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Implementing EU environmental standards for waste treatment

Guidance for Non-governmental Organisations on the EU Waste Treatment BREF

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Contents

Executive summary 4

Introduction 6

The environmental impact of waste treatment 6

The EU Industrial Emissions Directive (IED) and the Best Available Techniques Reference documents (BREFs) 8

The original WT BREF 10

The revised WT BREF: what changes with the new BAT conclusions published in 2018? 11

Air Pollution 13

Focus sector: mechanical treatment in shredders of metal waste 15

Air pollution monitoring 19

Water Pollution 21

Focus sector: Treatment of water-based liquid waste 24

Water pollution monitoring 27

Soil pollution 29

Treatment of hazardous waste 30

The right to know & participate in the permitting procedure 34

List of main recommendations 34

Annexes 40

Executive summary

The purpose of this document is primarily to brief Non-governmental Organisations (NGOs) active in the field of environmental protection, and with particular focus on addressing the impact of industrial activities, on the recently adopted EU Best Available Techniques Reference Document on Waste treatment or WT BREF.

Part of the WT BREF form the so-called Best Available Techniques (BAT) conclusions: the conclusions on the most effective techniques that the industry can employ to prevent or minimise the impact of their activities. The BAT conclusions for waste treatment have been published in the EU Official Journal in August 2018[1], triggering a maximum four-year deadline by which installations across the EU must comply with the updated requirements. In cases where the BAT conclusions are published before the permit is issued, the installations in question must immediately comply with the requirements.

The overall outcome of the review is positive. There are several improvements compared to the original standards[2]. One of the most important changes is that the scope of the BAT conclusions was extended to cover the mechanical treatment in shredders of metal waste, including WEEE[3] and end-of-life vehicles and their components.

However, there are still areas where the ambition level was compromised, especially regarding the biological treatment of waste, e.g. for manure treatment which was partly excluded from scope (when it comes specifically to *'on farm processing of manure, when this is covered by the BAT conclusions for intensive rearing of poultry or pigs*[4]) and, even for the cases included under the scope, exemptions were still introduced regarding the odour and NH3 emission levels to air.

There are also areas where the most effective techniques are put forward, but their proper implementation is not secured due to their non-prescriptive descriptions and vague applicability restrictions.

The Industrial Emissions Directive (IED) gives the right to NGOs to be informed and consulted during the permitting process and their participation is crucial for the ambitious implementation of such standards.

NGOs operating at national / local level are therefore advised to closely follow the upcoming / on-going permitting process and bring the recommendations outlined in this report to the attention of their competent authorities. It should be noted that due to considerations of investment certainty the revision of permits will start very early, and first review applications are expected by August 2019. For countries that implement the BAT conclusions through sector-level general binding rules the national transposition process has already started.

[1] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.208.01.0038.01.ENG&toc=OJ:L:2018:208:FULL
[2] WT BREF 2006: http://eippcb.jrc.ec.europa.eu/reference/BREF/wt_bref_0806.pdf
[3] WEEE: Waste Electrical and Electronic Equipment (as defined in Article 3(1) of Directive 2012/19/EU on waste electrical and electronic equipment
[4] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2017.043.01.0231.01.ENG&toc=OJ:L:2017:043:FULL

This report aims to assist them in this mission, offering a first introduction to the topic (for example what these requirements are, the scope of sectors and activities to which they apply) and specific recommendations for selected industry sectors.

In terms of air pollution, emphasis is given to the requirements for the prevention or reduction of diffuse pollutant emissions to air (BAT 14) with particular focus to the mechanical treatment in shredders of metal waste (BAT 25, 27). In terms of water pollution, emphasis is given to the requirements for the reduction of pollutant emissions to water (BAT 20) with particular focus to the treatment of water-based liquid waste (BAT 52). Additional effective techniques that were not included in the BAT conclusions as a result of political compromises (or procedural reasons) are also presented. The requirements for pollution monitoring, as well as techniques for the efficient and safe treatment of hazardous waste are also discussed.

The sectors and/or aspects tackled are not meant to be exhaustive or presented in order of priority; the aim of report is to provide NGOs with concrete examples of ambitious implementation of these standards based on the EEB's experience and involvement in drafting these standards at EU level. The focus on implementation should be adapted based on the national / local circumstances to address the most pressing issues.

Introduction

The environmental impact of waste treatment

The Waste Treatment BREF (WT BREF) covers a very wide range of waste treatment activities, primarily those leading to air and water emissions. Depending on the composition of the waste input and the treatment process itself, the potential range of components that might be present in emissions is vast. Due to such variance in components and composition, there are few common emissions from waste management operations, since each site has a slightly different combination of unit operations and accepts a different range of wastes based on local circumstances.

Most waste treatment installations emit **carbon dioxide**, **ammonia** and **particulate matter.** Issues such as **odour** and **volatile organic compounds** are also relevant, in particular for biological and solvents wastes streams treatment. Other contaminants that might be relevant for some sites are acids (**hydrogen chloride**), **amines**, **nitrogen oxides**.

The most common water pollutants are **heavy metals** and certain **organic chemicals** which are also relevant to soil contamination (in particular due to diffuse emissions from physico-chemical treatment and mechanical treatment). Other components that may occur are **PAHs**[5] and **dioxins** mainly because they are imported with the waste to be treated.

The tables below summarise the main pollutants emitted by waste treatments to air and water and their main sources (source: WT BREF 2018[6]).

Table 1: Main air pollutants emitted by waste treatments and their main sources

Main emissions to air	Waste treatment operation
Dust	Storage and handling of solids Mechanical treatment and physico-chemical treatment of solid waste
Ammonia (NH_3)	Biological treatment, including mechanical biological treatment
Hydrogen sulphide (H_2S)	Biological treatment
Hydrogen chloride (HCl)	Treatment of water-based liquid waste
Volatile organic compounds (VOCs)	Storage and handling of organic substances Treatment of WEEE containing VFCs and/or VHCs Treatment of waste with calorific value Mechanical biological treatment Treatment of waste oil Treatment of waste solvent

[5] PAHs: Polycyclic Aromatic Hydrocarbons

[6] http://eippcb.jrc.ec.europa.eu/reference/BREF/WT/JRC113018_WT_Bref.pdf

Table 2: Main water pollutants emitted by waste treatments and their main sources

Main emissions to water	Waste treatment operations
Biodegradable organic compounds (e.g. COD, TOC, BOD)	All waste treatment
Total suspended solids	All waste treatment
Hydrocarbons, phenols	Mechanical treatment of metal waste treatment of waste oil Physico-chemical treatment of waste with calorific value Water washing of excavated contaminated soil Treatment of water-based liquid waste
Total nitrogen	Biological treatment Treatment of waste oil Treatment of water-based liquid waste
Total phosphorus	Biological treatment Treatment of waste oil Treatment of water-based liquid waste
Metals and metalloids	Mechanical treatment of metal waste Treatment of WEEE containing VFCs and/or VHCs Mechanical biological treatment Physico-chemical treatment of waste oil, of waste with calorific value, of solid and/or pasty waste Treatment of water-based liquid waste

Other environmental concerns are linked to the outputs of the installations (depending on the type of waste treated/the treatment itself/the management and final destination of the output streams) and soil/groundwater contamination.

The EU Industrial Emissions Directive (IED) and the Best Available Techniques Reference documents (BREFs)

The Industrial Emissions Directive (IED)[7] is an EU law that aims to prevent and control the environmental impact of industrial activities.

Some 50 000 industrial installations[8] in the EU, including waste treatment installations, must have an environmental permit based on the requirements of the IED.

