The highest concentration value was reported by Plant 156 (335 mg/l as a maximum), with the 97th percentile at 200 mg/l. It is not clear how the reported concentration values fit with the limit value of the permit, expressed as a daily load. Plant 426, which treats waste water from offshore drilling, reported a concentration value of 90 mg/l as a maximum. Plant 449, which indicates a salt content of 25g/l in the waste input, reported a NH_3-N concentration value of around 18 mg/l as a maximum.
    - NO_2/NO_3: Four plants (of which one also reported Total N, two also NH_3-N, and two also TKN). The highest concentration value (around 35 mg/l) was reported by Plant 140 (see TKN above).
- Based on plants that reported Total N concentration values and which are equipped with appropriate techniques, a concentration level of 60 mg/l is achievable.
- Regarding Total N emissions from plants treating nitric acid, no concentration values and no information on abatement efficiency were provided by plants discharging directly to the environment. One plant (Plant 91) treating nitric acid and discharging to a sewer provided a Total N concentration value of around 160 mg/l, although without any information to allow the calculation of the abatement efficiency. According to information provided by some plants discharging directly to the

environment (but not treating nitric acid), a Total N abatement efficiency of between 75 % and 90 % is achievable. It is assumed that this level of efficiency is also achievable by a plant treating nitric acid, thus allowing plants with a minimum abatement efficiency of 90% to be exempt from the BAT-AEL.

- Although the data collection did not allow the correlation of a high chloride content with the applicability of nitrification, this correlation is clearly identified in the CWW BAT conclusions, and there is no reason that this would be different for physico-chemical and/or biological treatment of water-based liquid waste.

Total P (direct discharge)

- Of the 12 plants directly discharging to the environment, 8 plants reported Total P concentration values. The reported sampling method is 24-hour flow-proportional composite sampling in six cases (mainly short-term average), and grab sampling in two cases. Standards used are EN 6878, EN 15681, DS 292, and ISRA 3020.
- The highest concentration value was reported by Plant 192, with a high variability, and a 97th percentile range of 5–9 mg/l. It is not clear why the Total P concentration value reported by Plant 423 is high (up to 36 mg/l), since this plant is equipped with chemical precipitation which is, in principle, appropriate for abating phosphorus (no information on the waste input content (drilling muds) was provided). Plant 140 reported a maximum concentration value of around 10 mg/l, with the 97th percentile around 6–7 mg/l.
- All of the other reported Total P concentration values (of which two plants are equipped with chemical precipitation) are lower than 5 mg/l.

Phenol index (direct discharge)

- Of the 12 plants directly discharging to the environment, 6 plants reported phenol concentration values. The reported sampling method is 24-hour flow-proportional composite sampling for all plants but one (grab sampling). The reported standards used are ISRA 5070, T 90-204, and DS 281.
- The highest concentration values were reported by Plants 156 and 140 (additional information provided in 2015) apparently due to very high peaks. For Plant 156, the 97th percentile range was 0.3–0.5 mg/l in 2015. For Plant 140, these peaks come from treatment of inorganics, the discharge of which is added to that from the treatment of organics according to the information provided. The phenol concentration values reported for the reference period (2010–2012) show that a concentration level below 0.3 mg/l is achievable by Plant 140, and that the 97th percentile of concentration values reported by Plant 156 is around 0.3 mg/l. Plant 144 reported highly variable concentration values, with the 97th percentile below 0.4 mg/l.
- All of the other reported phenol concentration values are lower than 0.3 mg/l.
- In the questionnaire, phenols were defined as "*the sum of concentrations of phenolic compounds, expressed as phenol concentration*", which is the definition of phenol index in EN 6439. In EN 14402, it is indicated that phenol index is an analytical convention that represents a group of aromatic compounds which form coloured condensation products under specific reaction conditions. It is not clear why it would be preferable to monitor phenol rather than phenol index.

Metals (direct and indirect discharge)

- When reported, the monitoring standard is mainly EN 11885, although also other standards such as EN 17294 were reported.
- Arsenic (As): Of the 41 plants treating WBLW, 26 reported As concentration values. The highest concentration value, reported by Plant 154, results from two high values measured in 2015 (around 0.3 mg/l), whereas the 97th percentile is 0.05 mg/l. For all of the other cases, the maximum reported As concentration values are equal to or lower than 0.1 mg/l.
- Cadmium (Cd): Of the 41 plants treating WBLW, 34 reported Cd concentration values.
    - Five plants, all equipped with appropriate techniques to abate metals (chemical precipitation), reported Cd concentration values above 0.1 mg/l (Plants 140, 144, 156, 192, and 550). The variability of these concentration values is high, with the 97th percentile below 0.1 mg/l for all plants but Plant 192 in 2010. In 2011 and 2012, Plant 192 reported maximum concentration values below 0.1 mg/l, which shows that this level is achievable.

	○ All of the other plants reported maximum Cd concentration values lower than 0.1 mg/l. • Chromium (Cr): Of the 41 plants treating WBLW, 40 reported Cr concentration values. ○ Nine plants reported maximum Cr concentration values above 0.3 mg/l (Plants 144, 149, 153, 154, 156, 192, 322, 347, and 401). Of these plants, three (Plants 153, 194, and 322) did not report being equipped with chemical precipitation. ○ According to the information provided, Plant 347 is discharging in an external physico-chemical water-based liquid waste treatment plant. ○ As is the case for cadmium, the highest concentration value was reported for 2010 by Plant 192. In 2011 and 2012, the maximum reported concentration value is 0.5 mg/l, with the 97th percentile around 0.3 mg/l. ○ The concentration value reported by Plant 401 is expressed in mg/kg, and it is not clear whether and how this should be considered as emissions to water. ○ Plants 140, 144, 154, and 156, all equipped with an appropriate technique to abate metals (chemical precipitation), reported highly variable concentration values, with a 97th percentile below 0.3 mg/l. ○ All the other plants reported maximum Cr concentration values lower than 0.3 mg/l. • Nickel (Ni): Of the 41 plants treating WBLW, 35 reported Ni concentration values. ○ Eight plants reported maximum Ni concentration values above 1 mg/l (Plants 91, 140, 144, 153, 156, 192, 194, and550). Of these plants, three (Plants 140, 153, and 194) did not report being equipped with chemical precipitation. ○ Plant 156 reported highly variable Ni concentration values, with the 97th percentile around 2 mg/l. It should be noted that this plant carries out the treatment of inorganics and the treatment of organics in two separate lines. The effluent is released after treatment at the same point of discharge. The Ni concentration values from the treatment of inorganics is reported to be around 10 times higher than for the treatment of organics. It should be noted that the maximum reported TSS concentration values coming from the treatment of inorganics is up to 1264 mg/l (2015). ○ Plant 91 reported Ni concentration values for 2012 of 1.5 mg/l, and discharging to an external waste water treatment plant. ○ Plant 550 reported highly variable concentration values, ranging from < 0.3 mg/l to 5 mg/l, and discharging to an external waste water treatment plant. According to the information provided, the waste input (acid) may contain up to 36 mg/l Ni. ○ Plant 192 reported highly variable Ni concentration values, with the 97th percentile around 1 mg/l in 2011 and 2012. ○ Plant 144, equipped with an appropriate technique to abate metals (chemical precipitation), reported highly variable concentration values, with a 97th percentile below 1 mg/l. ○ All the other plants reported maximum Ni concentration values lower than 1 mg/l. • Lead (Pb): Of the 41 plants treating WBLW, 35 reported Pb concentration values. ○ Four plants reported Pb concentration values above 0.3 mg/l (Plants 156, 192, 486, and 550). One plant (Plant 556) did not report being equipped with chemical precipitation. ○ Plants 156, 192 and 486 reported variable concentration values: for Plant 156, the 97th percentile is below 0.3 mg/l; for Plant 486, three out of 36 Pb concentration values are above 0.3 mg/l); for Plant 192, the maximum reported concentration values were equal to or below 0.3 mg/l in 2010 and 2011. ○ All the other plants reported maximum Pb concentration values lower than 0.3 mg/l. • Copper (Cu): Of the 41 plants treating WBLW, 35 reported Cu concentration values. ○ ○ Six plants reported maximum Cu concentration values above 0.5 mg/l (Plants 144, 156, 192, 347, 401, and 550). All are equipped with an appropriate technique to abate metals.

	○ Plant 550 reported highly variable concentration values, ranging from < 0.2 mg/l to 5 mg/l, and discharging to an external waste water treatment plant. According to the information provided, the waste input may contain up to 96 mg/l Cu. ○ Plant 156, similarly to Ni, reported significantly higher Cu concentration values coming from the treatment of inorganics (up to 7 mg/l in 2014) than from the treatment of organics (up to 0.8 mg/l in 2014). It should be noted that the maximum reported TSS concentration values coming from the treatment of inorganics was up to 525 mg/l in 2014. ○ Plant 347 reported discharging to an external physico-chemical water-based liquid waste treatment plant. ○ The concentration value reported by Plant 401 is expressed in mg/kg, and it is not clear whether and how this should be considered as the emissions to water. ○ Plants 144 and 192 reported highly variable Cu concentration values, with the 97th percentile below 0.5 mg/l. ○ All the other plants reported maximum Cu concentration values equal to or lower than 0.5 mg/l • <u>Zinc (Zn):</u> Of the 41 plants treating WBLW, 36 reported Zn concentration values. ○ Five plants reported maximum Zn concentration values above 2 mg/l (Plants 144, 156, 192, 194, and 550). ○ Of these plants, one (Plant 194) did not reported being equipped with techniques to abate dissolved metals. ○ As for Ni and Cu, Plant 156 reported Zn concentration values significantly higher coming from the treatment of inorganics (up to 16 mg/l in 2015) than from the treatment of organics (up to 2 mg/l in 2015). It should be noted that the maximum reported TSS concentration values coming from the treatment of inorganics was up to 1264 mg/l in 2015. The maximum Zn concentration values reported in the reference period (2010 to 2012) are highly variable, with the 97th percentile ranging from 4 mg/l to 6.5 mg/l for direct discharge. ○ Plant 550 reported highly variable Zn concentration values, ranging from < 0.01 mg/l to 10 mg/l, and discharging to an external waste water treatment plant. According to the information provided, the waste input may contain up to 4.4 g/l of Cu. ○ Plant 192 reported highly variable Zn concentration values, with the 97th percentile up to 4 mg/l, and below 2 mg/l in 2011 and 2012. ○ Plant 14 reported highly variable Zn concentration values, with the 97th percentile below 2 mg/l. ○ All the other plants reported maximum Zn concentration values equal to or lower than 2 mg/l. • <u>Mercury (Hg):</u> Of the 41 plants treating WBLW, 29 reported Hg concentration values. ○ Eight plants reported maximum Hg concentration values above 0.01 mg/l (Plants 144, 154, 156, 215, 322, 471, 473, and 569). Of these plants, two (Plants 156 and 473) did not report being equipped with techniques to abate dissolved metals, or with activated carbon. ○ Plant 471 reported Hg concentration values as being lower than 0.05 mg/l, and Plant 215 as being lower than 0.025 mg/l. ○ Plant 569 reported Hg concentration values ranging from 0.01 mg/l in 2010 to 0.04 mg/l in 2011 and 2012 (24-hour flow-proportional composite sample, long-term average). ○ Plants 322 and 154 reported Hg concentration values either mostly at 0.02 mg/l (all but one of the six concentration values reported by Plant 322), or with a 97th percentile at 0.02 mg/l (Plant 154). ○ All the other plants reported maximum Hg concentration values equal to or lower than 0.01 mg/l. • <u>Summary for metal emissions</u> ○ The concentration values reported by plants carrying out physico-chemical and/or biological treatment of water-based liquid waste are generally higher than those reported by the other waste treatment sectors. ○ In many cases, the highly variable concentration values are reported with a 97th percentile significantly lower than the maximum value.

	○ Some plants indirectly discharging to the environment reported relatively high metals concentration values. In some cases, an indication that the effluent is dealt with by the downstream facility was provided. It is therefore relevant to take these cases into account when setting the BAT-AELs (e.g. in a footnote). Additional parameters • Hexavalent chromium (Cr(VI)): Of the 41 plants treating WBLW, 19 provided Cr(VI) concentration values. An emission value associated with the use of BAT is set in the current BAT conclusions. It is therefore coherent to keep this parameter. ○ Two plants reported Cr(VI) concentration values above 0.1 mg/l. ○ Plant 468 reported concentration values (24-hour flow-proportional composite sampling, daily average) as being < 0.5 mg/l. This seems to be the emission limit value set in the permit. ○ Plant 217 reported concentration values (composite sample taken for each batch) ranges of 0.01–0.14 mg/l in 2014 and 0.01–0.05 mg/l in 2015. ○ All the other plants reported maximum Cr(VI) concentration values equal to or lower than 0.1 mg/l. • Cyanides (CN^-): Of the 41 plants treating WBLW, 18 provided CN^- concentration values. These plants carry out chemical oxidation that is adapted to treat CN^-, and some of them use ion exchange which might abate CN^-. It is relevant to set a BAT-AEL for CN^- emissions to water. Four plants reported CN^- concentration values above 0.02 mg/l (Plants 06, 144, 192, and 550). ○ Plant 06 reported concentration values ranging from 0.01 mg/l to 6 mg/l, but mainly around 3 mg/l. This plant is not equipped with chemical oxidation, but with the ion exchange technique. It is indicated that CN^- is one of the parameters that needs to be controlled before release into the downstream facility. This may mean that this downstream facility is able to treat CN^- to a certain extent. ○ Plants 144 and 192 reported highly variable CN^- concentration values, both with the 97th percentile at 0.1 mg/l. ○ Plant 550 reported very highly variable CN- concentration values, ranging from < 0.2 mg/l to 9 mg/l. This plant is not equipped with chemical oxidation or with the ion exchange technique. ○ All the other plants reported CN^- concentration value lower than 0.2 mg/l. As for the lower end of the range, Plant 04, which is equipped with chemical oxidation, reported a CN^- concentration value of 0.02 mg/l. • Adsorbable organically bound halogens (AOX): Of the 41 plants treating WBLW, 15 provided AOX concentration values, most of them carrying out biological treatments and/or chemical oxidation which may be able to treat such influent. It is relevant to set a BAT-AEL for AOX emissions to water. Five plants reported AOX concentration values above 1 mg/1 (Plants 03, 140, 151, 194, 216, 217, and 468). ○ Plant 03 reported AOX concentration values as a yearly average of daily samples, at around 1.3 mg/l. ○ Plant 140 reported variable AOX concentration values for 2011 only (monthly average of 24-hour flow-proportional composite samples), ranging from 0.3 mg/l to 3.3 mg/l, and with no indication of the 97th percentile. ○ Of the 15 AOX concentration values reported by Plant 151, only one is above 1 mg/l. ○ Plant 194 reported AOX concentration values up to 1.3 mg/l, with the 97th percentile at 1 mg/l. ○ Of the 12 AOX concentration values reported by Plant 216, only one is above 1 mg/l. ○ Plant 217 reported very high AOX concentration values in 2010, 2011 and 2012 (up to 540 mg/l), whilst the concentration value was below 1 mg/l (0.5 mg/l as a maximum) in 2014 and 2015. It is not clear how this should be interpreted. ○ Plant 468 reported AOX concentration values for 2014 and 2015 as being < 15 mg/l. ○ All other plants reported AOX concentration values lower than 1 mg/l. As for the lower end of the range, the AOX concentrations reported, e.g. by Plant 154, which has a biological treatment step, show that 0.2 mg/l is

	achievable as a minimum. • Manganese (Mn) and BTEX: The situation regarding monitoring of these parameters by the 41 plants of the data collection carrying out physico-chemical and/or biological treatment of water-based liquid waste is the following: o 11 provided Mn concentration values; o 6 provided BTEX concentration values. Based on the information provided, it seems that these parameters might not be considered generic for this sector. It is proposed at this stage to ask for information on their monitoring, but not to set BAT-AELs. • As for thallium (Tl), antimony (Sb), PAHs, PCDD/F, and PCB, concentration values were reported by three plants or less. These parameters do not seem to be key issues for this sector.
EIPPCB proposal	• To set BAT-AEL ranges specific to the physico-chemical treatment of water-based liquid waste as follows: o COD 30–300 mg/l and TOC 10–100 mg/l. Introduce a footnote by which the BAT-AEL may not apply when the abatement efficiency is > 95 % and when the waste input concentration of COD is > 6 g/l and of TOC is > 2 g/l. o TSS: 5–60 mg/l. o HOI: 0.5–10 mg/l. o Total N: 10–60 mg/l. Introduce a footnote by which the BAT-AEL only applies when biological treatment is used, and does not apply when nitric acid is the main waste input provided that the abatement efficiency is ≥ 90 %. o Total P: 1–5 mg/l. o Phenol index: 0.05–3 mg/l. o CN^-: 0.02–0.2 mg/l. o AOX: 0.2–1 mg/l. o As: 0.01–0.1 mg/l. o Cd: 0.01–0.1 mg/l. o Cu: 0.05–0.5 mg/l. o Cr: 0.01–0.3 mg/l. o Cr(VI): 0.01–0.1 mg/l. o Hg: 1–10 µg/l. o Ni: 0.05–1 mg/l. o Pb: 0.05–3 mg/l. o Zn: 0.1–2 mg/l. • To introduce a footnote by which the BAT-AELs for HOI, CN^-, AOX, and metals and metalloids may not apply in the case of an indirect discharge if the downstream waste water treatment plant adequately treats the pollutants concerned. • To add monitoring of Mn and BTEX for emissions to water from physico-chemical and/or biological treatment of water-based liquid waste in BAT 3.