Operating permits include binding Emission Limit Values (ELVs) for harmful substances. These limits are based on what can be achieved using the Best Available Techniques (BATs). Which techniques are considered as 'BAT' is defined in the binding conclusions (BAT conclusions) of industry-specific reference documents known as 'BREFs'.

Drafting BREFs:

The preparation of the BREFs is coordinated by the European Commission through the European Integrated Pollution Prevention and Control Bureau (EIPPCB) of the Institute for Prospective Technological Studies at the EU Joint Research Centre in Seville (Spain).

A consultation process is conducted with a Technical Working Group (TWG), which for the waste treatment BREF was composed of 270 members – 129 of which represented Member States and Norway, 17 the European Commission, 118 industry and 6 environmental protection NGOs (represented by the EEB).

The so-called *'Sevilla process'* includes the gathering of environmental performance data e.g. the levels of pollutant emissions to air and water, from hundreds of installations currently operating across Europe. Despite the fact that this data is supposed to be gathered from the best-performing installations, in order to demonstrate what the 'best available' techniques are, in some cases average- to bad-performing installations are put forward by industry / industry-friendly member state delegations, with the aim to reduce the ambition level. This needs to be kept in mind during the implementation phase.

The voice and interests of EU citizens are supposed to be represented in the process by both environmental NGO and Member State delegates. However, rather than sending neutral environmental experts or if not available give up their seat, some countries choose to send industry representatives to occupy their national seats (see info-box).

[7] Directive 2010/75/EU on industrial emissions: http://ec.europa.eu/environment/industry/stationary/ied/legislation.htm
[8] Installations undertaking the industrial activities listed in Annex I of the IED

Industry infiltration in Member State delegations (WT BREF review)
The delegations of Spain and the UK were made up of 3 out of 9 and 5 out of 12 members respectively that were employees of industry groups. Other cases include: Poland (3 out of 12); Romania and Croatia (1 out of 2); Bulgaria (1 out of 3) and the Czech Republic (1 out of 4).
This infiltration raises the number of industry representatives to 133 – making them the largest group represented and outnumbering the independent Member State delegates.

This used to be standard (mal-)practice in BREFs reviews, until the European Commission took the step in March 2018 to enforce the *'horizontal rules on the creation and operation of Commission expert groups'*[9], which clearly state that Member States' authorities and other public entities shall only be represented by civil servants or public employees. The move was welcomed by environmental NGOs who continue to advocate for a more fair, inclusive and transparent process.

Implementing BREFs:

The publication of the BAT conclusions in the EU Official Journal triggers a four-year deadline by which – at the latest[10] – installations across the EU must comply with the updated requirements. In cases where the BAT conclusions are published before the permit is issued, the installations in question must immediately comply with the requirements.

Some member states set requirements for certain categories of installations in **sector-level general binding rules applying at national or regional level**, while others set dedicated requirements directly for the installations in question.

Permit writers have some flexibility when setting such requirements, including when setting ELVs: the BAT conclusions define a range of achievable pollutant emissions, also known as 'Best Available Techniques-Associated Emissions Levels', or 'BAT-AELs' (for example the BAT-AELs for channelled TVOC[11] and CFCs[12] emissions to air from the treatment of WEEE[13] is 3 – 15 mg/Nm^3). The permit writer will set an ELV within this range and in many cases based on the upper end of the range, whilst this is not in the spirit of the IED framework to aim for pollution prevention first. The upper end shall not be exceeded, unless the operator has been granted a derogation as described in Article 15.4 of the IED.

[9] http://ec.europa.eu/transparency/regexpert/PDF/C_2016_3301_F1_COMMISSION_DECISION_EN.pdf
[10] The competent authorities are entitled to apply the BAT conclusions before the four-year period expires
[11] TVOC: Total volatile organic carbon, expressed as C (in air)
[12] CFCs: Chlorofluorocarbons, volatile organic compounds consisting of carbon, chlorine and fluorine
[13] WEEE: Waste Electrical and Electronic Equipment (as defined in Article 3(1) of Directive 2012/19/EU on waste electrical and electronic equipment

The original WT BREF

The original WT BREF (hereafter '2006 WT BREF')[14] was aiming to outline the best available techniques for the prevention or – when prevention was not possible – the minimization of the environmental impacts associated with the treatment of waste.

The 2006 WT BREF covered the installations of several waste (hazardous and non-hazardous) treatments, and dealt with:

- **common waste treatments** such as the temporary storage of waste, blending and mixing, waste reception, sampling, checking and analysis, waste transfer and handling;
- **biological treatments of waste** such as aerobic/anaerobic treatments and mechanical and biological treatments;
- **physico-chemical treatments of waste** such as neutralisation, chromic acid and cyanide treatments, dewatering, filtration, oil/water separation, precipitation, separation of mercury from waste, solidification and stabilization;
- **treatments to recover mainly waste material** such as the re-concentration of acids and bases, the regeneration of organic solvents and the re-refining of waste oils;
- **treatments to produce mainly solid and liquid fuels** from hazardous and non-hazardous waste.

The BREF included 130 BAT conclusions (found in Annex I) addressing, among others, the issues of: sound environmental management practices such as the establishment of a suitable Environmental Management System (EMS) and a system to guarantee the traceability of waste treatment, improvement of knowledge on the 'waste IN' such as the establishment of waste pre-acceptance/acceptance procedures, improvement of knowledge on the 'waste OUT' taking into consideration the relevant parameters of the receiving facility, utilities and raw materials management, pollutant emissions to air, to water and to soil, as well as the management of process-generated residues.

[14] WT BREF 2006: http://eippcb.jrc.ec.europa.eu/reference/BREF/wt_bref_0806.pdf

The revised WT BREF: what changes with the new BAT conclusions published in 2018?

The review of the '2006 WT BREF' started in 2013, aiming to adapt the document to technological advances and changes in scientific knowledge and understanding. The final version of the revised 2018 WT BREF, which has been published on the European Commission website of the IPPC Bureau on October, is a 851 pages long document, which provides the background information to the BAT-Conclusions for the waste treatment sector[15].

Following years of expert consultations, the revised BAT conclusions were published in the EU Official Journal in August 2018[16]. The **maximum four-year compliance deadline ends on 17 August 2022**. Due to considerations of investment certainty the revision of permits will start very early, and first review applications are expected by August 2019. For countries that implement the BAT conclusions through general binding rules the national transposition process has already started.

There are now 53 BAT conclusions, of which 24 apply to the sector as a whole and 29 apply to the most common waste treatments, including mechanical, biological and physico-chemical treatments. The conclusions also apply to independently operated treatment of waste water, if it is discharged by waste treatment installations falling under the scope of these BAT conclusions.

One of the most important changes is that the scope of the updated BAT conclusions has been extended to cover the mechanical treatment in shredders of metal waste, including WEEE[17] and end-of-life vehicles and their components.

It is estimated that around 4 000 installations fall under the scope of the conclusions[18].

Overall outcome of the review is positive; there have been several improvements compared to the original conclusions of 2006.