2 ITEMS CONSIDERED TO BE LARGELY AGREED AND NOT REQUIRING DISCUSSION AT THE FINAL WT TWG MEETING

2.1 General issues

2.1.1 Data assessment

Location in D1	Whole Chapter 6
Current text in D1	Not applicable
Summary of comments	• (AT 21, DK 106, ES_A 17, SE 201, FEAD 76, ECN 95, MWE 116) Lack of transparency in the way BAT-AELs have been derived, especially when few data were provided via the questionnaires, and (BE 8; BE 9) in the way the selection of plants for establishing BAT-AELs has been done. (DE 97). A data assessment workshop should be organised. • (DE 38) Clarify how reported data below detection or quantification limit have been taken into account. • (EURITS 12, BE 14) Lack of transparency in the way techniques have been qualified or not as BAT. • (CEWEP 6, SE 55, MWE 115) As for emissions to air, BAT-AELs should only apply to channelled emissions.
EIPPCB assessment	• A webinar was organised in September 2016 in order to: o present the data sets related to emissions to air and emissions to water; and o discuss the representativeness and robustness of the reported data and information (including the abatement techniques used), and their usefulness for deriving BAT conclusions and BAT-AE(P)Ls. The resulting assessment is presented in this background paper. • When information was available, data below the detection or quantification limit are presented in tables with the sign "<" before the figure. These data have been plotted in the graph in order to include the information for the assessment. • As for emissions to air, it is indeed needed to clarify in the BAT statement that both collection and treatment of emissions to air are BAT. This is done by referencing BAT 10d (see the assessment related to BAT 10) in each relevant BAT statement
EIPPCB proposal	• See the rest of the documents for specific proposals.

2.1.2 Volatile organic compounds emissions to air

Location in D1	Whole Chapter 6
Current text in D1	Not applicable
Summary of comments	• (EURITS 75, FEAD 141) Clarification is needed for VOC and TVOC parameters, which are confusingly used throughout the document, and should be differentiated with regards to flow rates and/or hazardousness of VOC emitted (see also comment HWE 82 in Section 0). • (EURITS 75) A range of 20–110 mg/Nm^3 could be proposed for plants where the flow exceeds 2 kg/h with footnotes specifying that: o the lower end of the range is from thermal oxidation; o specific levels may be needed for VOC species with high toxicity and/or which cause photochemical reactions leading to ozone increases; o if the facility is part of an integrated hazardous waste treatment site with a hazardous waste incinerator, then VOCs can be captured and incinerated in the incinerator.
EIPPCB assessment	• Data on volatile organic compounds emissions have been reported in D1 as they were provided via the questionnaires (i.e. VOCs, TVOC or even TOC). The measurement standard used, when reported, is in most cases EN 12619 (or in some cases EN 13256 which was superseded by EN 12619 in 2013) and the reported monitoring method was mainly FID, for which filtration of the sample is necessary. With this standard and this method, total gaseous organic carbon is determined. • Only very limited data were collected on the monitoring of specific VOCs, which do not allow the specification of which compounds should be monitored, for which waste treatment process and with which frequency. • The assessment of emissions of organic compounds to air is detailed for each combination process/waste stream in this background paper.
EIPPCB proposal	• To set BAT-AELs for emissions to air of volatile organic compounds expressed as TVOC.

2.1.3 Other issues

Location in D1	Whole Chapter 6
Current text in D1	Not applicable
Summary of comments	• (AT 24) Add a new chapter dedicated to mechanical treatment of waste with calorific value and a new BAT related to the characteristics of the waste fuel. • (ES_A 92) The document should consider an adaptation period for existing installations of 6 years after publication of the BAT conclusions. • (ES_A 110) Distinction should be made in the proposed BATs between hazardous and non-hazardous waste. • (BE 3) The European waste management hierarchy should be mentioned in the introductory chapter of the WT BREF and should be repeated in the BAT conclusions consequentially. • (EURELECTRIC 3) Improve consistency within WT BREF and with LCP BREF and WI BREF between "treatment of slags and bottom ash" (included in the list of activities outside the scope of the BAT conclusions) and fly ash/other residues from flue-gas desulphurisation. • (EURITS 13) A cross-check should be made between the existing BATC and the

	proposed BATC to make sure no important information has been lost. • (FEAD 80) BAT-AELs should define only the upper end of the emission value range. • (FEAD 100) Cost-effectiveness must be considered in the general conditions to define BAT conclusions. • (SE 198) The link between the activities listed in the scope and each BAT conclusion and BAT-AEL is not clear. The BAT conclusions and BAT-AELs should have the same format throughout Chapter 6.
EIPPCB assessment	<u>Waste fuel</u> • The output quality, and especially the definition of end-of-waste criteria, product specifications, by-products criteria, and the definition of acceptance criteria in the downstream utilisation, are excluded from the WT BREF and BATC Scope (see KoM conclusion 1.4-a). However, the quality management is part of the overall waste stream management. See the rest of the background paper for further details. <u>Implementation period</u> • The implementation period of the BATC is beyond the competence of the TWG. <u>Hazardous and non-hazardous waste</u> • As per conclusion 1.3-j of the KoM conclusions, the determination of whether a waste is hazardous or not is outside the WT BREF and BATC Scope. However, specific BAT are proposed in some cases where hazardous waste might be treated (e.g. regeneration of spent solvents, decontamination of equipment containing POPs). <u>Waste hierarchy</u> • Indeed waste hierarchy is an important issue in the waste treatment sector. The discussion at the kick-off meeting highlighted that, despite this importance, deriving a BAT conclusion on this topic might not be appropriate. Moreover, the BAT conclusions do not aim to repeat Directive 2008/98/EC. However, a summary could be included in a general chapter of the BREF. <u>Consistency regarding bottom and fly ashes</u> • It is not clear how the consistency needs to be improved. <u>Cross-check with existing BATC</u> • The statement does not make a concrete proposal for rewording. <u>Only upper ranges of the BAT-AELs</u> • Article 3.3.1 of COM Decision 2012/119/EU (BREF Guidance) states: "an individual BAT conclusion with BAT-AELs will contain a numerical range of emission levels". BAT-AELs have been proposed as numerical ranges and therefore have been proposed accordingly. <u>Cost effectiveness</u> • The statement does not make a concrete proposal for rewording. <u>Format of the BAT conclusion</u> • The format of the BAT conclusion is standardised and consistent with recently adopted BAT conclusions. It is not clear what is meant by the same format throughout Chapter 6.
EIPPCB proposal	• To introduce information on waste hierarchy in a general chapter of the BREF.

2.2 Definitions

2.2.1 Definition of terms

Location in D1	DEFINITIONS Section 6 – page 877
Current text in D1	For the purposes of these BAT conclusions, the following **definitions** apply:

Term used	**Definition**
Continuous measurement	Measurement using an 'automated measuring system' permanently installed on site
Diffuse emissions	Non-channelled emissions (e.g. of dust, VOC) which can result from 'area' sources (e.g. tanks) or 'point' sources (e.g. pipe flanges)
Emission Factors	Numbers that can be multiplied by known data such as plant/process activity data or throughput data to estimate emissions
Existing plant	A plant that is not a new plant
Flaring	High-temperature oxidation to burn combustible compounds of waste gases from industrial operations with an open flame. Flaring is primarily used for burning off flammable gas for safety reasons or during non-routine operating conditions.
Fugitive emissions	Diffuse emissions from 'point' sources
Laboratory smalls	Laboratory chemicals in containers of a small capacity
Mechanical Biological Treatment' (MBT)	Treatment of solid waste combining mechanical treatment (e.g. shredding) with biological treatment such as aerobic or anaerobic treatment
New plant	A plant first permitted at the site of the installation following the publication of these BAT conclusions or a complete replacement of a plant following the publication of these BAT conclusions
Pasty waste	Non-pumpable waste (e.g. sludge)
Periodic measurement	Determination of a measure (particular quantity subject to measurement) at specified time intervals using manual or automated methods
Recovery	Recovery as defined in Article 3(15) of Directive 2008/98/EC
Re-refining	Treatments carried out to waste oil to be transformed to base oil
Regeneration	Treatments and processes mainly designed to make the treated equipment (e.g. activated carbon) or material (e.g. spent solvent) usable again
Residues	Materials generated by the activities covered by the scope of this document, as waste or by-products.
Sensitive receptor	Area which needs special protection, such as: - residential areas; - areas where human activities are carried out (e.g. schools, daycare centres, recreational areas, hospitals or nursing homes).
Treatment of waste with calorific value	Treatment of waste wood, waste oil, waste plastics, waste solvents, etc. to obtain a fuel or to allow a better recovery of its calorific value
Waste holder	Waste holder as defined in Article 3(6) of Directive 2008/98/EC
Waste input	The incoming waste to be treated in the waste treatment plant

Summary of comments	All definitions • (FR 143) Separate the different types of techniques and move those concerning the control of emission to Chapter 6.6. • (EEB 247, EEB 275) Replace throughout the document "plant" with "installation", which is clearly defined in the IED Art. 3(3). The WT scope in Annex I to the IED clearly refers to "installation", and not "plants". Additional definitions • (FR 151, DK 154, DK 163, FI 11, UK 220, SE 105, SE 147, MWE 123, CEWP 7, FR 202, EURITS 15) The following waste treatments and associated terms should be defined: o Aerobic and anaerobic treatments o Composting o Biological treatment o Biological treatment of water-based liquid waste o Fresh water o Mechanical treatment (as there may be confusion with mechanical pretreatment, e.g. in composting or AD) o Physico-chemical treatment o Mercury-containing equipment o Decontamination of equipment containing POPs. • (FR 150, CEWEP 7, SE 58, SE 142, SE 145, SE 146, SE 149) The following terms should be defined: o slag ashes and bottom ashes o installation o process o finishing techniques o certificate of cleanliness o plant. Indirect and direct discharge • (AT 10, BE 1, DK 103, FI 10, CEWEP 9, SE 182, PL 21, ECN 96, MWE 117) Direct and indirect discharges should be defined. One point of concern is whether discharges to "natural treatments" like wetlands are to be considered direct or indirect. Direct discharge should concern discharge that could have a direct impact on the recipient. Continuous measurement • (SE 13) Include continuous sampling for measurement purposes as it could be an alternative to continuous measurement in case of excessive costs. Channelled, diffuse and fugitive emissions • (DK 102 EEB 213, ECN 97, MWE 118) Diffuse emissions from "point" sources are contradicting terms. Diffuse and fugitive emissions are synonymous and the definitions from ROM should be used. • (SE 69, MWE 122) Channelled emissions should be defined. Laboratory smalls • (UK 218) The size of the containers should be identified. MBT • (EEB 214, AT 10, UK 219, SE 144, DE 188, FEAD 233, IT 35, ECN 98, MWE 119) It should be clarified that MBT treats mixed solid waste to avoid any confusion with biological treatments of source-separated biowaste. New plant • (DK 104, SE 43, ECN 99, MWE 120) The definition should be the same in all BREFs, and in line with Annex VI to the IED. It may be that one part of a facility is considered a new plant and another part is considered an existing plant. • (EEB 273) It should be clear that plants which are currently being built during the WT BREF review should comply with the "new" BAT standards.

	Pasty waste (AT 8, SE 148) The definition should be clarified. Regeneration • (EUCOPRO 2) Replace "usable again" with "usable for a similar purpose". Sensitive receptor • (DK 105, UK 221, SE 29, ECN 100) Workplaces are also sensitive receptors and the duration of exposure should be accounted for. • (FEAD 234) "Human activities" is too wide and should be specified. Treatment of waste with calorific value • (EUCOPRO 3) It should be mentioned that the aim of the treatment is to prepare waste fuel. • (MWE 121) Replace "Treatment of waste with calorific value" with "pre-treatment of waste for incineration and co-incineration". Introduce a definition of "pre-treatment of waste for incineration and co-incineration" which excludes biomass waste as defined in Article 3 (31)(b) of Directive 2010/75/EU.
EIPPCB assessment	All definitions • The first table contains all the terms used in the BAT conclusions and the second table defines the parameters used for monitoring. Flaring is not mentioned as a technique to reduce emissions to air and is therefore not listed in Section 6.6. This is consistent with the CWW BREF. • Installation means a stationary technical unit within which one or more activities listed in Annex I are carried out.. The use of the term "plant" is in line with other BAT conclusions (CWW, WBP) and a specific definition does not seem necessary. Additional definitions • Biological treatment and physico-chemical treatment are activities listed in Annex I to the IED and it is not the aim of the BAT conclusions to give an interpretation of the IED. • The terms "finishing technique" and "fresh water" no longer appear in the proposed BAT conclusions. • The term "installation" is defined in IED Article 3(3). • The terms "bottom ashes" and "slag ashes" are no longer used in the BAT conclusions. • The term "fly ash" is used in the BAT conclusions, and a definition may be needed. • The terms "process", "aerobic", "anaerobic" and "composting" are commonly used and it is not clear where clarification or disambiguation would be needed. • "Decontamination of equipment containing POPs" is used in the BAT conclusions but it is not clear what needs to be defined in this term. • "Mercury-containing equipment" is no longer used in the proposed BAT conclusions. • It is useful to define "water-based liquid waste" and "declaration of cleanliness". • The heading of Section 6.2 has been reworded to make clear that mechanical treatment does not include mechanical treatment combined with biological treatment (i.e. MBT or pretreatment). It is therefore not necessary to define "mechanical treatment". Indirect and direct discharge • It is indeed necessary to define "direct" and "indirect" discharge. Whether "wetlands" are further waste water treatment or not is an implementation issue to be addressed at the local level. • It is not clear why a connection is made between the mode of discharge and the impact on the receiving body. Continuous measurement • Continuous sampling is not mentioned in the proposed BAT conclusions and therefore a definition is not needed.

	Channelled, diffuse and fugitive emissions • The proposed definition for diffuse emissions is based on the definition in the BAT conclusions for the refining of oil and gas (REF). It does not seem necessary to change it. As for fugitive emissions, it is proposed to keep the definition given in the ROM REF. It is to be noted that diffuse and fugitive emissions are not synonymous. A definition for channelled emissions would indeed enhance clarity. Laboratory smalls • Further specification of the size of "small" containers could indeed be useful. MBT • It is indeed important to avoid any confusion between MBT and mechanical pretreatment prior to aerobic or anaerobic treatment. New plant • The definition is the same as for the most recent BREFs (CWW, WBP, etc.). It is not clear why it should be changed. Pasty waste • In the BAT conclusions, a clear distinction is made between the treatment of solid and pasty waste, and the treatment of water-based liquid waste. A definition for water-based liquid waste is proposed, and by default pasty waste is not liquid waste. A definition for pasty waste is therefore unnecessary Regeneration • The idea of similar usage is indeed missing in the definition. Sensitive receptor • The duration of human activities carried out in potentially sensitive areas given as examples in the definition could generally be considered to be prolonged periods. It is difficult to define a period of time above which this duration is prolonged or not. Workplaces could indeed also be added in the list of examples as it may be a significant part of the sensitive receptors. Treatment of waste with calorific value • It is not obvious how the proposed changes bring clarity or remove ambiguities. The aim of the BAT conclusions is not to give an interpretation of existing legislation as to the status of the waste treatment outputs.
EIPPCB proposal	• To complete and amend the definitions.

2.2.2 Definition of parameters

Location in D1	DEFINITIONS Section 6 – page 878
Current text in D1	For the purposes of these BAT conclusions, the following **definitions** of parameters apply:

Parameters	**Definition**
Arsenic	Arsenic, expressed as As, includes all inorganic and organic arsenic compounds, dissolved or bound to particles
Cadmium	Cadmium, expressed as Cd, includes all inorganic and organic cadmium compounds, dissolved or bound to particles
Chromium	Chromium, expressed as Cr, includes all inorganic and organic chromium compounds, dissolved or bound to particles
COD	Chemical oxygen demand. Amount of oxygen needed for the total oxidation of the organic matter to carbon dioxide. COD is an indicator for the mass concentration of organic compounds
Copper	Copper, expressed as Cu, includes all inorganic and organic copper compounds, dissolved or bound to particles
Hydrocarbon oil index (HOI)	The sum of compounds extractable with a hydrocarbon solvent (including long-chain or branched aliphatic, alicyclic, aromatic or alkyl-substituted aromatic hydrocarbons)
Lead	Lead, expressed as Pb, includes all inorganic and organic lead compounds, dissolved or bound to particles
Mercury	Mercury, expressed as Hg, includes all inorganic and organic mercury compounds, dissolved or bound to particles
Nickel	Nickel, expressed as Ni, includes all inorganic and organic nickel compounds, dissolved or bound to particles
PCBs	Polychlorinated biphenyls
Phenol index	The sum of phenolic compounds, expressed as phenol
TOC	Total organic carbon, expressed as C (in water), includes all organic compounds
Total N	Total nitrogen, expressed as N, includes free ammonia and ammonium nitrogen (NH_4–N), nitrite nitrogen (NO_2–N), nitrate nitrogen (NO_3–N) and organically bound nitrogen
Total P	Total phosphorus, expressed as P, includes all inorganic and organic phosphorus compounds, dissolved or bound to particles
Total suspended solids (TSS)	Mass concentration of all suspended solids (in water), measured via filtration through glass fibre filters and gravimetry
TVOC	Total volatile organic compounds as measured by a flame ionisation detector (FID) and expressed as total C (in air)
VOC	Volatile Organic Compound as defined in Article 3(45) of Directive 2010/75/EU
Zinc	Zinc, expressed as Zn, includes all inorganic and organic zinc compounds, dissolved or bound to particles

Summary of comments	All definitions • (AT 9) Complete definition of terms, parameters and acronyms (see glossary of the BREF). For instance, H_2S, NH_3, BOD_5, NMVOC or dust are not defined. • (EEB 333) POPs should be defined. COD • (AT 11) Add "chemical" before "oxidation". Mercury • (UK 222) This should include elemental mercury. PCB • (FR 149, SE 150) The definition should be more precise as to which molecules it covers. Phenol index • (SE 151) The definition needs to be clarified. TOC/TVOC/VOC • (EEB 215, DK 107, ECN 101) Include definitions for TOC (in air) and NMVOC and review definitions for TVOC and VOC. When possible, use the definitions of the ROM REF. • (EUCOPRO 4) It should be mentioned that TVOC includes methane. • (DE 195) It should be clearly defined which parameter is addressed in the BAT conclusions: VOC or TVOC.
EIPPCB assessment	All definitions • POPs are not defined as they are already listed in Regulation (EC) 850/2004. A reference to this regulation could however be useful. • The definitions of the BAT conclusions define only the terms used in the BAT conclusions, so there may be some difference with the Glossary which defines the terms of the entire BREF. That said, the definitions should define as many terms used in the BAT conclusions as needed. COD • The term "chemical" would indeed improve the definition. Mercury • Elementary mercury is indeed included in the definition. PCB • In the BAT conclusions, all types of PCBs are concerned. For the purposes of monitoring emissions to air (BAT 4) however, only dioxin-like PCBs are monitored as the existing monitoring standards specifically address this type of PCB. Therefore further clarity is needed in the second table of the definitions, where the monitoring parameters are defined. Phenol index • The definition should be more in line with the ROM REF definition. TOC/TVOC/VOC • TOC in air is not used in the BAT conclusions. • The definitions of TVOC and VOC are in line with the ROM REF definitions and other adopted BAT conclusions (CWW, NFM, WBP). • VOC is defined in Article 3(45) of Directive 2010/75/EU and refers to a type of pollutant. TVOC is a monitoring parameter which reflects the sum of all pollutants pertaining to this type. Considering the difference in nature between these two terms, it is more appropriate to define VOC in the first table of the definition. NMVOC is not used in the BAT conclusions. • Methane is clearly covered by the definition of Article 3(45) of Directive 2010/75/EU and it does not appear necessary to mention it explicitly.

EIPPCB proposal	• As for POPs, to refer to Regulation (EC) No 850/2004 in the list of acronyms. • To modify the definitions of COD, mercury and phenol index. • To further specify which PCBs are monitoring parameters. • To move the definition of VOC into the first table of the definitions. • To complete the table with the missing parameters to be defined.

2.3 Monitoring of diffuse VOC emissions

<table>
<tr><td>Location in D1</td><td>Section 6.1.1.3 – page 888 – BAT 5</td></tr>
<tr><td>Current text in D1</td><td>BAT 5. BAT is to monitor diffuse VOCs emissions to air from the regeneration of spent solvents and the solvent-using decontamination of equipment containing POPs at least once per year using one or a combination of the techniques given below.
<table>
<tr><th></th><th>Technique</th><th>Description</th></tr>
<tr><td>a</td><td>Measurement</td><td>Sniffing, optical gas imaging, solar occultation flux or differential adsorption. See descriptions in Section 6.6.1.</td></tr>
<tr><td>b</td><td>Emissions factors</td><td>Calculation of emissions based on emissions factors, periodically validated (e.g. once every two years) by measurements.</td></tr>
<tr><td>c</td><td>Solvent mass balance</td><td>Calculation of diffusion emissions using a mass balance considering the solvent input, channelled emissions to air, emissions to water, solvent in output, and process (e.g. distillation) residues.</td></tr>
</table></td></tr>
<tr><td>Summary of comments</td><td>• (CEFIC 12) This BAT conclusion only repeats European law and should be deleted.
• (FR 219, HWE 22) The BAT should apply to physico-chemical treatment of waste with calorific value involving fuel recovery.
• (ES_A 94, FEAD 88) Change the monitoring frequency from "at least once per year" to "once every three years". A yearly monitoring of the diffuse VOC emissions to air results in too high a frequency for operators to technically and economically be able to afford.
• (ES_A 20, FEAD 7) BAT 5 should be moved to Section 6.4 on physico-chemical treatments.</td></tr>
<tr><td>EIPPCB assessment</td><td>• As for the duplication of European law, the activities concerned by this BAT are not covered by Annex VII to the IED.
• Indeed, the BAT is relevant for the physico-chemical treatment of waste with calorific value, when solvent is treated.
• The BAT offers different possibilities for monitoring of diffuse VOC emissions, including calculations, and it is not clear why it is not technically or economically affordable to have a yearly frequency.
• It is true that BAT 5 concerns only physico-chemical treatments and could be moved to Section 6.4. However, for editorial reasons, it is preferable to maintain it with the other BAT conclusions related to monitoring.</td></tr>
<tr><td>EIPPCB proposal</td><td>• To complement the BAT statement.</td></tr>
</table>

2.4 Monitoring of odour emissions

Location in D1	Section 6.1.1.3 – pages 888-889 – BAT 6
Current text in D1	**BAT 6. BAT is to periodically monitor odour emissions from relevant sources in accordance with EN standards.** **Description** Emissions can be monitored by dynamic olfactometry according to EN 13725. **Applicability** The applicability is restricted to cases where odour nuisance can be expected or has been substantiated.
Summary of comments	• (DE 420) To have a BAT for the monitoring of odour is very much appreciated. • (EEB 231, CEWEP 93, SE 112) For the sake of clarity and simplification, BAT 6 and BAT 8 should be merged. • (ECN 260, FEAD 89) For the sake of clarity and simplification, BAT 6, BAT 8 and BAT 9 should be merged. • (ESRG 6) BAT 6 should be deleted because the monitoring requirements will be part of the odour management plan required in BAT 8. • (UK 238) In order to avoid repetition and to ensure consistency, delete BAT 6 and build into BAT 8. • EUCOPRO (16) Delete BAT 6 because BAT 8 is sufficient, or change the wording of BAT 6 to: *BAT is to define adapted monitoring for odour emissions according existing standards or equivalent methodologies that ensure the provision of data of an equivalent scientific quality*, and adapt the applicability because the term "expected" might be subject to various interpretations. • (BE 34, IT 41) The minimum monitoring periodicity should be defined (every 6 months is proposed). • (AT 43) Clarify in the statement that BAT 6 is about diffuse emissions. • (DE 203, BE 34) "Relevant sources" should be defined. <u>BAT-AEL</u> • (IE 39) Provision to set a BAT-AEL for odour emissions from relevant sources should be included because the value of monitoring without a BAT-AEL may be limited. <u>Applicability</u> • (AT 43) Remove "can be expected" from the applicability restriction. • (CEWEP 93, BE 35) Add "or/and" before "has been substantiated". • (EURITS 31) Amend the text: the applicability is restricted to cases where an odour nuisance in residential or other sensitive areas has been substantiated. • (HWE 23) Amend the text: the applicability is restricted to cases where an odour nuisance in residential or other sensitive areas has been substantiated and where all other corrective measures have failed. • (CEFIC 13) Amend the text: the applicability is restricted to cases where odour nuisance can be expected, or has been substantiated, or no active measures for odour prevention are taken. <u>Standard</u> • (MWE 131, EUCOPRO 16) The standard to be used for measuring odour emissions should be extended to other standards besides EN 13725 because it is very expensive.
EIPPCB assessment	• BAT 8 and BAT 9 relate to the prevention and/or reduction of odour emissions whilst BAT 6 is about monitoring. As for channelled emissions to air and for emissions to water, odour monitoring is dealt with separately. • The minimum monitoring periodicity would depend on the expected and/or substantiated nuisance, which is not possible to determine *a priori*. This frequency is

	to be defined in the framework of the odour management plan (see BAT 8). • Odour emissions may be channelled or diffuse. • Relevant sources are potential sources of odorous emissions which would be identified thanks to the odour management plan required in BAT 8. • • Odour nuisance can be expected and/or substantiated only when receptors are present, e.g. in residential areas. • When measures to prevent odour emissions are taken and are effective, odour nuisance should no longer be expected or substantiated. • Concerning the standard, the proposed wording "can be monitored" gives useful guidance about the standard to be used preferably whilst keeping some degree of flexibility. • Concerning the BAT-AEL for odour emissions, see the assessment related to table 6.9.
EIPPCB proposal	• To make the wording of the applicability restriction consistent with that of BAT 8.

2.5 Monitoring of water, energy, and raw material consumption

Location in D1	Section 6.1.1.3 – page 889 – BAT 7
Current text in D1	**BAT 7. BAT is to monitor water consumption, energy consumption, raw material consumption, sludge generation, residue generation, and the amount of waste water generated, all broken down by process, with a frequency of at least once per year, and considering any significant changes in plant operation.**
Summary of comments	General comments • (EEB 159) Add BAT-AEPLs expressed e.g. in consumption (of raw material / energy / water) per mass of waste input (e.g. in kg/t, MJ/t). With regard to waste generation, BAT-AEPLs could be expressed in mass of residues generated per mass of waste input. • (EEB 278) Add a new BAT for periodical monitoring of the presence of any substance of very high concern identified in the REACH candidate list. • (CEFIC 14) Delete BAT 7 because it is redundant with BAT 1 that includes mass and energy flow management. Statement • (ESRG 7, AT 45, UK 239, SE 64) Process breakdown is not defined; the wording "all broken down by process" should be deleted, and (AT 45) a clear description of BAT 7 should be added. • (ES_A 21, FEAD 116, ECN 116, MWE 132) Delete "all broken down by process" because it is not always relevant or even possible. • (EURITS 32, HWE 24) Replace "process" with "installation" because this is relevant at this level. • (FR 156) Clarify that collecting information all broken down by process should be done when necessary (which is not always the case). • (DK 30) Reformulate the BAT by deleting the reference to process breakdown, and adding the monitoring of process outputs, and of hazardous wastes generated. Additionally, it should be noted that several of the generic issues included in the conclusion are already covered in other general conclusions, and that including those in the EMS could be sufficient. • (BE 36) Replace "raw material" with "waste input". Others • (UK 240, FEAD 117) Monitoring water consumption is not always needed for biowaste treatments. To calculate consumption instead of monitoring should also be an option. • (FEAD 118) Concerning waste water, clarify that this is the waste water generated by the process.
EIPPCB assessment	General comments • As discussed at the kick-off meeting (point 3.6 of the KoM report), water, energy and chemical consumption data were collected to get contextual information which could reveal, for instance, possible cross-media effects of techniques to reduce emissions to water and to air. (This is why the questionnaire asked to break down energy, water and raw material consumption into consumption associated with the process itself, consumption associated with water treatment and consumption associated with air treatment.) The information in the BREF is therefore given as contextual information but the data collection did not aim to identify and did not permit the identification of consumption reduction techniques to which environmental performance levels could be associated. In addition, the consumption breakdown is sometimes provided in very different ways across the questionnaires (at plant level, unit level, subunit level, etc.), which makes comparison very difficult (not to mention the differences in processes, even within the same subsector). This is the reason for proposing BAT 7, so as to have comparable data for the next review of the BREF.

	As for the output, the information provided was also provided in varied forms in the corresponding sheet of the questionnaire, which makes it difficult to identify, for example, whether the output is a residue. This is why this BAT for monitoring consumption and generation of sludge, residues, and waste water is proposed, which should allow the setting of a BAT-AEPL in a further step. • REACH itself establishes procedures for collecting and assessing information on the properties and hazards of substances. BAT conclusions cannot interfere with this regulation. • BAT 1 is about implementing a management system. BAT 7 is more specifically on monitoring. <u>Statement</u> • The process might not always be the most adequate level for establishing the breakdown of consumption of water, energy, and raw material, and of generation of sludge, residues and waste water. Flexibility could be given in the statement. • Monitoring of process outputs is dealt with by means of the waste tracking system required in BAT 2. Depending on the waste input type and the process, hazardous waste generated can be part either of these process outputs, or of the residues for which monitoring is required by BAT 7. • This BAT is about monitoring consumption and emissions and not about the treated waste. Raw material means material needed for the waste treatment process (it may be reactant, additive, etc.). Waste input may be used as raw material in some cases, which leads to a decrease in raw material consumption. <u>Other</u> • As for water, the purpose is to monitor contaminated water leaving the installation.
EIPPCB proposal	• To give more flexibility with regard to the level at which the breakdown should be done for monitoring the consumption of water, energy, and raw material, and of the generation of sludge, residues and waste water. • To clarify that monitoring includes direct measurement or calculation.