Most notably: **in terms of air pollution,** diffuse emissions[19] of dust, heavy metals and other toxic substances will now have to be captured and properly treated in most waste treatment facilities that fall under the scope of the BAT conclusions – the only exception concerns the facilities for biological treatment of waste. This is for example important for shredders of metal waste, where emissions are linked to the shredding process itself, to the handling of residues e.g. SLF[20], to material transports etc. Further techniques for the prevention / management of deflagrations (explosions) reported in shredding facilities have been included. To realise the importance of such measures, one should be aware that the

[15] http://eippcb.jrc.ec.europa.eu/reference/BREF/WT/JRC113018_WT_Bref.pdf
[16] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.208.01.0038.01.ENG&toc=OJ:L:2018:208:FULL
[17] WEEE: Waste Electrical and Electronic Equipment (as defined in Article 3(1) of Directive 2012/19/EU on waste electrical and electronic equipment
[18] https://ec.europa.eu/jrc/en/news/new-eu-environmental-standards-waste-treatment
[19] Diffuse emissions may further cause water / soil pollution due to atmospheric deposition
[20] SLF: Shredder Light Fraction, which is mainly plastics e.g. from vehicles

data collection revealed a max of 70 deflagrations per year (per installation) – with an operator in the UK reporting 220 (!) incidents in year 2012. The environmental impact of this industry is expected to be significantly reduced provided sound implementation occurs at the sites concerned.

Regarding water pollution, a key highlight was the inclusion of monitoring requirements and so-called BAT-AELs in case of indirect discharges as well (indirect discharge = discharge not directly to the environment, but to a sewer or to an off-site waste water treatment plant). This is important as common waste water treatment plants may not be fitted to treat toxic heavy metals or other persistent pollutants.

However, there are still areas where the ambition level has been compromised, especially regarding the biological treatment of waste where e.g. manure treatment, has been fully exempted regarding odour and ammonia emission levels, whose applicability – this exception aside – is now extended to all biological treatments[21]. The revised air emission levels for MBT facilities (MBT = Mechanical Biological Treatment) treating mixed residual waste are also not representative of what can be achieved by the application of BAT.

Furthermore, the text wording concerning the **management of hazardous wastes** is vague (describing the aim of the different BAT rather than the techniques themselves), leaving the national authorities with additional responsibility to 'concretise' these conclusions and ensure their proper implementation in order to curb current illegal practice (in quite a few member states) in relation to the dilution of hazardous wastes with non-hazardous ones and their re-direction to cheaper, inefficient treatment options.

[21] In 2006 WT BREF, odour and ammonia emission levels only applied to MBT (MBT = Mechanical Biological Treatment) facilities

Air Pollution

The BAT conclusions include techniques aiming at preventing, or where this is not possible, reducing channeled[22] and diffuse[23] emissions to air, odour, as well as emissions to air from flares[24].

There are dedicated BAT conclusions addressing the air emissions arising from:

- the mechanical treatment of waste (the treatment in shredders of metal waste, the treatment of WEEE[25] containing VFCs[26] and/or VHCs[27], the treatment of waste with calorific value, the treatment of WEEE containing mercury),
- the biological treatment of waste (aerobic, anaerobic and mechanical-biological treatments),
- the physico-chemical treatment of waste (treatment of solid/pasty waste, re-refining of waste oil, treatment of waste with calorific value, regeneration of spent solvents, treatment of spent activated carbon, waste catalysts, excavated contaminated soil, decontamination of equipment containing PCBs[28]) and for the treatment of water-based liquid waste.

BAT-AELs are set for dust, TVOC[29], ammonia, hydrogen chloride, mercury, CFCs[30] and odour – depending on the process in question.

BAT on the prevention or reduction of diffuse emissions to air (BAT 14)
This BAT outlines techniques for the prevention or, where that is not practicable, the reduction of diffuse emissions to air, in particular of dust, organic compounds and odour.

These techniques are very important especially for mechanical treatment installations such as shredders of metal waste or the treatment of waste with calorific value.

Depending on the risk posed by the waste in terms of diffuse emissions, NGOs should demand from the competent authority to properly implement BAT 14(d) in particular *('containment, collection and treatment of diffuse emissions'*). The consideration of BAT 14(d) is mandatory for most installations falling under the scope of these BAT conclusions (with the exception of the installations for the biological treatment of

[22] Channelled emissions: emissions of pollutants into the environment through any kind of duct, pipe, stack, etc. This also includes emissions from open-top biofilters
[23] Diffuse emissions: non-channelled emissions e.g. of dust which can result from 'area' sources e.g. tanks or 'point' sources e.g. pipe flanges; this also includes emissions from open-air windrow composting
[24] 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
[25] WEEE: Waste electrical and electronic equipment (as defined in Article 3(1) of Directive 2012/19/EU)
[26] VFCs or Volatile (hydro)fluorocarbons: volatile organic compounds consisting of fluorinated (hydro)carbons, in particular chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs)
[27] VHCs or Volatile hydrocarbons: volatile organic compounds consisting entirely of hydrogen and carbon (e.g. ethane, propane, iso-butane, cyclopentane)
[28] PCB: polychlorinated biphenyl
[29] TVOC: Total volatile organic carbon, expressed as C (in air)
[30] CFCs: Chlorofluorocarbons, volatile organic compounds consisting of carbon, chlorine and fluorine

waste) but its proper implementation is not secured due to its non-prescriptive description and applicability restrictions.

	Technique	Description	Applicability
d.	Containment, collection and treatment of diffuse emissions	This includes techniques such as: — storing, treating and handling waste and material that may generate diffuse emissions in enclosed buildings and/or enclosed equipment (e.g. conveyor belts); — maintaining the enclosed equipment or buildings under an adequate pressure; — collecting and directing the emissions to an appropriate abatement system (see Section 6.1) via an air extraction system and/or air suction systems close to the emission sources.	The use of enclosed equipment or buildings may be restricted by safety considerations such as the risk of explosion or oxygen depletion. The use of enclosed equipment or buildings may also be constrained by the volume of waste.

On-going adaptation of the German regulation TA Luft:

Germany is one of the EU member states that implements the BAT conclusions through sector-level general binding rules applying at national level.

The regulators, recognising that diffuse emissions is a key issue for the waste sector in general and the mechanical treatment of waste in particular, proceeded to propose a clear implementation approach for BAT 14(d):

Proposed draft requirements for shredders of metal waste: *'emissions from collected sources e.g. shredders, screening equipment, etc. shall be extracted and fed to a suitable waste gas purification facility. Suitable technical measures e.g. pressure relief flaps or equivalent technical equipment, shall be taken to protect the waste gas purification facility against possible damage or functional impairments caused by deflagrations in the shredder'*[31].

Proposed draft requirements for the mechanical treatment of WEEE containing mercury: *'facilities for the delivery, storage and treatment of mercury-containing input materials shall be constructed in closed rooms in which the air pressure is to be kept lower than atmospheric pressure by suction in the sluice area or in the loading and unloading area as well as storage. The waste gas shall be fed into a waste gas purification facility'*[32].

[31] TA Luft (under review), section 5.4.8.9.1(f): https://www.bmu.de/gesetz/entwurf-zur-neufassung-der-ersten-allgemeinen-verwaltungsvorschrift-zum-bundes-immissionsschutzgeset/ (please note that the updated TA Luft should be published end 2019)
TA Luft (2002) in English: https://www.bmu.de/fileadmin/Daten_BMU/Download_PDF/Luft/taluft_engl.pdf

[32] TA Luft (under review), section 5.4.8.10(k)

Focus sector: mechanical treatment in shredders of metal waste

One of the waste treatment sectors that deserve the most attention when it comes to addressing the air pollution aspect is the shredders of metal waste. Emissions to air include dust carrying particulate-bound heavy metals, VOC and potentially dioxin-like PCBs (dl-PCBs). Diffuse emissions further cause water / soil pollution due to atmospheric deposition.