2.6 Flaring

2.6.1 Prevention of emissions to air from flares

<table>
<tr><td>Location in D1</td><td>Section 6.1.2 – page 892 – BAT 11</td></tr>
<tr><td>Current text in D1</td><td>BAT 11. In order to prevent emissions to air from flares, BAT is to use flaring only for safety reasons or for non-routine operating conditions (e.g. start-ups, shutdowns) by using both of the techniques given below.
<table>
<tr><th></th><th>Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Correct plant design</td><td>This includes the provision of a gas recovery system with sufficient capacity and the use of high-integrity relief valves.</td><td>Generally applicable to new plants.
Gas recovery system may be retrofitted in existing plants.</td></tr>
<tr><td>b.</td><td>Plant management</td><td>This includes balancing the gas system and using advanced process control.</td><td>Generally applicable.</td></tr>
</table></td></tr>
<tr><td>Summary of comments</td><td>• (CEFIC 18) This BAT conclusion refers to the CWW BREF and not to WT plants and should be deleted.
• (FR 162, 316) Using both of the techniques is too strict and is not cost-effective.
• (FR 161, EURITS 38, HWE 30) Clarify for which type of gas flaring can be used (gases with sufficient calorific value).</td></tr>
<tr><td>EIPPCB assessment</td><td>• BAT 11 has been derived from the rationale and example plants presented in Section 2.3.5.5 of the BREF.
• It is not clear why using both techniques is not cost-effective.
• BAT 11 is not to use flaring but to use flaring only for safety reasons or for non-routine operating conditions. In other words, when a flare is installed, it should be used only in those two situations. It is therefore not necessary to mention for which gas flaring is used.</td></tr>
<tr><td>EIPPCB proposal</td><td>• To retain the BAT as in D1.</td></tr>
</table>

2.6.2 Reduction of emissions to air from flares

<table>
<tr><td>Location in D1</td><td>Section 6.1.2 – page 893 – BAT 12</td></tr>
<tr><td>Current text in D1</td><td>BAT 12. In order to reduce emissions to air from flares when flaring is unavoidable, BAT is to use both of the techniques given below.
<table>
<tr><th></th><th>Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Correct design of flaring devices</td><td>Optimisation of height, pressure, assistance by steam, air or gas, type of flare tips (either enclosed or shielded), etc., aimed to enable smokeless and reliable operation and to ensure the efficient combustion of excess gases.</td><td>Applicable to new flares. In existing plants, applicability may be restricted due to e.g. maintenance time availability during the turnaround of the plant.</td></tr>
<tr><td>b.</td><td>Monitoring and recording as part of flare management</td><td>Continuous monitoring of gas sent to flaring, measurements of gas flow and estimations of other parameters (e.g. composition of gas flow, heat content, ratio of assistance, velocity, purge gas flow rate, pollutant emissions (e.g.</td><td>Generally applicable.</td></tr>
</table></td></tr>
</table>

			NO_X, CO, hydrocarbons, noise)). The recording of flaring events usually includes the estimated/measured flare gas composition, the estimated/measured flare gas quantity and the duration of operation. The recording allows for the quantification of emissions and the potential prevention of future flaring events.	

Summary of comments	Whole BAT • (CEFIC 19) This BAT conclusion refers to the CWW BREF and not to WT plants and should be deleted. • (BE 86, EURITS 76) This BAT is applicable to all flare operations not only when avoidable. • (EURITS 76) Clarify that flaring is only for gases with sufficient calorific value. • (FR 164) Flares are not applicable to all waste treatment plants. For anaerobic digestion, the redaction should highlight that flares are not the only emergency systems. • (FEAD 245) For simplification, merge BAT 11 and BAT 12 as follows: "In order to prevent and/or reduce emissions to air from flares when flaring is unavoidable, BAT is to use one on an appropriate combination of the techniques given below: a - correct plant design b - correct design of flaring devices c - plant management d - monitoring and recording as part of flare management". Technique a • (EEB 115, EBA 32, DE 173) Include: a minimum height of 3 metres, ensure the technical necessary pressure of the flare, use of a flame arrestor, utilisation of dry gas or use of a system to derive condensate, installation of a safety valve to prevent air inlet, frost resistance, corrosion resistance, safety distance around the flare of at least 5–10 metres, depending the capacity and power of the flare, combustion yield of at least 99 %. • (ECN 122, ECN 123) Technique a should not be mandatory for existing flares (for instance enclosing or shielding the units) at least in AD plants, as operation time over the year is reduced. • (UK 251) Shielded flares are not BAT, they should always be enclosed. • (FR 165) Applicability to "maintenance time availability during turnaround of the plant" is very specific to industries where long periods of shutdown are scheduled each year for maintenance and repair actions. This cannot be the case for anaerobic digestion which is a biological process. So long and periodic times of shutdown should be avoided. Technique b • (ECN 122, ECN 123) Technique b is disproportionate for biogas plants where flaring time over the year is minimised, and the environmental impact is consequently of minor relevance with respect to impacts from, for instance, biogas combustion in an engine. • (UK 252, FR 166) Technique b is too detailed, considering the low environmental impact. • (DK 119) Replace technique b with "Flares shall have the minimum capacity to incinerate the amount of biogas (per hour) of which the installation has been dimensioned".
EIPPCB assessment	Whole BAT • BAT 12 has been derived from the rationale and example plants presented in Section 2.3.5.5 of the BREF. • BAT 11 and BAT 12 have to be read together: BAT 11 is about using flaring only for

	safety reasons and in OTNOC, i.e. it is about the minimisation of flaring. When flaring cannot be avoided (i.e. for safety reasons or in OTNOC), BAT 12 is to be applied. Removing the word "unavoidable" would weaken the message that using flaring in other conditions besides safety-related conditions or OTNOC is not BAT. • Flaring as such is not BAT. BAT 12 is about reducing emissions from flares when flaring is used. It is therefore not necessary to specify for which gas or which waste treatment processes flaring is used. • Merging BAT 11 and BAT 12 could be an option but the proposed wording would not allow the indication of when flaring is to be used. <u>Technique a</u> • The principles of correct flare design are given in technique a. The application of these principles may depend on the local situation and is essentially an implementation issue. • Technique a indeed needs maintenance time to be applied for existing plants. This maintenance time may be limited, which therefore may restrict the applicability of technique a. The reference to turnaround is not needed and can be removed. • Concerning shielded flares, the available information and data collection do not allow a conclusion to be drawn as to whether or not a shielded flare is BAT. In any case, the type of flare tips is unnecessarily detailed and is not supported by Section 2.3.5.5 of the BREF. <u>Technique b</u> • The balance of the flare burning capacity with the gas to be burnt is part of BAT 11 (correct plant design and plant management). • Technique b may indeed be too detailed for biogas plants but some of the parameters may be of relevance for other sectors such as re-refining of waste oil. This variability in terms of parameters to be monitored needs to be reflected in the technique description.
EIPPCB proposal	<u>Technique a</u> • To modify the description and the applicability. <u>Technique b</u> • To introduce flexibility with regards to the parameters to be estimated.

2.7 Consumption of raw materials and chemicals

<table>
<tr><td>Location in D1</td><td>Section 6.1.4 – page 897 – BAT 16</td></tr>
<tr><td>Current text in D1</td><td>BAT 16. In order to reduce the raw material and chemical consumption of waste treatment, BAT is to use the technique given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a</td><td>Use of waste instead of raw materials for waste treatment operations</td><td>Waste is used instead of raw materials for the treatment of other wastes by substituting chemicals or raw materials (e.g. APC residues as a replacement for hydrated lime in the neutralisation of waste acid).</td><td>Some applicability limitations derive from the presence of impurities in the waste that substitutes the raw material.
Another limitation is the compatibility of the waste to be used as raw material with the wastes to be treated (see BAT 2).</td></tr>
</table></td></tr>
<tr><td>Summary of comments</td><td>• (CEFIC 24) This BAT repeats only European law and should be deleted.
• (FEAD 180, EFR 120, DK 159) It should be reflected in the applicability that some waste fractions have limited availability, and although their use is preferred as a substitute to raw materials, it is not always possible.
• (FR 104) Agree upon this BAT but the use of waste instead of raw materials for waste treatment operations should be done in consistency with existing European or local regulations.
• (FR 242, EURITS 52, HWE 53) Delete the example given in brackets. Indeed, uses of waste acids, waste alkalis, oxidisers, etc. are much more common.
• (DK 158) Applicability should be restricted to non-hazardous wastes, since only Member States have the possibility of derogation from Waste Framework Directive, Article 18 1 (mixing of hazardous waste).</td></tr>
<tr><td>EIPPCB assessment</td><td>• This BAT gives a concrete example of reduction of raw material consumption.
• BAT 16 indeed only makes sense if there is waste available to be used instead of raw material but it does not seem necessary to mention this explicitly. Moreover, this corresponds more to the extent to which the technique may be applied than to an applicability restriction.
• As mentioned in the Scope, these BAT conclusions apply without prejudice to other relevant legislation, e.g. on health and safety. It does not appear necessary to repeat this here.
• The BAT would be of less value without concrete examples. However, one particular case should not be given undue focus.
• Concerning hazardous waste, as decided at the kick-off-meeting, the BAT conclusions will never seek to establish whether a waste is hazardous or non-hazardous. Moreover, the BAT conclusions apply without prejudice to other relevant legislation, e.g. on health and safety.
• Additionally, it is necessary to clarify the objective of the BAT which is to increase the efficiency of the use of materials, which includes raw materials and chemicals.</td></tr>
<tr><td>EIPPCB proposal</td><td>• To add in the description other examples from the main chapter of the BREF.
• To clarify the BAT statement and applicability.
• As there is only one row in the table proposed in D1, to write BAT 16 in plain text.</td></tr>
</table>

2.8 Energy efficiency

<table>
<tr><td>Location in D1</td><td>Section 6.1.5 – page 898 – BAT 17</td></tr>
<tr><td>Current text in D1</td><td>

BAT 17. In order to use energy efficiently in waste treatment, BAT is to use all of the techniques given below.

<table>
<tr><th colspan="2">Technique</th><th>Description</th></tr>
<tr><td>a</td><td>Set up and implement an energy efficiency plan</td><td>An energy efficiency plan entails defining and calculating the specific energy consumption of the activity (or activities), setting key performance indicators on an annual basis (e.g. MWh/tonne of waste processed) and planning the periodic improvement targets and related actions.</td></tr>
<tr><td>b</td><td>Establish a detailed energy balance</td><td>A detailed energy balance provides a breakdown of the energy consumption and generation (including exportation) by the type of source (i.e. electricity, gas, conventional liquid fuels, conventional solid fuels, and waste). This involves:
(i) reporting the energy consumption information in terms of delivered energy;
(ii) reporting the energy exported from the installation;
(iii) providing energy flow information (for example, Sankey diagrams or energy balances) showing how the energy is used throughout the process.</td></tr>
</table>

</td></tr>
<tr><td>Summary of comments</td><td>

<u>Whole BAT</u>

- (AT 57, ES 26, DE 357, FEAD 136, CEFIC 53) Give flexibility to BAT 17 by allowing the use of one or a combination of the techniques.
- (UK 262) Remove the wording "waste treatment" from the statement because the scope is already clear.
- (SE 83, NL 11) Add applicability to address only plants with high energy consumption, for example (NL 11) above 50 000 kWh or above 25 000 m^3 of gas.
- (CEFIC 25) Delete BAT 17 because the techniques are already part of an EMS described in BAT 1.

<u>Technique a</u>

- (FR 243, EURITS 53, HWE 56) Delete the example of a performance indicator expressed in MWh/tonne of waste processed because it is not always possible to have such detail (e.g. on sites where installations are integrated), and (EURITS 53) it may fluctuate considerably according to the market while having little correlated impact on the energy consumed.
- (DK 121, CEWEP 97. SE 199, ECN 132) Change MWh/tonne to kWh/tonne.

<u>Technique b</u>

- (ESRG 14, IE 3, SE 83, FEAD 150, ECN 133, 134, FR 244, 245, EURITS 54, HWE 56) Replace, both in the technique and in the description, "energy balance" with "energy audit", or (FR 244, 245, EURITS 54, HWE 56) with "energy consumption assessment", because a detailed balance is very difficult, particularly for integrated plants.
- (AT 57) Delete the term "detailed" because it is not described and may comprise a broad range of possibilities.
- (DK 48) It is not always possible to provide specific energy consumption for each process. This should be reflected in the description.
- (UK 263) Replace the wording "reporting" and "providing" with "recording", because "reporting" and "providing" are implementation issues for competent authorities.
- (EUCOPRO 28, FEAD 98) The requirements should be adapted to the context of the plant (e.g. size, equipment, or configuration), and more flexibility should be given for its implementation.

</td></tr>
</table>

	New BAT-AEPL • (EEB 160) Add a BAT-AEPL for specific energy consumption (see also comment EBB 159 on BAT 7).
EIPPCB assessment	Whole BAT • In order to be efficient by identifying the main sources of energy consumption and the corresponding potential improvements, an energy efficiency plan is based on an energy balance. • The level of detail of the energy efficiency plan and of the energy balance depends indeed on the complexity of the waste treatment plant. • Indeed, this BAT applies to waste treatments that fall under the scope of the BAT conclusions. • Energy efficiency may also be improved for smaller energy consumers, even though the gain in terms of MWh spared may not be so high. In addition, the revised wording makes it clear that the techniques a and b may be adapted to the local situation. • The energy efficiency plan can of course be part of the EMS but BAT 17 allows further details to be given. Technique a • Specific energy consumption is given only as an example of a performance indicator. This does not preclude the use of other more relevant performance indicators. • Indeed, specific energy consumption can also be expressed in kWh/tonne. Technique b • An energy balance also includes energy produced (e.g. biogas from anaerobic digestion), which goes beyond an energy consumption assessment. It is not clear why an energy audit, for which information, for example on energy consumption, energy production, and energy flow, is needed, would be easier to implement than an energy balance. • Indeed, the wording of the description could be improved to avoid confusion with implementation issues. New BAT-AEPL • See the assessment related to BAT 7in Section 2.5.
EIPPCB proposal	• To give flexibility with regards to the processes carried out and the waste streams to be treated (technique b). • To express the example performance indicator, specific energy consumption, in kWh/tonne (technique a). • To reword the description of technique b in order to avoid confusion with implementation issues (e.g.energy balance record includes information).

2.9 Noise and vibration

2.9.1 Noise and vibration management plan

Location in D1	Section 6.1.6 – page 898 – BAT 18
Current text in D1	**BAT 18. In order to prevent or, where that is not practicable, to reduce noise and vibration emissions, BAT is to set up, implement and regularly review a noise and vibration management plan, as part of the environmental management system (see BAT 1), that includes all of the following elements:** I. a protocol containing appropriate actions and timelines; II. a protocol for conducting noise and vibration monitoring; III. a protocol for response to identified noise and vibration events; IV. a noise and vibration reduction programme designed to identify the source(s), to measure/estimate noise and vibration exposure, to characterise the contributions of the sources and to implement prevention and/or reduction measures. **Applicability** The applicability is restricted to cases where noise or vibration nuisance can be expected or has been substantiated.
Summary of comments	• (ESRG 15) Add "nuisance" to the text of the conclusion "…, to reduce nuisance noise and vibration emissions…". • (IE 13) Add a new bullet point as follows: "a protocol for recording and responding to complaints relating to noise and vibration nuisance". It is difficult for enforcement authorities to follow up on noise and vibration complaints if adequate records are not maintained. • (BE 57) In the "Applicability" sentence, replace "or" with "and/or" cf. BAT 8. • (CEFIC 26) Delete BAT 18, because it is not based on real examples. • (CEFIC 54) In the text "that includes all of the following elements" replace "all" with "one or a combination". • (MWE 144) Add in the "Applicability" sentence: "The applicability is restricted to cases where noise or vibration nuisance can be expected or has been substantiated as nuisance of neighbourhood".
EIPPCB assessment	• The rewording of the BAT statement is not necessary as the consideration of potential for noise or vibration nuisance is reflected in the applicability. • The point concerning complaints has been reflected in the revised text of the BREF – in the third bullet point. For reasons of consistency with other BREFs, it does not seem necessary to add further detail to the text of the BAT. • The wording "and/or" is indeed in line with the wording of BAT 8. • This BAT is based on Sections 2.3.10.1 and 3.1.3.2.1 with information on plants using the technique. • In order to efficiently prevent and reduce noise and vibration emissions, "all" of the techniques have to be implemented and not just "one or a combination". Nevertheless, the list of techniques in BAT conclusions is neither prescriptive nor exhaustive. • The proposed rewording of the applicability sentence does not convey new information or contribute to clarity. • Although no comments were made on this point, BAT 18 and BAT 19 are about emissions and would be better placed after the section about "diffuse emissions"
EIPPCB proposal	• To slightly modify the applicability. • To move BAT 18 and BAT 19 after BAT 12

2.9.2 Techniques for the prevention or reduction of noise and vibration emissions

<table>
<tr><td>Location in D1</td><td>Section 6.1.6 – page 899 – BAT 19</td></tr>
<tr><td>Current text in D1</td><td>

BAT 19. In order to prevent or, where that is not practicable, to reduce noise and vibration emissions, BAT is to use one or a combination of the techniques given below.