There have been many studies[33] concerning elevated levels of heavy metals, dioxins and dl-PCBs in the surroundings of such installations. In Essen (Germany) the shredding installation of company Richter was shut down in 2016 due to high concentrations of dioxins and dl-PCBs in the vicinity of the installation[34]. The same environmental pollution concerns have been revealed at several French shredders e.g. site GDE in Salaise-sur-Sanne[35].

The main pollution source is the diffuse emissions occurring during the waste input handling phase (transport, unloading, and scrap / outputs handling in unprotected transportation belts and transfer points), the treatment phase (shredding the scrap, deflagrations (explosions) e.g. due to rests of fuels in car vehicles) and during the handling and storing of residues (especially SLF[36]) post-treatment. In terms of deflagrations the BREF lists several installations where a very high number of incidents occurred (2018 WT BREF, page 280). An extreme number of deflagrations has been reported by the UK installation S. Norton and Co Ltd. in Liverpool (up to 220 in 2012!).

BAT on the prevention or reduction of diffuse emissions to air (BAT 14) – additional techniques

As aforementioned, the prevention/reduction of diffuse emissions is a key issue for the sector.
In addition to the techniques included in BAT 14 mentioned above, the following techniques were identified by the EEB and EU member state experts during the BREF review, but not included in the final text of the BAT conclusions due to big opposition by industry:

- *In order to prevent diffuse emissions, BAT is to apply all the techniques mentioned in BAT 14g and mentioned below:*
  Set up and implement a diffuse emission reduction program designed to identify the sources of diffuse emissions using e.g. for dust EN 15445 (e.g. potential leaks of shredders, conveyor belts, transfer points, drop heights), to estimate the contribution of the sources and to define and implement appropriate actions and techniques to prevent or reduce diffuse emissions over a given time frame.

- *In order to determine the contamination of dl-PCB and PCDD/F in the vicinity of shredding installations, BAT is to monitor these substances (in dust deposition samples) at a maximum distance to the boundary of the site of up to 300 meters. Operators shall ensure that all necessary measures are taken so that the action*

[33] https://www.lfu.bayern.de/analytik_stoffe/analytik_org_stoffe_pop/schredderanlagen_abfalldeponien/index.htm
[34] http://www.derwesten.de/staedte/essen/firma-richter-schliesst-gift-schredder-in-essen-kray-id12283951.html
[35] see Table 3.2 on page 251 of 2018 WT BREF, data provided by the EEB (reference number #103)
[36] SLF: Shredder Light Fraction which is mainly plastics e.g. from vehicles

thresholds referred to in Annex II of Directive 2002/32/EC[37] are not exceeded. Sampling needs to be performed once a year during the vegetation period in case of vegetation samples for animal food. The frequency may be reduced when no action threshold is exceeded.

The following additional techniques were further proposed based on a study[38] by VITO on scrap handling, treatment and dismantling, outlining sector-specific BAT for preventing diffuse dust emissions.

- To store the following fractions in an enclosed space:
    - light fractions of the shredder residue;
    - dust derived from sweeping of the waste treatment area;
    - dust derived from the dedusting equipment.
- To fit spray nozzles or rubber flaps to the inlet and outlet of the shredding installation
- To use enclosed conveyor belts or protect conveyor belts against the influences of wind

  The conveyor belt just after the shredder housing (rotor) may, because of risk of fire, not be closed. Here, however, wind protection methods (long screens, cross screens) or nozzles are installed.

- To enclose the transfer points on conveyor belts for the light fractions of the shredder residue
- To implement a dust management plan.

Depending on the risk posed by the installation, in terms of diffuse emissions, to the surrounding areas, it is advisable to bring these techniques to the attention of the competent authority.

CAUTION: BAT 14 leaves a margin of interpretation to the competent authorities on whether to require the containment, collection and treatment of diffuse emissions (BAT 14.d), depending on the "*risk posed by the waste in terms of diffuse emissions to air*". Because this technique involves costs for the operator, they would certainly argue there is no "risk".

It is worth to note that in Germany most of the shredding plants treating waste wood do not carry out dusty operations (unloading, shredding) in closed buildings and the emissions are so far not captured and subsequently treated. Often, these installations use water sprayers to minimize dust emissions but the abatement efficiency is not at all the same, often those sprayers are broken and water freezes in winter. The new general binding rules (TA Luft) therefore foresees that the unloading and on-site transportation, shredding or grading of waste wood needs to take place in enclosed buildings and with appropriate dust abatement. The dust emission limits are differentiated depending on whether this refers to fresh virgin wood (10mg/Nm³) or other types of wood (5mg/Nm³).

[37] Directive 2002/32/EC requires that certain pollution thresholds in animal feed are not to be exceeded (Annex I). The Directive further requires upstream pollution action if the action thresholds in Annex II are exceeded, which includes the identification of the source of contamination and then appropriate measures to reduce or eliminate the contamination: https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2002L0032:20061020:EN:PDF. Information provided by the EEB during the BREF review indicates that these limits are sometimes exceeded in the vicinity of shredding plants, due to failure in properly addressing diffuse emissions. Please see the below links.

[38] https://emis.vito.be/nl/bbt-voor-schrootverwerking-en-sloperij

BAT on the reduction of emissions to air of dust and of particulate-bound metals, dioxins and dioxin-like PCBs (BAT 25)

This BAT conclusion outlines techniques aiming at the reduction of emissions to air of dust, particulate-bound metals, dioxins and dl-PCBs and the associated dust levels that could be achieved. It is not relevant to shredders only, but to all mechanical treatments.

It is worth noting here that the most effective technique in terms of pollution abatement is the fabric filter. A cyclone, for example, is not considered as BAT as a standalone technique as it only abates coarse dust but not the fine fraction incl. $PM_{2,5}$ / PM_{10} which is particularly harmful for health – it should be applied only in combination with the other techniques described.

The BAT-AEL set for the dust emissions to air from the mechanical treatment of waste is set to the level of 2-5mg/Nm³ (BAT 25, Table 6.3). This level was opposed by the metals shredding industry, arguing that a fabric filter would not be applicable due to safety issues and demanded a level up to 20mg/Nm³. The final compromise was to allow (through a footnote) a higher level of 10mg/Nm³ *'if a fabric filter is not applicable'* (the reason is to cope with deflagrations). **The EEB took the view that this applicability restriction is not valid because pressure relief valves can be implemented to cope with exceptional situations, and in any case, even with wet scrubbers, values below 5 mg/m3 dust can be achieved. A maximum level of 5mg/Nm³ for channeled emissions is therefore to be implemented.**

In general, when negotiating with the competent authority, it should be kept in mind that in many cases the emission levels included in the BAT conclusions have been the result of negotiations as well and do not necessarily reflect what can be achieved by the application of BAT in all cases. The adopted BAT-AEL ranges aim to accommodate many different types of plants and circumstances, considering various potential applicability restrictions that may not pose a problem in every case. Any applicability concerns brought forward by the operator need to be critically assessed, also taking into consideration that the database used for the derivation of the BAT conclusions is dated back to 2010-2012.

BAT on the prevention of deflagrations and the reduction of emissions when deflagrations occur (BAT 27)

This BAT conclusion outlines techniques aiming at the prevention of deflagrations and the reduction of emissions when deflagrations occur e.g. rigorous inspection of the waste input as part of the deflagration management plan described in BAT 27a and the use of pre-shredders (BAT 27c). Pre-shredding, due to significant costs involved, is required for new plants only and *'for major plants upgrades where a significant number of deflagrations have been substantiated'.* The main benefit of the pre-shredder or 'ripper' is the potential to prevent deflagrations due to lower temperatures reached, as well as the formation of dioxins/furans.

There is a large degree of flexibility left to competent authorities to judge on what is considered a "significant number of deflagrations". For all the three reference plants that treat only WEEE, no deflagration events occurred after having treated 50000 tonnes WEEE in those periods. No deflagration

should occur on plants treating only WEEE. For shredding plants that treat End of Life Vehicles or other wastes, the average no event throughput level is at least at 182 000 tonnes (top performers were Alba Ebbingen >316KT, Evert Heeren GmbH in Leer >265KT, Alba Wilhelmshaven >235KT). For those plants that reported deflagration, the average throughput volume that triggered a deflagration event was around 15 000 tonnes, however vary from one installation to the other (worst was achieved by Norton and Co in Liverpool, where an event occurred in average at each 1000 tonnes treated in 2012). The EEB would regard the occurrence of more than 1 deflagration below each 50 000 tonnes throughput of waste treated as significant, requiring further pollution prevention measures such as set within BAT 27 a and BAT27c.

Note on the biological treatment of waste (manure treatment):
The treatment of manure is partly excluded from scope (when it comes specifically to 'on farm processing of manure, when this is covered by the BAT conclusions for intensive rearing of poultry or pigs[39]').

However, even for the cases included under the scope, exemptions were still introduced regarding the odour and NH3 emission levels to air. This was the result of most EU member state delegates unwillingness to regulate this treatment further, rather than the result of technical discussions concluding that there is no environmental impact.

It is worth reminding that NH3 emissions (92% from agriculture activities) have a big impact both on human health and the environment. NH3 emissions from agriculture mainly originate form manure/fertilisers management, animal housing and enteric fermentation. NH3 causes secondary particulate matter, which also spreads to cities; it also causes eutrophication of soil and water. EU member States already agreed to reduce NH3 emissions under the National Emissions Ceilings (NEC) Directive[40].

It is recommended to bring this issue to the competent authority to obtain reduction of emissions at source.

The EEB further submitted a split view[41] on odour levels, as the upper level for odour concentration of 1 000 ou_E/Nm^3 is much higher to what can be achieved with the application of the best available techniques. To be noted that installations in Germany are already regulated[42] to the level of 500 ou_E/Nm^3. Please see the split view in Annex II.

[39] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2017.043.01.0231.01.ENG&toc=OJ:L:2017:043:FULL
[40] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2016.344.01.0001.01.ENG&toc=OJ:L:2016:344:TOC
[41] If the TWG reaches no consensus on an issue, the experts can still express their dissenting (split) views and have them reported in the 'Concluding remarks and recommendations for future work' section of the BREFs (if deemed valid by the European Commission)
[42] TA Luft (under review): https://www.bmu.de/gesetz/entwurf-zur-neufassung-der-ersten-allgemeinen-verwaltungsvorschrift-zum-bundes-immissionsschutzgeset/ (please note that the updated TA Luft should be published end 2019)
TA Luft (2002) in English: https://www.bmu.de/fileadmin/Daten_BMU/Download_PDF/Luft/taluft_engl.pdf

Air pollution monitoring

A dedicated BAT conclusion (BAT 8) outlines the requirements for monitoring emissions to air.

The parameters monitored are: brominated flame retardants, CFCs[43], dl-PCBs, dust, hydrogen chloride (HCl)[44], hydrogen fluoride (HF)[45], mercury (Hg)[46], other metals and metalloids (examples given: As, Cd, Co, Cr, Cu, Mn, Ni, Pb, Sb, Se, Tl, V), hydrogen sulphide (H_2S)[47], ammonia (NH3), odour, dioxins and furans (PCDD/F)[48] and total volatile organic carbon (TVOC), depending on the waste treatment process in question.

The monitoring frequency is set to once every year or once every six months depending on the process in question. More frequent monitoring (once every three months) is required for mercury for the treatment of WEEE containing mercury, and for dl-PCBs and TVOC for the decontamination of equipment containing PCBs.

A footnote[49] derogation notes that *'monitoring frequencies may be reduced if the emission levels are proven to be sufficiently stable'*; it should be kept in mind that the opposite is also possible as the frequencies given here are minimum frequencies – meaning that when the data series for a given pollutant show high variability, an increase of the monitoring frequency is justified and it should asked for to the competent authority.

Especially regarding the emissions of dust, for treatments with a high emission flow e.g. end-of-life vehicles treatment in shredding installations, the EEB experts asked for continuous monitoring of dust emissions to further have under control the emissions of particulate-bound toxic heavy metals – efficient management of dust is a good, first indicator that the installation has optimized their air pollution abatement system.

The EEB further recommended to continuously monitor VFC/VHCs when WEEE containing such substances is treated. VFCs/VHCs, banned under the Montreal Protocol[50] / under the Regulation (EC) No 1005/2009[51] because of very high ozone depleting potential, can fluctuate significantly, so they should be monitored continuously. This approach has been already adopted in Germany[52].

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[43] CFCs: Chlorofluorocarbons, volatile organic compounds consisting of carbon, chlorine and fluorine
[44] All inorganic gaseous chlorine compounds, expressed as HCl
[45] All inorganic gaseous fluorine compounds, expressed as HF
[46] Mercury, expressed as Hg, includes elementary mercury and all inorganic and organic mercury compounds, gaseous, dissolved or bound to particles
[47] Carbonyl sulphide and mercaptans are not included
[48] Polychlorinated dibenzo-p-dioxin/furan(s)
[49] BAT 8, footnote 1
[50] http://web.unep.org/ozonaction/who-we-are/about-montreal-protocol
[51] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02009R1005-20170419
[52] TA Luft (under review), sections 5.4.8.10 (c) / 5.4.8.11 (c4): https://www.bmu.de/gesetz/entwurf-zur-neufassung-der-ersten-allgemeinen-verwaltungsvorschrift-zum-bundes-immissionsschutzgeset/ (please note that the updated TA Luft should be published end 2019)
TA Luft (2002) in English, sections 5.4.8.10.3 / 5.4.8.11.3:
https://www.bmu.de/fileadmin/Daten_BMU/Download_PDF/Luft/taluft_engl.pdf

It should also be noted that the monitoring only applies when the substance concerned " is identified as relevant" in the waste gas stream based on the inventory mentioned in BAT 3, so it is very important that a comprehensive inventory, including all substances of potential concern, is compiled.

Water Pollution

The BAT conclusions include techniques aiming at the optimization of water consumption and the reduction of waste water generation, as well as the prevention or, where this is not possible, the reduction of pollutant emissions to water.

BAT on the reduction of pollutant emissions to water (BAT 20)
A dedicated BAT conclusion (BAT 20) outlines techniques for the treatment of waste water and the emission levels that can be achieved by the application of these techniques (BAT-AELs).

In general, when negotiating with the competent authority, it should be kept in mind that in many cases the levels in tables 6.1 and 6.2 have been the result of negotiations as well and do not necessarily reflect what can be achieved by the application of BAT in all cases. The adopted BAT-AEL ranges aim to accommodate many different types of plants and circumstances, considering various potential applicability restrictions that may not pose a problem in every case. Any applicability concerns brought forward by the operator need to be critically assessed, also taking into consideration that the database used for the derivation of the BAT conclusions is dated back to 2010-2012.

BAT-AELs are set for total organic carbon, chemical oxygen demand (COD), total suspended solids, hydrocarbon oil index, total nitrogen, total phosphorus, phenol index, free cyanide, absorbable organically bound halogens and metals and metalloids (e.g. arsenic, cadmium, chromium, copper, lead, nickel, mercury, zinc) – depending on the process in question.