<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a</td><td>Appropriate location of equipment and buildings</td><td>Increasing the distance between the emitter and the receiver and using buildings as noise screens.</td><td>For existing plants, the relocation of equipment may be restricted by a lack of space or excessive costs.</td></tr>
<tr><td>b</td><td>Operational measures</td><td>This includes:
i. improved inspection and maintenance of equipment;
ii. closing of doors and windows of enclosed areas, if possible;
iii. equipment operation by experienced staff;
iv. avoidance of noisy activities at night, if possible;
v. provisions for noise control during maintenance activities.</td><td rowspan="2">Generally applicable.</td></tr>
<tr><td>c</td><td>Low-noise equipment</td><td>This includes compressors, pumps and flares.</td></tr>
<tr><td>d</td><td>Noise and vibration control equipment</td><td>This includes:
i. noise-reducers;
ii. equipment insulation;
iii. enclosure of noisy equipment;
iv. soundproofing of buildings.</td><td>Applicability may be restricted due to space requirements (for existing plants).</td></tr>
<tr><td>e</td><td>Noise abatement</td><td>Inserting obstacles between emitters and receivers (e.g. protection walls, embankments and buildings).</td><td>For existing plants, the insertion of obstacles may be restricted by a lack of space.
For mechanical treatment in shredders of metal wastes, it is applicable within the constraints imposed by the possible deflagration in shredders.</td></tr>
</table>

</td></tr>
<tr><td>Summary of comments</td><td>

<u>Whole BAT</u>

- (CEFIC 27) Delete BAT 19 because it is based on CWW-BREF.

<u>BAT statement</u>

- (IE 4) Insert the word "nuisance" before the word "noise" in the statement of conclusion.
- (FEAD 107) Add in the statement of the conclusion "where they have potential to cause nuisance" after the word "emissions".

<u>BAT applicability</u>

- (BE 54) Add an "Applicability" section for the whole BAT 19, with the same wording as for BAT 18.
- (EEB 241, ECN 137) Add an "Applicability" section for whole BAT 19, with two sentences. First with the same wording as for BAT 18, and other "Applicability may be restricted due to plant design (e.g. not applicable in open windrow composting) and/or space requirements."

</td></tr>
</table>

	BAT techniques • (EEB 241, AT 58, ECN 136, ECN 137, MWE 145) Insert the word "can/may" before word "include" in description of techniques b), c) and d) • (BE 55) Add the technique "Include decoupling individual equipment to pre-empt and limit propagation of vibrations and resonance noise in the BAT conclusion" Technique a • (UK 266) In applicability of technique a) add at the end of sentence "but if responsible for causing nuisance and it cannot be abated it must be removed or replaced". Technique b • (AT 59) Add a bullet "traffic management plan to consider transport / movement of containers". • (DK 122, IT 53, ECN 135) Rephrase bullet v. to add noise control for traffic of vehicles, not only machines used in maintenance. • (UK 267) In description of technique b) delete word "improved" in first bullet and add "appropriately" before "experienced" in third bullet. Technique e • (UK 268) Add at the end of sentence "including the relocation of entrances and exits to buildings." (CEFIC 27) This BAT is based on Sections 2.3.10.2 where information on plants applying the techniques is provided. • (IE 61) Define "deflagration" in Applicability section of technique e).
EIPPCB assessment	Whole BAT • Noise and vibration reduction techniques are applied by 96 reference plants (see Section 2.3.10.2 of the BREF). • Although no comments were made on this point, BAT 18 and BAT 19 are about emissions and would be better placed after the section about "diffuse emissions" BAT statement • The BAT addresses noise emissions, which are, according to Article 3(4) of the IED, covered by the IED and are therefore to be prevented or reduced regardless of the nuisance. BAT applicability • Adding an applicability statement from previous BAT (nuisance) is not needed, since, in this BAT, the techniques address the prevention/reduction of noise emissions as a generic issue for the whole sector and the applicability of specific techniques, including space and design restrictions, is already included in the text. BAT techniques • The text of the descriptions of techniques b, c and d can be improved by adding "can/may" before the word "include" as the techniques are neither prescriptive nor exhaustive. • The proposed technique for decoupling individual equipment to pre-empt and limit the propagation of vibrations and resonance noise is already implicit in the elements of technique d but the wording of bullet ii can be improved. Technique a • Low-noise equipment is already mentioned in technique c. Removing or replacing the equipment that is the source of emission if abatement is not possible is an implementation issue left to the competent authority and operator to decide on in view of local conditions and noise levels. Technique b • The wording of technique b can be improved by extending bullet v. to "traffic/transport and movement of containers". • The word "improved" in the first bullet of technique b is redundant. And adding "appropriately" in front of "experienced staff" is unnecessary, since this is already implied by the current wording.

	Technique e • To relocate the entrances and exits of the buildings is indeed relevant but seems to fit better in technique a (which is about location) than in technique e (which is about abatement). • It is not clear why "deflagration" is unclear. However, the wording of the sentence could be improved to highlight that it is the risk of deflagration which imposes constraints.
EIPPCB proposal	• To improve the wording of the description and applicability of technique a by adding " exits or entrances " in the text. • To add "may" before "include" in the text of the description of technique c. • To improve the wording of technique b by extending bullet v. to "maintenance, traffic and handling activities". • To delete the word "improved" in the first bullet of technique b. • To change the wording for technique d, bullet ii to "acoustic and vibrational insulation of equipment". • To reword the applicability of technique e. • To move BAT 18 and BAT 19 after BAT 12

2.10 Management of residues

<table>
<tr><td>Location in D1</td><td>Section 6.1.8 – page 900 – BAT 21</td></tr>
<tr><td>Current text in D1</td><td>BAT 21. In order to reduce the amount of residues generated during waste treatment, BAT is to use the technique given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th></tr>
<tr><td>a</td><td>Maximise the reuse of packaging</td><td>Packaging (drums, containers, IBCs, palettes, etc.) is reused for containing waste, when it is in good working order and sufficiently clean, on the basis of a compatibility check between the two substances contained (first and second use). If necessary, packaging is sent for appropriate treatment (e.g. reconditioning, cleaning, and washing).</td></tr>
</table></td></tr>
<tr><td>Summary of comments</td><td>• (EEB 283) Set the BAT-AEPLs for recycling efficiency expressed as recycling rate per input waste stream for each relevant treatment process (if a positive cross-media impact is substantiated).
• (ESRG 19) Add recycling as follows: "Maximise the reuse / recycling of packaging".
• (DK 164) Add an applicability column for the technique (the applicability depends on type of packaging material, standards for packaging material, etc.).
• (DE 292) "Management" of residues is part of the EMS which contains more than the reduction of packaging. Reconsider BAT in line with the EMS.
• (CEFIC 30) Delete the BAT because it repeats EU law / waste hierarchy.</td></tr>
<tr><td>EIPPCB assessment</td><td>• BAT-AEPLs cannot be set for several reasons: i) this conclusion is about reuse and not recycling (recycling is related to waste and if the package is not a waste, it can be reused); ii) there were no data collected on the rate or amounts of waste recycling or reuse of packaging in the waste treatment plants.
• This conclusion is generally applicable because the technique is not to reuse but to "maximise" the reuse, i.e. to reuse as much as possible, even if that is only a little.
• This conclusion is not about reduction of packaging but its reuse. Indeed the technique could be linked to parts of the EMS.
• It is not clear how the conclusion repeats the legislation, as it is a very specific technical description.</td></tr>
<tr><td>EIPPCB proposal</td><td>• To add in the wording of the conclusion a reference to feature "XIV. Residues management plan" of the EMS in BAT 1.
• As there is only one row in the table proposed in D1, to write BAT 21 in plain text.</td></tr>
</table>

2.11 Accidents and incidents

<table>
<tr><td>Location in D1</td><td>Section 6.1.9 – page 901 – BAT 22</td></tr>
<tr><td>Current text in D1</td><td>

BAT 22. In order to prevent or limit the environmental consequences of accidents and incidents, BAT is to use all of the techniques given below.

<table>
<tr><th colspan="2">Technique</th><th>Description</th></tr>
<tr><td>a</td><td>Management of accidental emissions</td><td>Procedures are established and technical provisions are in place to manage accidental emissions such as spillages, firefighting water, or emissions from safety valves.</td></tr>
<tr><td>b</td><td>Event registration and assessment system</td><td>This includes:
• A log/diary to record all incidents, near-misses, changes to procedures, abnormal events, and the findings of maintenance inspections. Leaks, spills and accidents can be recorded in the site diary.
• Procedures to identify respond to and learn from such incidents.</td></tr>
<tr><td>c</td><td>Protection measures</td><td>These include:
• security measures to protect the plant against malevolent acts which could have environmental impacts;
• fire and explosion protection system, containing prevention and detection equipment, and extinction equipment;
• Instrumentation and control equipment is accessible and maintained in emergency situations.</td></tr>
</table>

</td></tr>
<tr><td>Summary of comments</td><td>

<u>BAT statement / whole conclusion</u>

- (EEB 246, ECN 142 and UK 274) Reorder the techniques: c first, then a and b last. Add bullet to c, Prevention measures: "implement detection equipment (e.g. fire/smoke, temperature outside tolerance range, unintentional breakdown of machines, equipment, pumps, control devices…) being linked to emergency services and automatically raise an alarm / alert".
- (AT 62) In the text of b and c, change introductory wording to "This MAY include".
- (CEFIC 31) Delete conclusion – has no effect on environmental performance and is covered by BAT 1.
- (CEFIC 55) In the BAT statement, replace "all" with "one or a combination".

<u>Technique a</u>

- (FR 176) Add more description of what is meant by "manage emissions from safety valves".
- (UK 276) Replace wording "Management of accidental emissions" with "Set up, implement and regularly review a structured Accident Management Plan". For the sake of consistency, this technique is specified in Section 6.6.4 and also the BATC mentions other plans: energy efficiency plan, noise action plan, and odour management plan.

<u>Technique c</u>

- (FR 249, EUCOPRO 30, EURITS 55, FEAD 99) Either reword the first bullet to "the plant is secured and enclosed" to make it more general, or add concrete measures description to the existing text to make it more explicit or delete the bullet because security issues are not part of the IED / BAT.
- (ESRG 20, FEAD 226 and HWE 58) Add the word "relevant" at the beginning of the last bullet – to focus on important I&C because there is no need to guarantee accessibility to all equipment during emergency. Also, the ability to protect I&C depends on the nature of the emergency situation. Or delete the bullet because it is too vague.
- (IE 43) Add a new bullet point: "selection of fire detection and fire suppression equipment should take account of the waste types involved and the ambient environment at a waste installation (e.g. dust) to ensure the effectiveness of the

</td></tr>
</table>

	equipment is not compromised". • (SE 19) Add bullets: - to protect the plant from flooding and other accidents caused by climatic change; - backup system, e.g. bypass pipelines, recirculation etc.
EIPPCB assessment	<u>BAT statement / whole conclusion</u> • Although the order of techniques stated in the BAT does not affect their implementation, it makes sense to reorder them from "hands-on" immediate (prevention) to more "desk-based" (control) techniques: c first, then a, and b last. • Early warning systems are of course important but are already referred to in technique c (detection equipment). • The rewording to "may" in the introduction of techniques b and c leaves more flexibility for the implementation of their elements. • The techniques of this conclusion can indeed be part of the EMS which is covered by BAT 1, but also represent a concrete example of it. • In order to efficiently prevent accidents or control them when they occur, "all" of the techniques have to be implemented and not just "one or a combination". Nevertheless, the list of techniques in BAT conclusions is neither prescriptive nor exhaustive. • Although no comments were made on this point, BAT 22 is about emissions and would be better placed after the section about "water emissions" <u>Technique a</u> • Indeed some clarification of the text is needed, based on Chapter 2.3.1.3.1. • The accident management plan is already mentioned as part of the EMS so it is not needed to repeat here "BAT is to set up, (…) and accident management plan". However, it could be useful to mention that the three techniques are part of the accident management plan. <u>Technique c</u> • Instead of referring to security measures, the wording should focus on "protection of the plant against malevolent acts..." • Indeed only I&C which is needed in case of emergency needs to be operable in emergency situations. • The focus of the last bullet in c is to ensure that the I&C is "operable" and not "maintained" during emergency situations. • Selection of fire detection and/or suppression equipment is an implementation issue pending a risk assessment on a case-by-case basis by the operator, competent authority and other fire protection regulations. • Vulnerability to natural hazards is outside the scope of the IED.
EIPPCB proposal	• To add in the statement of the conclusion a reference to feature "XV. Accident management plan" of BAT 1. • To reorder techniques: c, a, b. • To modify the description of techniques a and c. • To change the introductory text in the descriptions of a and c to: "This includes measures such as". • To move BAT 22 after BAT 15

2.12 Mechanical treatment in shredders of metal waste

2.12.1 Energy efficiency

<table>
<tr><td>Location in D1</td><td>Section 6.2.2.3 – page 905 – BAT 28</td></tr>
<tr><td>Current text in D1</td><td>BAT 28. In order to use energy efficiently, BAT is to use the technique given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th></tr>
<tr><td>a</td><td>Mill feeding regulation</td><td>Reduction of peak energy consumption and power losses and avoidance of unwanted shutdowns of the mill, by regulating the feed to ensure that the shredder load and rotor speed are as constant as possible.</td></tr>
</table></td></tr>
<tr><td>Summary of comments</td><td>• (EEB 90) Add a BAT-AEL range on specific energy consumption.
• (ES_C 26, EFR 184) Add a new technique applicable to new plants: starters with liquid rheostats.
• (FR 78, EFR 67) Replace the wording "Mill feeding regulation" with "Shredder feed control".</td></tr>
<tr><td>EIPPCB assessment</td><td>• It has not been possible to derive BAT-AELs on specific energy consumption because the information provided was diverse and not easily comparable. However, setting up an energy efficiency plan and establishing an energy balance record are required by BAT 17 of D1.
• No information was provided via the data collection on starters with liquid rheostats. Therefore, although it may be a valuable technique for reducing peak energy consumption, it is not possible to derive a specific BAT conclusion.
• The proposed wording is clearer but it would be even clearer to mention that the feed should be "equalised". In addition, the technique description explains more why the shredder mill should be controlled rather than how, which should be clarified.</td></tr>
<tr><td>EIPPCB proposal</td><td>• To clarify the technique title and technique description.
• As there is only one row in the table proposed in D1, to write BAT 28 in plain text.</td></tr>
</table>

2.13 Biological treatment of waste

2.13.1 Emissions to water and water usage

2.13.1.1 Techniques related to the prevention or reduction of emissions to water and water usage

<table>
<tr><td>Location in D1</td><td>Section 6.3.1.3 – page 908-909 – BAT 33</td></tr>
<tr><td>Current text in D1</td><td>
BAT 33. In order to minimise generation of leachate and the volume of waste water, as well as to avoid contamination of ground or surface waters and to reduce water usage, BAT is to use the technique given below.
<table>
<tr><th>Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td rowspan="4">Water and leachate management</td><td>Segregation of leachate seeping from compost piles and windrows, surface water arising from roads, and uncontaminated run-off water from buildings.</td><td>Generally applicable to new plants.
Applicable to existing plants within the constraints imposed by the configuration of the water circuit.</td></tr>
<tr><td>When relevant in aerobic processes, the ceiling of the biological degradation hall is thermally insulated in order to minimise the generation of condensate.</td><td>Generally applicable.</td></tr>
<tr><td>Recycling process waters (e.g. from dewatering of liquid digestate in anaerobic processes) or muddy residues, or using as much as possible alternative sources of water, e.g. condensed water, rinsing water, run-off water, within the process.</td><td>The recycling of water into the process is limited by potential contents of impurities (heavy metals, salts, pathogens, etc.).</td></tr>
<tr><td>Adjusting the moisture content of the waste to its water-holding capacity and therefore minimising the generation of leachate.</td><td>Generally applicable.</td></tr>
</table>
</td></tr>
<tr><td>Summary of comments</td><td>
<u>Thermal insulation</u>
• (FR 184, AT 80, PL 24, ECN 153, FEAD 127) The reference to thermal insulation should be deleted as, inter alia, it is not generally applicable, depends on local meteorological conditions, on the air extraction system and is expensive.
• (IT 57) Thermal insulation does not seem appropriate, since preventing biowaste drying out during the process is one of the main concerns.