The sound implementation of this BAT conclusion is of utmost importance, especially regarding the BAT-AELs for the heavy metals cadmium (Cd), mercury (Hg), lead (Pb) and nickel (Ni) – Pb and Ni are recognized as Priority Substances under the EU Water Framework Directive[53] which dictates action at source for the reduction of their emissions; Cd and Hg are recognised as Priority Hazardous Substances, for which the aim is to be eliminated and any pollution through discharge, emission or loss must cease or be phased-out.

Abatement techniques for metals should be primarily optimized for the removal of mercury and cadmium: chemical precipitation, flocculation, sedimentation, combined with specific precipitation of mercury using sulphurous precipitants in a separate step, or alternatively using selective ion exchange or membrane filtration or application of activated carbon.

Please see below the alternative levels proposed by the EEB in accordance to the data collection results, as well as the BAT-AELs that were derived by VITO[54] following an analysis of data from plants treating industrial waste water and water-based liquid waste in Flanders (Belgium), demonstrating that much stricter pollutant levels can be achieved with the application of BAT. NGOs should demand the levels

[53] EU Water Framework Directive: http://ec.europa.eu/environment/water/water-framework/index_en.html
[54] VITO: Flemish Institute for Technological Research: https://vito.be/en

proposed by the EEB to be implemented as the water status is affected the IED requires stricter measures to be taken (see Article 18 of the IED).

Heavy metal	WT BAT conclusions 2018[55]	EEB proposal	VITO study[56, 57]
Cadmium (Cd)	0,01 - 0,05 mg/l (relevant treatments[58] except wblw treatment)	< 0,004 mg/l (relevant treatments except wblw treatment)	≤ 0,002 mg/l (wblw treatment)
	0,01 - 0,1 mg/l (wblw treatment[59])	< 0,001 - 0,05 mg/l (wblw treatment)	
Mercury (Hg)	0,5 - 5 µg/l[60] (relevant treatments except wblw treatment)	< 2 µg/l[61] (relevant treatments except wblw treatment)	≤ 0,3 µg/l (wblw treatment)
	1 - 10 µg/l (wblw treatment)	1 - 5 µg/l (wblw treatment)	
Lead (Pb)	0,05 - 0,1 mg/l (relevant treatments except wblw treatment)	< 0,1 mg/l (all relevant treatments)	≤ 0,05 mg/l (wblw treatment)
	0,05 - 0,3 mg/l (wblw treatment)		
Nickel (Ni)	0,05 - 0,5 mg/l (relevant treatments except wblw treatment)	< 0,1 mg/l (all relevant treatments)	0,3 mg/l (wblw treatment)
	0,05 - 1 mg/l (wblw treatment)		

The cadmium levels in particular are too high when compared with the data collection results (all relevant treatments). EEB submitted a split view on this issue that was accepted as valid by the European Commission (see Annex III).

[55] Unless stated otherwise, averaging periods associated with the BAT-AELs refer to either of the following two cases: a) in the case of continuous discharge, daily average values, i.e. 24-hour flow-proportional composite samples; b) in the case of batch discharge, average values over the release duration taken as flow-proportional composite samples, or, provided that the effluent is appropriately mixed and homogeneous, a spot sample taken before discharge. Time-proportional composite samples can be used provided that sufficient flow stability is demonstrated

[56] VITO BAT study on processing of external industrial waste water and liquid/sludgy industrial waste streams: https://emis.vito.be/nl/bbt-studie-voor-de-verwerking-van-externe-bedrijfsafvalwaters-en-vloeibareslibachtige

[57] the levels in the VITO study are based on spot samples and 24-hour flow-proportional composite samples

[58] See the relevant treatment processes to which the BAT-AEL applies in pages 64-67 of the BAT conclusions: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.208.01.0038.01.ENG&toc=OJ:L:2018:208:FULL

[59] wblw: water-based liquid waste

[60] 1 µg (microgram) = 0,001 mg (milligram)

[61] In combination with a load limit of 100g/year

Another important parameter to focus on, linked to the heavy metals levels, is the Total Suspended Solids (TSS). According to Huybrechts et al., 2016[62] a significant fraction of the pollution in polluted runoff water from waste treatments is associated with particles. Therefore, the Waste Water Treatment (WWT) installation should be designed and operated so as to ensure the efficient removal of TSS. This will also lead to reductions in other parameters, such as heavy metals.

Requirements for both direct and indirect discharges to a receiving water body

It is very important that the new WT BAT conclusions include monitoring of emissions and BAT-AELs for both direct and indirect discharges[63] to a receiving water body, as common waste water treatment plants may not be fitted to treat toxic heavy metals or other persistent pollutants.

A worrying footnote derogation[64] has been included in the BAT conclusions, offering flexibility to operators that could undermine effective implementation. The footnote states that the proposed indirect discharge emission levels *'may not apply if the downstream waste water treatment plant abates the pollutants concerned, provided this does not lead to a higher level of pollution in the environment'.*

This vaguely-formulated derogation is not in line with the principles of the EU Water Framework and Industrial Emissions Directives: pollution abatement at source, the polluter pays principle, no dilution of hazardous substances, equivalent level of protection.

A downstream (biological) waste water treatment plant does not guarantee an equivalent level of protection for many critical pollutants e.g. for toxic heavy metals: the removal efficiency is lower than in the case of a physico-chemical treatment, there is dilution and, often, it is not the polluter who pays.

In case a local authority intends to grant such derogations, they should make sure that the downstream waste water treatment plant is indeed appropriately designed and equipped to abate the pollutants concerned and is not operating in conformity with its permit because the dilution of substances allows the operator to comply with the prescribed pollutant (concentration) limits.

Another issue to be considered is the proper disposal of sludges produced following the treatment, as metals or other substances can be retained therein. The aim should be to prevent / control the pollution and not shifting the contamination from water to soil.

[62] D. Huybrechts, E. Verachtert, S. Vander Aa, C. Polders, L. Van den Abeele, Polluted rainwater runoff from waste recovery and recycling companies: Determination of emission levels associated with the best available techniques, Waste Management 2016, 54, pp. 74-82: https://www.ncbi.nlm.nih.gov/pubmed/27184449
[63] indirect discharge: discharge not directly to the environment, but to a sewer or to an off-site waste water treatment plant
[64] BAT 20, table 6.2, footnote 2

Focus sector: Treatment of water-based liquid waste

One of the waste treatment sectors that deserve the most attention when it comes to addressing the water pollution aspect is the industry treating water-based liquid waste.

Examples of such wastes include emulsions/cooling lubricants, acids e.g. pickling acids from surface treatments, alkaline solutions, concentrates/saline solutions containing metals, waste water containing hydrocarbons, solvent mixtures, cyanide wastes, sludge (including drilling mud), aqueous marine waste. A list of waste types is included in page 603 of the WT BREF.

BAT on improving the overall environmental performance of the treatment of water-based liquid waste (BAT 52)

In order to improve the overall environmental performance, BAT is to monitor the waste input (as part of the waste pre-acceptance and acceptance procedures[65]) in terms of e.g. bio-eliminability by determining e.g. the Biochemical oxygen demand or BOD[66] or performing a so-called Zahn Wellens test among other methods.

This is a great provision in the sense that it guides companies to choose the optimal treatment route. This provision can be further strengthened by including criteria for bio-eliminability that can be used to decide whether a waste water stream is adequately treatable in a biological WWTP or should get a pre-treatment.

The following criteria were suggested for inclusion by some EU member state experts and the EEB, and accepted by the hazardous waste industry representatives:

- DOC[67] elimination of >70% in 7 days (>80% when adapted inoculum is used) in accordance with DIN EN 9888 (Zahn Wellens). This is considered a sufficient criterion of biological treatability in a biological waste water treatment plant;
- if BOD/COD ratio > 40%, no problems with bio-eliminability are expected and, in that case, the execution of a Zahn Wellens test is unnecessary.

These criteria aim to ensure that liquid wastes containing a significant load of organic PBT[68] substances are treated separately in order to minimize the risk posed to receiving water bodies and soil. They do not form part of the BAT conclusions merely for procedural reasons (lack of time for discussion during the final meeting of the TWG).

The WT BREF gives the following rule of thumb for biodegradability:

- BOD/COD < 0.2 relatively non-degradable waste water
- BOD/COD 0.2–0.4 moderately to highly degradable
- BOD/COD > 0.4 highly degradable.

[65] pre-acceptance procedures aim to ensure the technical (and legal) suitability of waste treatment operations for a particular waste prior to the arrival of the waste at the plant. Acceptance procedures aim to confirm the characteristics of the waste, as identified in the pre-acceptance stage (see BAT 2)
[66] BOD refers to the amount of oxygen needed for the biochemical oxidation of organic and/or inorganic matter. This parameter is often used as a surrogate of the degree of organic pollution of water.
[67] DOC: Dissolved Organic Carbon
[68] Persistent, Bio-accumulative and Toxic

Especially for waste waters with a BOD/COD ratio between 0.2 – 0.4, it can be useful to perform a Zahn Wellens test. A recent test, performed in the context of a permit review in Flanders (Belgium), has shown that two waste waters with a similar BOD/COD ratio perform totally different in a Zahn Wellens: the TOC of one waste water was easily eliminable and at the same time, acute toxicity also deceased completely. This result showed that the readily degradable TOC was responsible for the acute toxicity. The waste water was easy to treat and the water posed no risk to the aquatic environment – the TOC in the other waste water was only partially eliminated after the Zahn Wellens. The toxicity decreased only little, which indicates that the toxicity was not due to easily degradable organic compounds. This waste water potentially poses a problem to the aquatic environment.

The following BAT proposal (supported by some EU member state experts, the EEB and the hazardous waste industry delegations) to monitor acute toxicity in the effluent, should also be brought to the attention of the competent authority. This BAT proposal was not included in the final text again because of procedural reasons (lack of time during the final meeting of the TWG):

Additional technique proposed for the treatment of water-based liquid waste:
"In order to improve the overall environmental performance, BAT is to monitor acute toxicity in the effluent at the point of discharge. The lower end of the BAT-AEL for direct or indirect emissions to water may apply in case there is residual toxicity in the effluent".

Acute toxicity tests allow for an integrated assessment of the potential environmental impact of a waste water stream (including synergistic/antagonistic effects of compounds) that cannot be achieved by analysing single substances or other chemical sum parameters. The test results reflect the effect of all compounds present in the waste water, regardless of their origin and nature (e.g. including side products and metabolites).

Examples of the application of acute toxicity tests are :

- ranking the environmental risk of waste water discharges;
- toxicity identification/reduction evaluations;
- prioritization of waste water treatment techniques;
- judging the effectiveness of treatment improvements;
- identifying sources of effects observed in receiving water bodies.

Tests carried out in the liquid waste treatment sector show that acute toxicity often occurs. Per waste water, toxicity strongly varies in time and it is not possible to be monitored by 'a most sensitive organism'. It is therefore necessary to test with the whole battery of organisms (distinct trophic levels, including bacteria, algae, invertebrates and fish eggs).

The tests also confirm that there is no systematic relationship between COD and toxicity. This was to be expected because toxicity can also come from inorganic components or very low levels of certain organic substances that are not visible in the COD measurement.

Treatment with activated carbon does not lead to a decrease in toxicity in all circumstances, but there are situations where there is a decrease. This means that it may be appropriate to better manage active carbon treatments in function of toxicity reduction in addition to or in place of COD removal.

The sources of toxicity can often be identified by backtracking (Toxicity Identification and Evaluation).

Water pollution monitoring

A dedicated BAT conclusion (BAT 7) outlines the requirements for monitoring emissions to water.

The parameters monitored are: the PS/PHS under the EU Water Framework Directive nickel (Ni), lead (Pb), cadmium (Cd), mercury (Hg) and perfluorooctanesulphonic acid (PFOS), as well as arsenic (As), chromium (Cr), copper (Cu), Zinc (Zn), manganese (Mn), hexavalent chromium (Cr(VI)), perfluorooctanoic acid (PFOA), adsorbable organically bound halogens (AOX), benzene, toluene, ethylbenzene, xylene (BTEX), chemical oxygen demand (COD), free cyanide (CN-), hydrocarbon oil index (HOI), phenol index, total nitrogen (TN), total organic carbon (TOC), total phosphorus (TP) and total suspended solids (TSS), depending on the waste treatment process in question.

The monitoring frequency is once per month for all relevant treatments except for the treatment of water-based liquid waste where the frequency is once per day.

A footnote[69] derogation notes that *'monitoring frequencies may be reduced if the emission levels are proven to be sufficiently stable'*; it should be kept in mind that the opposite is also possible as the frequencies given here are minimum frequencies – meaning that when the data series for a given pollutant show high variability, an increase of the monitoring frequency is justified and it should be asked for to the competent authority.

It is worth highlighting the new requirements to monitor PFOS and PFOA that concern all waste treatments. PFOS and PFOA are persistent substances that bio-accumulate, bio-magnify, and are toxic to wildlife and humans. Concerns over the health and environmental impact of these chemicals have already led to regulatory action: the Stockholm Convention[70] has classified PFOS and its derivatives as Persistent Organic Pollutants (POPs) and restricted their production and use in 2009. PFOS is widely restricted in the EU by Regulation (EC) No 850/2004[71]. The EU also restricts the use of PFOA through Regulation (EU) 2017/1000, which regulates PFOA, its salts and certain related substances as a new entry (entry 68) to Annex XVII of EU Chemicals Regulation REACH[72].

A recent report by the Scientific Committee on Health, Environmental and Emerging Risks (SCHEER) highlights that there is a high reason for concern in relation to Per- and polyfluoroalkyl substances or PFAS (the group of man-made chemicals that includes PFOS and PFOA) and that essential data is still missing[73].

[69] BAT 7, footnote 1
[70] http://chm.pops.int/TheConvention/Overview/tabid/3351/Default.aspx
[71] https://eur-lex.europa.eu/legal-content/GA/TXT/?uri=celex:32004R0850
[72] http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017R1000&from=EN
[73] SCHEER statement on emerging health and environmental issues

A wide array of waste sources can contain PFOS, which can be released to water after the waste is treated. In a campaign[74] in 2013, the Norwegian EPA asked all plants treating hazardous waste with emissions to water to analyze their effluent for PFOS and related compound PFOA as well as several other perfluorinated compounds. The results revealed that several plants had PFOS/PFOA in their effluent, despite not accepting any waste characterized as containing PFOS/PFOA.

It should also be noted that the monitoring only applies when the substance concerned "is identified as relevant" in the waste water inventory of the installation (see BAT 3) so it is important that a comprehensive inventory, including all substances of potential concern, is compiled. Similar to the air route, relevant should mean "occurring", and not a risk-based approach e.g. the substance is occurring in the wastewater inventory but industry/competent authorities set mass thresholds based on possible risks this pollutant could cause to the water bodies.