<u>Moisture content</u>
• (EEB 255, FR 185, AT 81, ECN 154) It is not adequate to adjust the moisture content until the maximum water-holding capacity is reached: the moisture is adjusted at the minimum needed to ensure an efficient treatment and not adjusted according to the water-holding capacity of the waste.
</td></tr>
<tr><td>EIPPCB assessment</td><td>
<u>Thermal insulation</u>
• As shown by the data collection, one of the origins of waste water is condensates. The aim of this technique is to minimise the generation of condensates and therefore the volume of waste water. Thermal insulation is only one example of the techniques used to achieve this goal, amongst other design and operation techniques (for instance ventilation).
</td></tr>
</table>

	Water recycling • The limitation mentioned in the applicability is, in fact, more the extent to which the technique may be applied and fits better in the description. Moisture content • There is indeed a mistake in the description of the technique as, for the adjustment of the moisture content, the addition of water should consider the water-holding capacity but moisture should not be taken up to this level.
EIPPCB proposal	Thermal insulation • To rewrite the technique as minimisation of condensate generation. Water recycling • To move the current limitation into the description column and to define the technique as generally applicable. Moisture content • To rephrase the fourth part of the technique. • More generally, to bring the format of this BAT in line with the rest of the BAT conclusions and to rewrite it as a list of techniques (all are to be used).

2.14 Re-refining of waste oil

2.14.1 General environmental performance

<table>
<tr><td>Location in D1</td><td>Section 6.4.2.1 – page 913 – BAT 40</td></tr>
<tr><td>Current text in D1</td><td>BAT 40. In order to improve the general environmental performance of waste oil re-refining, BAT is to use both of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th></tr>
<tr><td>a</td><td>Set up and implement acceptance procedures</td><td>Acceptance procedures include controlling the waste input content in chlorinated compounds (e.g. solvents or PCBs).</td></tr>
<tr><td>b</td><td>Residue management</td><td>Using the residues as heater feed in a heater equipped with wet scrubber to generate energy for the plant.</td></tr>
</table></td></tr>
<tr><td>Summary of comments</td><td><u>Whole BAT</u>
• (UK 312, FEAD 66) Delete BAT 40 because it provides nothing more than already considered under general acceptance and raw material management.

<u>Technique a</u>
• (IE 54, UK 313) Clarify the wording of the description: Acceptance procedures include controlling the waste input content, including in terms of chlorinated compounds (e.g. chlorinated solvents, PCBs, etc.), or to include in chlorinated compounds [...].

<u>Technique b</u>
• (DE 62, DK 36) Use of residues to generate energy should not be limited only to internal use; external use should also be possible.
• (ESRG 21) Clarify that the plant heaters using the residues as fuel should comply with the requirements of waste incineration.
• (DK 36) Delete the use of residues as heater feed in a heater because there is a lack of information (especially on economics but also on e.g. operational data, applicability) in the description of techniques to consider in the determination of BAT.
• (IT 58, GEIR 24, EEB 161) Add the use of residues from vacuum distillation or thin film evaporators as asphalt products (existing BAT 102), which is a commonly applied environmentally friendly technique.</td></tr>
<tr><td>EIPPCB assessment</td><td><u>Whole BAT</u>
• Indeed, acceptance procedures and raw material management are also considered at a general level. However, there is a need to specifically address the potentially high content of chlorinated compounds which may arise when receiving waste oils from a number of collecting points (mixing or wrong orientation of the waste) when dealing with waste oil.
• BAT 40 as proposed in D1 in fact deals with two different ideas; acceptance procedure on one hand and management of residues on the other hand.

<u>Technique a</u>
• Chlorinated compounds may indeed not be the only parameters that need controlling.

<u>Technique b</u>
• Of the nine plants performing re-refining of waste oils that participated in the data collection, three plants reported sending some outputs (such as light ends, distillation bottom, residues from extraction) for energy recovery in incineration or co-incineration. Compliance with requirements for installations outside the scope of the BREF cannot be required in the WT BATC.
• Four plants reported recycling residues from distillation as asphalt products. Although it is recognised that this practice is environmental friendly, it implies that the output achieves specific characteristics; this relates to output quality and waste status which are outside the scope of the WT BREF. However, to broaden the field of the technique to material recovery is relevant.</td></tr>
</table>

EIPPCB proposal	• To keep technique a related to specific acceptance procedures. • To add pre-acceptance. • To clarify the description of technique a. • To broaden the field of technique b. • To split BAT 40 into two different BAT: one about acceptance of waste and the other about management of residues.

2.14.2 Techniques related to emissions to water and water usage

Location in D1	Section 6.4.2.3 – page 913 – BAT 42
Current text in D1	**BAT 42. In order to reduce water usage and emissions to water, BAT is to use one or both of the techniques given below.** **Technique** / **Description** a – Waste water pretreatment – This includes pretreatment of waste water such as evaporation and steam stripping (see description in Section 6.6.2) prior to the WWTP. b – Reuse of water – Reusing the cleaned waste water as cooling water after appropriate treatment.
Summary of comments	Whole BAT • (UK 314, FEAD 219) BAT 42 should be removed because it is a repetition of what is already dealt with in BAT 13 and BAT 14. Technique a • (GEIR 44) Add equalisation, API separation, flotation and skimming to the list of pretreatment techniques. Technique b • (GEIR 22) Reuse of water requires advanced treatment in order to achieve specific requirements depending on the equipment to be cooled, and also to avoid waterborne diseases (legionella). • (DK 38) The applicability of technique b should be limited to cleaned waste water that does not contain mercaptan leftovers.
EIPPCB assessment	• BAT 42 seems indeed to be a repetition of BAT 13 and BAT 14, without bringing useful details to those generic BATs. It should be noted however that BAT 14 is proposed to be deleted (see the assessment on BAT 14 in Section 1.8.2).
EIPPCB proposal	• To delete BAT 42.

2.15 Regeneration of spent solvents

2.15.1 General environmental performance

<table>
<tr><td>Location in D1</td><td>Section 6.4.4.1 – page 914 – BAT 44</td></tr>
<tr><td>Current text in D1</td><td>BAT 44. In order to improve the general environmental performance of regeneration of spent solvents, BAT is to use the technique given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th></tr>
<tr><td>a</td><td>Recover solvents from distillation residues</td><td>Vacuum drying and other drying techniques are used to evaporate the residues from the distillation columns and recover the solvents.</td></tr>
</table></td></tr>
<tr><td>Summary of comments</td><td>• (FEAD 72) Delete BAT 44 because recovery of solvents may be technically and economically difficult and because recovery of energy is done also.
• (ESRG 23, FR 258, EURITS 61, HWE 67, UK 315) Add the possibility for energy recovery from residues as distillation of residues is not always technically or economically feasible.
• (HWE 66, FR 256) For the same reason, replace "Recover solvents from distillation residues" with "Recovery".
• (CEFIC 41) Clarify that this BAT conclusion applies to those plants which regenerate spent solvents as a main activity and not to chemical plants which use spent solvents as a secondary raw material.</td></tr>
<tr><td>EIPPCB assessment</td><td>• Energy recovery from distillation residues is indeed a possibility which should not be excluded.
• The BAT conclusion applies to the IED activities listed in the Scope. There does not seem to be a need for further clarification.</td></tr>
<tr><td>EIPPCB proposal</td><td>• Add a technique b which provides for energy recovery.</td></tr>
</table>

2.15.2 Emissions to water and water usage

<table>
<tr><td>Location in D1</td><td>Section 6.4.4.2 – page 915 – BAT 46</td></tr>
<tr><td>Current text in D1</td><td>BAT 46. In order to reduce the generation of waste water and to reduce water usage, BAT is to use the technique given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th></tr>
<tr><td>a</td><td>Liquid ring pumps with high boiling point liquids</td><td>Solvent vapours generated by the distillation process carried out under vacuum are absorbed into liquids with high boiling points. The liquid used is alternately cooled and heated in a continuous process. When becoming hot, the condensed and soluble solvents are desorbed and the liquid ring fluid is returned to the vacuum pump for the next reuse. Desorbed solvents are condensed and recovered.</td></tr>
</table></td></tr>
<tr><td>Summary of comments</td><td>• (CEFIC 43, DE 315) Delete BAT 46 because describing only one technique contradicts the General considerations at the beginning of the BATC chapter.
• (FR 34) Delete the BAT because no information is available about cross-media effects and economics in Section 5.4.3.5.
• (FEAD 73 and FEAD 215) Change technique a because pumps other than ring pumps can be used and add a new technique related to the use of pumps without water cooling.</td></tr>
</table>

	• (AT 97) Introduce a new chapter for water emissions and water usage as Chapter 6.4.4.3.
EIPPCB assessment	• The existing heading does not reflect the content of BAT 46. • Cross-media effects are not expected as desorbed solvents are recovered. This technique is applied in at least one plant and mentioned as BAT in the OFC BREF so it seems economically feasible. • There are indeed more techniques to reduce the generation of waste water resulting from vacuum generation, such as the use of water-free cooling or of closed cycle liquid ring vacuum pumps. Liquid ruing pumps with high boiling point liquid should only be given as example. • The different types of technologies used to reduce the water usage from vacuum generation are however not specific to solvent regeneration and may be used for all types of vacuum generation.
EIPPCB proposal	• To move the technique into the generic BAT 13 (technique a) as an example of a water-saving technique for vacuum generation. • To add in the text of the BREF other examples of such techniques. • To delete BAT 46.

2.16 Thermal treatment of spent activated carbon, waste catalysts and excavated contaminated soils

2.16.1 General environmental performance

<table>
<tr><td>Location in D1</td><td>Section 6.4.5.1 – page 916 – BAT 47</td></tr>
<tr><td>Current text in D1</td><td>
BAT 47. In order to improve the general environmental performance of the thermal treatment of spent activated carbon, waste catalysts and excavated contaminated soil, BAT is to use all of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a</td><td>Heat recovery</td><td>This involves gas/gas heat exchangers to allow the preheating of combustion air and waste gas reheating. There may also be a waste heat boiler used for the generation of steam, which is also used in the reactivation of the carbon.</td><td>Generally applicable.</td></tr>
<tr><td>b</td><td>Reduction of waste gas to be treated</td><td>Use an indirectly fired kiln to avoid contact between the kiln content and waste gases generated by the burner(s).</td><td>Indirectly fired kilns are normally constructed with a metal tube and applicability may be restricted due to corrosion problems that may appear during treatment of some activated carbons used in industrial applications.</td></tr>
<tr><td>c</td><td>Primary measures for reducing particulate and acid gas emissions</td><td>This includes:
- control of furnace temperature, turning rate of the rotary furnace, fuel type;
- design of the regenerator and associated ducting and equipment to operate under a reduced pressure, in order to prevent the escape of regenerator gases into the air;
- use of a sealed furnace.</td><td>Design measures are generally only applicable to new plants.</td></tr>
</table>
</td></tr>
<tr><td>Summary of comments</td><td>
<u>Whole BAT 47</u>

(FR 360, HWE 84) BAT 47 is based on information obtained exclusively from Sections 5.5.3.1 and 5.5.4.1 (treatment of spent activated carbon and waste catalysts) but in no case from Section 5.6 (treatment of excavated contaminated soil). The applicability should be restricted to thermal treatment of spent activated carbon, and waste catalysts.
(CEFIC 44) Replace "all techniques" with "one or a combination of techniques" because the obligation to use all the techniques contradicts the improvement and development of other techniques which could have better environmental performance.
(CEFIC 45) Mention that BAT 47 does not apply for those plants covered by any chemical BREF and using spent activated carbon.
(EEB 341) Soil contaminated with POPs is sent to be treated by specialised technology on treatment of POPs waste.
(EEB 120) Add a technique about monitoring PAH and BTEX in emissions to air.

<u>Technique b</u>

(UK 316) "Reduction" could be read as chemical reduction rather than volumetric reduction.

</td></tr>
</table>

EIPPCB assessment	Whole BAT 47 • It is not clear why the techniques of BAT 47 are not technically applicable to the thermal treatment of excavated contaminated soil. • Any other technique may be used instead of the techniques listed if it ensures at least an equivalent level of environmental protection. • The BAT conclusions apply to the IED activities listed in the Scope. • It is not the aim of the BREF to define the waste streams. Moreover, other guidelines already exist such as the Basel technical guidelines. • PAHs and BTEX are not reported by either of the two plants carrying out thermal treatment of contaminated soil: Plant 188 monitors dust, TVOC, Hg and PCDD/PCDF and Plant 494 monitors SO_X, NO_X, CO and TVOC. PAHs and BTEX are abated by thermal oxidation which is used in both cases. This should be better reflected in BAT 48. Technique b • Clarification is indeed needed.
EIPPCB proposal	• To clarify technique b. • To clarify and simplify the wording of the two other techniques as well.

2.16.2 Techniques for the reduction of emissions to air

Location in D1	Section 6.4.5.2 – page 917 – BAT 48
Current text in D1	**BAT 48. In order to reduce emissions to air, BAT is to use one or a combination of the techniques given below.**

	Technique	Description
a	Thermal oxidation ([1])	See Section 6.6.1.
b	Cyclone	
c	Wet scrubber ([2])	
d	ESP	
e	Fabric filter ([3])	
f	Adsorption	
g	Condensation of waste gas	

([1]) Thermal oxidation is carried out with a minimum temperature of 1100 °C and two-second residence time for the regeneration of activated carbons used in industrial applications where refractory halogenated or other thermally resistant substances are likely to be present. In the case of activated carbon used for potable water- and food-grade applications, an afterburner with a minimum heating temperature of 850 °C and two-second residence time is sufficient (see Section 6.6.1)
([2]) Caustic or soda ash scrubbing solutions are used to neutralise acid gases for thermal treatment of activated carbon used in industrial applications.
([3]) Cooling the waste gas prior to a fabric filter is an important technique as it provides temperature protection for the filter and allows a wider choice of fabric.

Summary of comments	• (HWE85) None of the techniques listed correspond to an adapted technique for thermal desorption of excavated contaminated soils. Add technique h which is a post-combustion chamber with a flue-gas treatment system. • (BE43) A cyclone is not considered an equivalent for a wet scrubber, an ESP, or a fabric filter. The BAT should be corrected accordingly.

EIPPCB assessment	• Almost all techniques listed (except ESP) are used at the two example plants, Plants 188 and 494 (Section 5.6.2.1 of the BREF). • The definition of thermal oxidation given in the BAT conclusions also covers post-combustion chamber. • The cyclone is indeed used as a waste gas pretreatment. • Footnote 1 is valid not only for this waste treatment but for all waste treatments where thermal oxidation may be used to abate waste gas with halogenated compounds. It would therefore fit better in the description of technique. • Footnote 2 is not needed as the description of the technique already mentions that alkaline scrubbing liquid is used to abate acid gases. • Footnote 3 is in fact an engineering consideration. • It is needed to clarify in the BAT statement that both collection and treatment of emissions to air are BAT. This is done by referencing BAT 10d (see the assessment related to BAT 10). Once the emissions are collected, they are of course channelled and the abatement techniques are applied to these channelled emissions.
EIPPCB proposal	• To specify that cyclones are used in combination with other techniques. • To delete the footnotes. • To complete the description of thermal oxidation in Section 6.6.1 of the BAT conclusions. • To add in the BAT statement a reference to BAT 10d and the pollutants concerned

2.17 Water washing of excavated contaminated soil

2.17.1 Techniques for the reduction of dust and VOC emissions to air

<table>
<tr><td>Location in D1</td><td>Section 6.4.6.1 – page 917 – BAT 49</td></tr>
<tr><td>Current text in D1</td><td>BAT 49. In order to reduce dust and VOC emissions to air, BAT is to use one or a combination of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th></tr>
<tr><td>a</td><td>Wet scrubber</td><td rowspan="3">See Section 6.6.1.</td></tr>
<tr><td>b</td><td>Fabric filter</td></tr>
<tr><td>c</td><td>Adsorption</td></tr>
</table></td></tr>
<tr><td>Summary of comments</td><td>• (MWE153, CEWEP13, SE95) Mention "channelled emissions" in the statement as the techniques described in BAT 49 could only be used for channelled emissions.
• (UK317) Unclear on relevance of a wet scrubber, fabric filter or adsorption for a washing process.</td></tr>
<tr><td>EIPPCB assessment</td><td>• It is needed to clarify in the BAT statement that both collection and treatment of emissions to air are BAT. This is done by referencing BAT 10d (see the assessment related to BAT 10). Once the emissions are collected, they are of course channelled and the abatement techniques are applied to these channelled emissions.
• .Emissions to air are reported by the two example plants, Plants 14 and 40 (from wet sieving, sword washers, etc.). The abatement techniques listed are also used at these plants. A reference to the process steps from which emissions to air arise would indeed enhance clarity.</td></tr>
<tr><td>EIPPCB proposal</td><td>• To add in the BAT statement a reference to BAT 10d.
• To refer to the process steps from which emissions to air arise.</td></tr>
</table>

2.18 Decontamination of equipment containing POPs

2.18.1 General environmental performance of PCB decontamination

<table>
<tr><td>Location in D1</td><td>Section 6.4.7.1 – page 918 – BAT 50</td></tr>
<tr><td>Current text in D1</td><td>

BAT 50. In order to improve the general environmental performance of PCB decontamination, BAT is to apply all of the techniques given below.

<table>
<tr><th colspan="2">Technique</th><th>Description</th></tr>
<tr><td>a</td><td>Design measures to prevent dispersion of PCBs from the storage and treatment areas</td><td>• Dedicated storm and run-off water collection system.
• Resin coating applied to the whole concrete floor of the storage and treatment areas.</td></tr>
<tr><td>b</td><td>Implementation of staff access rules to prevent dispersion of contamination</td><td>• Accesses to storage and treatment areas are locked.
• Special qualification is required to access the area where the waste or polluted equipment is handled.
• Separate 'clean' and 'dirty' cloakrooms to put on/take off individual protective outfit.</td></tr>
<tr><td>c</td><td>Prevention of liquid PCB dispersion during the decontamination process</td><td>• External surfaces of the contaminated electrical equipment are cleaned with anionic liquid.
• Pumping the PCB oil out of the electrical equipment with a pump or under vacuum instead of gravity emptying.
• Procedures are defined and used for filling, emptying and (dis)connecting the vacuum vessel.
• Long period of dripping (at least 12 hours) to avoid any PCB drop during further treatment operations, after the separation of the core from the casing of an electrical transformer.</td></tr>
<tr><td>d</td><td>Control of emissions to air</td><td>• The ambient air of the decontamination workshop is treated on activated carbon filters.
• The exhaust of the vacuum pump mentioned in technique (c) above is connected to an end-of-pipe abatement system (e.g. a high temperature kiln or activated carbon filters).</td></tr>
<tr><td>e</td><td>Management of waste treatment residues</td><td>• Porous contaminated parts of the electrical transformer (wood and paper) are fed into a high temperature kiln (> 1100 °C).
• Destruction of the PCBs in the oils (dechlorination, hydrogenation, solvated electron processes).</td></tr>
</table>

</td></tr>
<tr><td>Summary of comments</td><td>

• (CEFIC 46) Replace "all of the techniques" with "one or a combination of the techniques" because the actual wording contradicts the improvement and development of other techniques which could have better environmental performances.
• (EURITS 78) Make clear that this section is applicable for all POP-containing equipment and not only for the example waste type PCB.
• (EEB 102, 306) This section should also apply to mercury-containing waste (see comment EEB 101 on BAT 30), and waste containing POP (not only equipment).
• (FR 278) In technique e, remove "hydrogenation and solvated electron processes" as there is little feedback on industrial (large-scale) implementation of such techniques, and replace it with high-temperature incineration which is a well-adapted technique.
• (EURITS 64, HWE 71) In technique e, add high-temperature incineration.
• (FR 279) Add a technique for emission collection as close as possible to the emission point such as valves, pump output, opening devices of autoclaves. This is particularly

</td></tr>
</table>

	relevant where emissions of substances of high concern are suspected.
	• (FR 323) Add a technique on the efficiency of the exhaust air treatment system which should be controlled continuously, especially due to the presence of substances of high concern.
	• (EEB 310, 311) Add techniques and efficiency levels:
	  o In the statement, replace "PCB decontamination" with "POPs (listed under Stockholm Convention) destruction technologies".
	  o In the table, add the following techniques:
	  ▪ Mechanical treatment of solid wastes contaminated with POPs and process units are enclosed; the air is collected via a Negative Air System (NAS)
	  ▪ Emissions to air from the NAS are controlled by means of appropriate filters
	  ▪ The process management ensures that no unintentional POPs are generated
	  ▪ The material is reprocessed until the required concentration target is met
	  ▪ The POPs concentration of the output is measured; these measurements are carried out in order to evaluate the treatment efficiency of the applied process.
	  o Add a BAT-associated destruction efficiency for PCDD/F, OCPs, PCBs, and chlorobenzenes, which is set at 99.999 % (calculation based on measurement of all input and output streams).

EIPPCB assessment	• The purpose of the techniques described is to improve the general performance of PCB decontamination, and not only to prevent or reduce a single environmental impact: in that case, the techniques are not equivalent. Furthermore, BAT are neither prescriptive nor exhaustive. • PCB is one POP but even if on the principle the BAT could apply to other POPs, the only example available so far and coming from the data collection concerns the decontamination of equipment containing PCB. • As for mercury, only information about mechanical treatment is available (see BAT 30). • Only one plant (Plant 191) provided data and contextual information and these are about decontamination of equipment, such as transformers. • Technique e is about the management of waste treatment residues when decontaminating a transformer containing oil contaminated with PCB for example. Incineration of oil is one way of eliminating the PCB. • Emission collection and control of the performance of the treatment of emissions to air are part of the generic BAT 10. • Monitoring of emissions to air (which includes monitoring of PCB emissions to air) is defined in BAT 4. • Output quality is not directly in the scope of the BAT conclusions; however, output quality management is now addressed in the modified BAT 2, and should allow the proper performance of the waste treatment, which may include the treatment efficiency rate.
EIPPCB proposal	• To add high-temperature incineration in technique e. • To indicate in technique e and in all techniques that the listed techniques are examples (not an exhaustive or limited list).

2.18.2 Techniques for the prevention or reduction of VOC emissions to air

<table>
<tr><td>Location in D1</td><td>Section 6.4.7.2 – page 919 – BAT 51</td></tr>
<tr><td>Current text in D1</td><td>BAT 51. When solvent washing is used for PCB decontamination, and in order to prevent or, where that is not practicable, to reduce VOC emissions to air and to recover solvent, BAT is to use all of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th></tr>
<tr><td>a</td><td>Recovery of solvent</td><td>Solvent emissions are collected and distilled in order to recover solvent and reuse it in the process</td></tr>
<tr><td>b</td><td>Control of VOC emissions</td><td>Airstreams over the whole working zone are collected (see BAT 10) and treated by activated carbon adsorption (for airstreams with low pollutant content) or thermal oxidation (see Section 6.6.1) for gas streams with high pollutant contents (typically solvent vents, etc.).</td></tr>
</table></td></tr>
<tr><td>Summary of comments</td><td>• (SE 193) Make clear that this applies only to channelled emissions.
• (EEB 310) Add new BATs, techniques, and BAT-AELs:
o Implement an Air Pollution Control System (APS) by using the most appropriate technique to control POP releases form the process including PCT reactors, such as activated carbon, or use a reducing working atmosphere; this APS applies also to indirect thermal desorption.
o Monitoring of air emissions: 3x8 hours sampling each month.
o Set BAT-AELs for PCDD/F and dl-PCB:
▪ PCDD/F + dl-PCB: 0.05 ng I-TEQ/Nm^3 for average of samples obtained during one measurement.
▪ PCDD/F: 0.02 µg (TEQ)/tonne of waste treated as yearly average.</td></tr>
<tr><td>EIPPCB assessment</td><td>• Technique b is to collect airstreams over the whole working zone, and to treat the therefore channelled streams.
• Only one plant provided data on PCB emissions to air. Nevertheless, monitoring of emissions to air (including PCBs and VOC) is defined in BAT 4.
• Technique b is in fact very similar to BAT 50 d and does not bring additional information.</td></tr>
<tr><td>EIPPCB proposal</td><td>• To delete technique b.
• To merge technique a with BAT 50.</td></tr>
</table>

2.19 Descriptions of techniques

2.19.1 Emissions to air

Location in D1	Section 6.6.1 – pages 921-923		
Current text in D1	**Technique**	**Typical pollutant(s) abated**	**Description**
	Absolute filter	Dust	In absolute filters (e.g. HEPA = high-efficiency particle air filter, ULPA = ultra-low penetration air filter), the filter medium is paper or matted glass fibre with a high packing density. The waste gas stream is passed through the filter medium, where particulate matter is collected.
	Adsorption	Mercury, volatile organic compounds, hydrogen sulphide odorous compounds	Adsorption is a heterogeneous reaction in which gas molecules are retained on a solid or liquid surface (adsorbent also referred to as a molecular sieve) that prefers specific compounds to others and thus removes them from effluent streams. When the surface has adsorbed as much as it can, the adsorbed content is desorbed as part of the regeneration of the adsorbent. When desorbed, the contaminants are usually at a higher concentration and can either be recovered or disposed of. The most common adsorbent is granular activated carbon.
	Fabric filter	Dust	Bag or fabric filters are constructed from porous woven or felted fabric through which gases are passed to remove particles. The use of a bag filter requires the selection of a fabric suitable for the characteristics of the waste gas and the maximum operating temperature.
	Biofilter	Ammonia, hydrogen sulphide, volatile organic compounds, odorous compounds	The waste gas stream is passed through a bed of organic material (such as peat, heather, compost, root, tree bark, compost, softwood and different kinds of combinations) or some inert material (such as clay, activated carbon, and polyurethane), where it is biologically oxidised by naturally occurring microorganisms into carbon dioxide, water, inorganic salts and biomass.
	Condensation and cryogenic condensation	Volatile organic compounds	Condensation is a technique that eliminates solvent vapours from a waste gas stream by reducing its temperature below its dew point. Cryogenic condensation can cope with all VOCs and volatile inorganic pollutants, irrespective of their individual vapour pressures. The low temperatures applied allow for very high condensation efficiencies in such a way that it is well-suited as a final VOC emission control technique.

	Cyclone	Dust	Cyclone filters are used to remove heavier particulates, which 'fall out' as the waste gases are forced into a rotating motion before they leave the separator again. Cyclones are used to control particulate material, primarily PM_{10}. There are high-efficiency cyclones (e.g. multi-cyclones) designed to be effective even for $PM_{2.5}$.
	Electrostatic precipitator (ESP)	Dust	Electrostatic precipitators operate such that particles are charged and separated under the influence of an electrical field. Electrostatic precipitators are capable of operating under a wide range of conditions. In a dry ESP, the collected material is mechanically removed (e.g. by shaking, vibration, compressed air), while in a wet ESP it is flushed with a suitable liquid, usually water.
	Leak detection and repair (LDAR) programme	Volatile organic compounds	A structured approach to reduce fugitive VOC emissions by detection and subsequent repair or replacement of leaking components. Currently, sniffing (described by EN 15446) and optical gas imaging methods are available for the identification of leaks. **Sniffing method**: The first step is the detection using hand-held VOC analysers measuring the concentration adjacent to the equipment (e.g. by using flame ionisation or photo-ionisation). The second step consists of enclosing the component in an impermeable bag to carry out a direct measurement at the source of the emission. This second step is sometimes replaced by mathematical correlation curves derived from statistical results obtained from a large number of previous measurements made on similar components. **Optical gas imaging methods**: Optical imaging uses small lightweight hand-held cameras which enable the visualisation of gas leaks in real time, so that they appear as 'smoke' on a video recorder together with the normal image of the component concerned, to easily and rapidly locate significant VOC leaks. Active systems produce an image with a back-scattered infrared laser light reflected on the component and its surroundings. Passive systems are based on the natural infrared radiation of the equipment and its surroundings.
	Thermal oxidation	Volatile organic compounds	The oxidation of combustible gases and odorants in a waste gas stream by heating the mixture of contaminants with air or oxygen to above its auto-ignition point in a combustion chamber and maintaining it at a high temperature long enough to complete its combustion to carbon dioxide and water.

	VOC diffuse emissions monitoring	Volatile organic compounds	Sniffing and optical gas imaging methods are described under leak detection and repair programme. Full screening and quantification of emissions from the installation can be undertaken with an appropriate combination of complementary methods, e.g. Solar occultation flux (SOF) or Differential absorption LIDAR (DIAL) campaigns. These results can be used for trend evaluation in time, cross-checking and updating/validation of the ongoing LDAR programme. Solar occultation flux (SOF): The technique is based on the recording and spectrometric Fourier Transform analysis of a broadband infrared or ultraviolet/visible sunlight spectrum along a given geographical itinerary, crossing the wind direction and cutting through VOC plumes. Differential absorption LIDAR (DIAL): This is a laser-based technique using differential absorption LIDAR (light detection and ranging), which is the optical analogue of radio wave-based RADAR. The technique relies on the back-scattering of laser beam pulses by atmospheric aerosols, and the analysis of the spectral properties of the returned light collected with a telescope.
	Wet scrubbing	Dust, volatile organic compounds, gaseous acids (basic scrubber), gaseous alkalis (acid scrubber)	Wet scrubbing (or absorption) is a mass transfer between a soluble gas and a solvent – often water – in contact with each other. Physical scrubbing is preferred for chemical recovery, whereas chemical scrubbing is restricted to removing and abating gaseous compounds. Physico-chemical scrubbing takes an intermediate position. The component is dissolved in the absorbing liquid and involved in a reversible chemical reaction, which enables the recovery of the gaseous component.
Summary of comments	Whole Section 6.6 • (FR 274, EURITS 74, HWE 81) Add for each technique a new column explaining criteria / applicability for decision making. • (FEAD 212) Section 6.6 should be moved to definitions. • (UK 322) It is not useful to describe techniques which are not named in the BAT conclusions, e.g. electrocoagulation. • Whole Section 6.6.1 • (FR 268, EURITS 68, HWE 75) Separate abatement techniques and monitoring techniques (such as LDAR and VOC diffuse emission monitoring) for the sake of clarity. • (DE 100) Add biowasher in the list of techniques. • (ECN 168) Add encapsulation with semipermeable membranes in the list of techniques. Adsorption • (IE 65) The description does not outline the possibility of adsorbents being exhausted and needing complete replacement. • (FR 269, EURITS 69, HWE 76) Consideration should be added about the risk of clogging due to TSS or salts accumulation or to microorganisms' development, which increases the frequency of activated carbon replacement and thus the associated costs.			

	Biofilter • (FR 270, EURITS 70, HWE 77) The description should mention that the biofilter needs a very constant flow rate and VOC composition to be efficient. • (AT 17) Ammonia is not a pollutant abated by a biofilter and should be moved to "Wet scrubbing" instead. Condensation • (FR 271, EURITS 71, HWE 78) The description should mention that the technique has a good efficiency but that a pretreatment may be needed to remove water, which is not possible when the humidity is too high in the gas. Thermal oxidation • (FR 272, EURITS 72, HWE 79) It should be added in the description that thermal oxidation has a good efficiency but this technique is applicable only if the waste gas to be treated is highly calorific, the concentration of VOC is very high and the air flow rate is low. Wet scrubbing • (EEB 62, DE 395) Mention in the description that wet scrubbing also abates dust. • (FR 273, EURITS 73, HWE 80) Add in the description that the abatement efficiency depends on the nature of the substances to be treated (hydrophilic substances or not) and that scrubbing liquor needs treatment.
EIPPCB assessment	Whole Section 6.6 • This section has been drafted consistently with the other published BAT conclusions where no such information is mentioned in the description of techniques. Information about the applicability may be found in the relevant BAT if relevant. Operational data may be found in the "techniques to consider" sections in the BREF. • Techniques are described according to Commission Implementing Decision 2012/119/EU. Descriptions are gathered in one single section to avoid repetition across the BAT conclusions. • Indeed, it is not useful to describe techniques which are not named in the BAT conclusion. Whole Section 6.6.1 • Separation of techniques related to channelled emissions on one hand and diffuse emissions on the other hand will indeed bring clarity. • Biowasher is not used in the BAT conclusions and encapsulation is mentioned only once so it is not needed to add descriptions of these techniques. Adsorption • A reference to the replacement of the adsorbent would improve the correctness of the description. • The additional information is valuable and consistent with the CWW BREF but more suitable for inclusion under the operational data described in Section 2.3 of the BREF. Biofilter • The additional information is valuable and consistent with the CWW BREF but more suitable for inclusion under the operational data described in Section 2.3 of the BREF. • NH_3: See the assessment related to BAT 32. • The description of the biofilter lacks details about design and operation. Condensation • The additional information is valuable and consistent with the CWW BREF but more suitable for inclusion under the operational data described in Section 2.3 of the BREF. • It seems necessary to clarify the description of cryogenic condensation. Thermal oxidation • The additional information is valuable and consistent with the CWW BREF but more suitable for inclusion under the operational data described in Section 2.3 of the BREF, where it is already mentioned.

	Wet scrubbing • Addition of dust in the description would bring consistency with the "typical pollutant abated" column. • The additional information is valuable and consistent with the CWW BREF but more suitable for inclusion under the operational data described in Section 2.3 of the BREF, where it is already mentioned.
EIPPCB proposal	Whole Section 6.6 • To remove the unnecessary descriptions from the list. Whole Section 6.6.1 • To move LDAR and diffuse VOC emission monitoring in a separate table. Adsorption • To mention the possible replacement of the adsorbent. • To complement Section 2.3 of the BREF with the additional information. Biofilter • To complement Section 2.3 of the BREF with the additional information. • To complement the description with design and operation considerations (see the assessment of comments related to BAT 32). Condensation • To complement Section 2.3 of the BREF with the additional information. • To clarify the description of cryogenic condensation. Wet scrubbing • To mention dust in the technique description. Thermal oxidation • To add more details about the treatment of waste gas containing halogenated compounds (see the assessment of BAT 48).

2.19.2 Emissions to water

Location in D1	Section 6.6.2 – pages 924-926

Current text in D1

Technique	Typical pollutant(s) targeted	Description
Equalisation	All pollutants	Balancing of flows and pollutant loads by using tanks or other management techniques.
Neutralisation	Acids, alkalis	The adjustment of the pH of waste water to a neutral level (approximately 7) by the addition of chemicals. Sodium hydroxide (NaOH) or calcium hydroxide ($Ca(OH)_2$) may be used to increase the pH; whereas, sulphuric acid (H_2SO_4), hydrochloric acid (HCl) or carbon dioxide (CO_2) may be used to decrease the pH. The precipitation of some substances may occur during neutralisation.
Oil-water separation	Oil/grease	The separation of oil and water and subsequent oil removal by gravity separation of free oil, using separation equipment or emulsion breaking, using emulsion breaking chemicals such as metal salts, mineral acids, adsorbents and organic polymers.
Coagulation and flocculation	Suspended solids	Coagulation and flocculation are used to separate suspended solids from waste water and are often carried out in successive steps. Coagulation is carried out by adding coagulants with charges opposite to those of the suspended solids. Flocculation is carried out by adding polymers, so that collisions of microfloc particles cause them to bond to produce larger flocs.
Electrocoagulation		The release of coagulants in the waste water to be treated is realised by electrolytically dissolving an electrode (i.e. anode, normally made of Fe or Al). When the electrode is dissolved, gas is released (i.e. O_2, H_2) which results in a flotation effect. If necessary, a (support) flocculant can be added to improve the flotation yield.

	Filtration		The separation of solids from waste water by passing them through a porous medium, e.g. sand filtration, microfiltration and ultrafiltration.
	Flotation		The separation of solid or liquid particles from waste water by attaching them to fine gas bubbles, usually air. The buoyant particles accumulate at the water surface and are collected with skimmers.
	Membrane filtration		Microfiltration (MF) and ultrafiltration (UF) are membrane processes that retain and concentrate on one side of the membrane substances such as suspended particles and colloidal particles contained in waste waters.
	Sedimentation		The separation of suspended particles by gravitational settling.
	Adsorption	Soluble non-biodegradable or inhibitory contaminants, e.g. organics	Adsorption is the transfer of soluble substances (solutes) from the waste water phase to the surface of solid, highly porous particles (the adsorbent). The adsorbent most commonly used is activated carbon.
	Distillation/rectification	Soluble non-biodegradable or inhibitory contaminants	Distillation or rectification is the separation of waste water from its contaminants by transferring them into the vapour phase. The enriched vapour phase is condensed afterwards.
	Chemical precipitation	Soluble non-biodegradable or inhibitory contaminants, e.g. metals, phosphorus	The conversion of dissolved pollutants into insoluble compounds by adding chemical precipitants or by changing the pH. The solid precipitates formed are subsequently separated by sedimentation, air flotation or filtration. If necessary, this may be followed by microfiltration or ultrafiltration.
	Chemical oxidation	Soluble non-biodegradable or inhibitory contaminants, e.g. nitrite, cyanide	Chemical oxidation is the conversion of pollutants by chemical oxidising agents other than oxygen/air, or by bacteria, into similar but less harmful or hazardous compounds and/or to short-chained and more easily degradable or biodegradable organic components. Chemical oxidation is also used to degrade organic compounds causing odour, taste, colour and for disinfection purposes

	Chemical reduction	Soluble non-biodegradable or inhibitory contaminants, e.g. chromium (VI)	Chemical reduction is the conversion of pollutants by chemical reducing agents into similar but less harmful or hazardous compounds
	Evaporation	Soluble non-biodegradable or inhibitory contaminants	Evaporation of waste water is a distillation process where water forms the vapour phase, leaving the concentrate as bottom residue to be disposed of. The volatile steam is collected in a condenser and the condensed water is, if needed after subsequent treatment, recycled.
	Ion exchange process	Soluble non-biodegradable or inhibitory contaminants, e.g. metals	Ion exchange is the removal of undesired or hazardous ionic constituents of waste water and their replacement by more acceptable ions from an ion exchange resin, where they are temporarily retained and afterwards released into a regeneration or backwashing liquid.
	Nanofiltration and reverse osmosis	Soluble non-biodegradable or inhibitory contaminants	A membrane process is the permeation of a liquid through a membrane, to be segregated into permeate that passes through the membrane and concentrate that is retained. The driving force of this process is the pressure difference across the membrane. Nanofiltration and reverse osmosis membranes can hold back all particles down to the size of organic molecules and even ions.
	Stripping	Soluble non-biodegradable or inhibitory contaminants, e.g. hydrogen sulphide (H_2S), ammonia (NH_3), adsordable organically bound halogens (AOX), hydrocarbons	The removal of volatile pollutants from waste water by bringing them into contact with a high volume flow of a gas current in order to transfer them to the gas phase. The pollutants are removed from the stripping gas in a downstream treatment such as condensation and phase separation, and may potentially be reused.

	Activated sludge process	Biodegradable organic compounds	The biological oxidation of dissolved organic substances with oxygen using the metabolism of microorganisms. In the presence of dissolved oxygen (injected as air or pure oxygen), the organic components are transformed into carbon dioxide, water or other metabolites and biomass (i.e. the activated sludge). The microorganisms are maintained in suspension in the waste water and the whole mixture is mechanically aerated. The activated sludge mixture is sent to a separation facility from where the sludge is recycled to the aeration tank.
	Anaerobic treatment		Anaerobic waste water treatment converts the organic content of waste water, with the help of microorganisms and without entry of air, to a variety of products such as methane, carbon dioxide, sulphide, etc.
	Membrane bioreactor		A combination of activated sludge treatment and membrane filtration. Two variants are used: a) an external recirculation loop between the activated sludge tank and the membrane module; and b) immersion of the membrane module into the aerated activated sludge tank, where the effluent is filtered through a hollow fibre membrane, the biomass remaining in the tank.
	Nitrification/denitrification	Total nitrogen, ammonia	A two-step process that is typically incorporated into biological waste water treatment plants. The first step is the aerobic nitrification where microorganisms oxidise ammonium (NH_4^+) to the intermediate nitrite (NO_2^-), which is then further oxidised to nitrate (NO_3^-). In the subsequent anoxic denitrification step, microorganisms chemically reduce nitrate to nitrogen gas.
Summary of comments	• No comments.		
EIPPCB assessment	• Some techniques are not used in the BAT conclusions and should therefore not be described here, namely electrocoagulation, nanofiltration, reverse osmosis and anaerobic treatment. • Some descriptions have been improved and agreed along the review of other BAT conclusions (for instance BAT Conclusions for Large Volume Organic Chemicals) and this should be reflected.		

EIPPCB proposal	• To remove the unnecessary descriptions. • To update the descriptions

2.19.3 Sorting techniques

Location in D1	Section 6.6.3 – pages 927-928

Current text in D1

Technique	Description
Air classification	Air classification (or air separation, or aeraulic separation) is a process of approximate sizing of dry mixtures of different particle sizes into groups or grades at cut points ranging from 10 mesh to sub-mesh sizes. Air classifiers (also called windshifters) complement screens in applications requiring cut points below commercial screen sizes, and supplement sieves and screens for coarser cuts where the special advantages of air classification warrant it.
All metal separator	Metals (ferrous and non-ferrous) are sorted by means of a detection coil in which the magnetic field is influenced by metal particles, linked to a processor that controls the air jet for ejecting the materials that have been detected.
Ballistic separation	Materials are separated in a ballistic separator, or ballistic sieve, composed of a series of parallel paddles, with orbital motion, arranged with a variable angle with respect to the horizontal. The materials fed into the ballistic separator, having different physical characteristics (weight, shape, surface…), assume different trajectories following the orbital movement of the paddles.
Electromagnetic separation of non-ferrous metals	Non-ferrous metals are sorted by means of eddy current separators. An eddy current is induced by a series of rare earth magnetic or ceramic rotors at the head of a conveyor that spins at high speed independently of the conveyor. This process induces temporary magnetic forces in non-magnetic metals of the same polarity as the rotor, causing the metals to be repelled away and then separated from the other feedstock.
Manual separation	Material is manually separated by means of visual examination by staff on a picking line to either selectively remove a target material from a general waste stream, or to remove contamination from an output stream to increase purity. This technique generally targets recyclables (glass, plastic, etc.) and any contaminants, hazardous materials and oversize materials such as WEEE. Manual separation takes place within a covered cabin isolated from the rest of the mechanical treatment hall, to limit staff exposure, e.g. to dust and particulates, vehicle movements, and vibration.
Magnetic separation	Ferrous metals are sorted by means of a magnet which attracts ferrous metal materials. This can be carried out, for example, by an overband magnetic separator, or a magnetic drum.
Near infrared spectroscopy (NIS)	Materials are sorted by means of a near infrared sensor which scans the whole width of the belt conveyor and transmits the characteristic spectra of the different materials to a data processor which controls an air jet for ejecting the materials that have been detected.
Sink-float tanks	Solid materials are separated into two flows by exploiting the different material densities..

	Size separation	Materials are sorted according to their particle size. This can be carried out by drum screens, linear and circular oscillating screens, flip-flop screens, flat screens, tumbler screens and moving grates.
	Vibration table	Materials are separated according to their density and size, moving (in slurry in the case of wet tables, or wet density separators) across an inclined table, which oscillates backwards and forwards.
	X-ray systems	Metal composites are sorted according to various material densities, halogen components, or organic components, with the aid of x-rays.
Summary of comments	Ballistic separation • (AT 12) For clarification, add a reference to conveyor belts: "(…) the orbital movement of the paddles/conveyor belts". Manual separation • (AT 13) Cabin should be described as air-conditioned. Manual pre-sorting can also be executed on the ground. • (FEAD 154) Manual sorting can also be executed on the ground and not only in cabins.	
EIPPCB assessment	Ballistic separation • The proposal indeed improves the clarity of the description. Manual separation • The cabin refers to permanent workstations only. The current definition is too restrictive.	
EIPPCB proposal	Ballistic separation • To mention conveyor belts in the description of ballistic separation. Manual separation • To delete the last sentence of the definition.	

2.19.4 Management techniques

<table>
<tr><td>Location in D1</td><td>Section 6.6.4 – page 928</td></tr>
<tr><td>Current text in D1</td><td><table>
<tr><td>Accident management plan</td><td>The accident management plan is part of the EMS (see BAT 1) and identifies hazards posed by the plant and the associated risks and defines measures to address these risks. It considers the inventory of substances present or likely to be present which could have environmental consequences if they escape.</td></tr>
<tr><td>Residue management plan</td><td>A residue management plan is a set of measures aiming to 1) minimise the generation of residues arising from the treatment of waste; 2) optimise the reuse or regeneration of the residues; and 3) ensure the proper disposal of internal residues or waste</td></tr>
</table></td></tr>
<tr><td>Summary of comments</td><td><u>Whole section</u>
• (DE 49, 50, 51) Add descriptions of odour management plan, noise and vibration management plan, as well as deflagration management plan.

<u>Residue management plan</u>
• (ESRG 24. UK 323) Recycling and thermal recovery should also be mentioned to better reflect the waste hierarchy.
• (DE 52) Add in the description a link to BAT 1.</td></tr>
<tr><td>EIPPCB assessment</td><td><u>Whole section</u>
• Section 6.6 aims at describing techniques which are referred to in the BATC in order to avoid repetition. As the aforementioned management plans are defined earlier in the BREF and appear in the BATC only once, the descriptions are not repeated here.

<u>Residue management plan</u>
• The proposed additions would indeed improve the completeness of the description.</td></tr>
<tr><td>EIPPCB proposal</td><td>• To amend the description of the residue management plan.</td></tr>
</table>