Another footnote[75] derogation notes that *'in the case of an indirect discharge to a receiving water body, the monitoring frequency may be reduced if the downstream waste water treatment plant abates the pollutants concerned'.* As mentioned above ('water pollution' section) it is important for the authority to verify that the downstream waste water treatment plant is indeed appropriately designed and equipped to abate the pollutants concerned and is not operating in conformity with its permit because the dilution of substances allows the operator to comply with the prescribed pollutant (concentration) limits.

For parameters/substances COD, phenol index, TOC linked to organics, there is a further footnote[76] derogation noting that *'the monitoring applies only in the case of direct discharge to a receiving water body'* assuming that in the case of indirect discharge, the downstream waste water treatment plant will cope with the organics load. However, for indirect discharge after a biological treatment of water-based liquid waste, it is important for the authority to again ensure that the downstream waste water treatment plant will not receive a high concentration of non-biodegradable organics which won't be adequately treated. It is therefore strongly recommended to monitor organics in this case as well, when the bio-eliminability criteria (mentioned above in section on 'water pollution') are not fulfilled after a biological treatment of water-based liquid waste.

[74] For more information see the Norwegian comments to the first draft of the revised BREF. Available on BATIS http://eippcb.jrc.ec.europa.eu/batis/ under folder *Waste Treatment > Review of the Waste Treatment BREF 2013 – 201810 > Comments on D1 > 01 Comments by TWG observers and non-TWG members*

[75] BAT 7, footnote 4

[76] BAT 7, footnote 6

Soil pollution

Local soil contamination in 2011 was estimated at 2.5 million potentially contaminated sites in the EEA-39, of which about 45 % have been identified to date[77].

According to the European Environment Agency (EEA)[78], managing contaminated land in Europe costs an estimated € 6.5 billion per year. Much of this is paid by companies but there is also a high public cost. The largest cause of soil contamination is poor waste management, so preventing waste in the first place could reduce the burden to society. **On average, 42% of the total expenditure on the management of contaminated sites comes from public budgets.**

Around 81% of annual national expenditures for the management of contaminated sites is spent on remediation measures, while only 15% is spent on site investigations.

The most frequent contaminants are mineral oils and heavy metals[79].

The BAT conclusions developed for the control of water emissions, air emissions (especially diffuse emissions), the management of residues and prevention actions such as retention / impermeabilisation, can prevent / minimize soil pollution, provided sound implementation. This being said, an important omission of these conclusions is the lack of monitoring requirements for soil and groundwater, as well as the lack of dedicated BAT conclusions for the in-situ remediation of contaminated soil (i.e. unexcavated soil).

In order to detect possible soil and groundwater pollution at an early stage and, therefore, to take appropriate corrective measures before the pollution spreads, the monitoring of soil and groundwater for relevant hazardous substances is necessary. You should therefore urge your competent authority to ask for effective monitoring linked to the risk of contamination by the activity in question. Under the IED, periodic monitoring shall be carried out at least once every 5 years for groundwater and 10 years for soil.

[77] http://publications.jrc.ec.europa.eu/repository/bitstream/111111111/30755/1/lbna26376enn.pdf
[78] https://www.eea.europa.eu/highlights/soil-contamination-widespread-in-europe
[79] http://publications.jrc.ec.europa.eu/repository/bitstream/111111111/30755/1/lbna26376enn.pdf

Treatment of hazardous waste

BAT on improving the overall environmental performance of the waste treatment plant (BAT 2)

The BAT conclusions include techniques aiming at the improvement of the overall environmental performance of the plants, such as the establishment of waste characterisation and (pre-)acceptance procedures, of a waste tracking system and inventory and of an output quality management system. These techniques are relevant to all waste streams but become of greater importance when it comes to the treatment of hazardous waste.

The issue with the techniques outlined in this BAT (BAT 2) is that the wording is very vague. The purpose of the techniques is described but not the techniques themselves. This is problematic since these BAT conclusions will serve as guidance for granting/updating installations permits and will be used for the purpose of proving compliance to the respective competent authority.

Techniques 2(a) (pre-acceptance procedures) and 2(b) (acceptance procedures) are of particular importance as unsuitable waste input(s) and/or inefficient input control processes could have a big impact on the overall environmental performance of the installations. A comprehensive (pre-)acceptance procedure is very important for the efficient treatment of the waste and the prevention or minimisation of any environmental impact; such techniques aim to both ensure the proper treatment of waste, as well as the suitability of the receiving installation.

It is important to bring the proposals below to the attention of the competent authority.

BAT 2(a) – pre-acceptance procedures:

In the case of hazardous waste, at least the following information must be gathered:

- (Expected) date of arrival at the waste treatment plant.
- The contact details of the waste producer and the sector which the waste originates from. The nature of process producing the waste, incl. the variability of the process.
- The estimated quantity expected to be delivered to the operator per delivery and per year.
- Description of the waste, incl.:
    - Composition of the waste,
    - Hazardous properties of the waste,
    - Waste code.
- The appropriate / suitable treatment route.

BAT 2(b) – acceptance procedures:

In the case of hazardous waste, the following techniques are in place:

- A reception facility with a laboratory to analyse samples on site,
- A clear sampling procedure depending on the risk of the waste (at least a check on the relevant physico-chemical parameters),
- A dedicated quarantine waste storage area, as well as written procedures to manage non-accepted waste.

Furthermore, the personnel having to deal with the (pre-)acceptance procedures need to be able due to his profession and/or experience to deal with all necessary questions relevant for the treatment of the wastes in the waste treatment facility. The procedures are intended to (pre-)accepting wastes at the waste treatment plant only if an appropriate / suitable treatment (route) is available and the disposal/recovery route for the output of the treatment is determined.

It should further be highlighted that current illegal practice in quite a few member states, leads to hazardous wastes being diluted (in order to showcase lower thresholds for hazardous substances) and being re-directed to cheaper, inefficient treatment options, posing a risk to health and the environment.
A further technique was proposed by EEB, one EU member state delegation and the hazardous waste industry representatives themselves addressing the issue of hazardous substances dilution when mixing/blending hazardous wastes, but this technique was not included in the final text. This is a real problem because Article 18(2) to the EU Waste Framework Directive[80], setting out the conditions under which mixing of hazardous waste can be allowed, specifically cross-references BAT: *'the mixing operation conforms to best available techniques'*. Without relevant BAT on mixing this condition cannot be met. If there is no BAT for describing authorized mixing/blending, it becomes very unclear what is permitted or not.
A valid split view was submitted about this omission to the Commission by the hazardous waste industry, which was supported by the EEB. Please find the split view in Annex IV.
The technique described below should be brought to the attention of the competent authority.

[80] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32008L0098

Additional technique on avoidance of hazardous substances dilution when mixing/blending hazardous wastes:

BAT is not to use dilution as a substitute for adequate treatment to achieve compliance with emission standards. Focus is on hazardous compounds, but not exclusively.

(Hazardous) wastes may not be mixed or blended with other hazardous wastes or non-hazardous wastes or materials when this leads to lowering, without chemical transformation, the concentration of one (or more) components present in the hazardous waste with the objective of dilution, i.e. to comply with the waste treatment plants' emission standards by balancing out pollutant concentrations.

Another important omission is that of a system for the monitoring and improvement of the efficiency of the treatment. The system described below forms part of the original 2006 BREF, but not of the revised version; no proper justification was provided on why such techniques have been overlooked. Major issues arise from the inefficient treatment of waste; in particular (but not limited to) hazardous waste and also depending on the characteristics and/or the destination of the treated waste.

Additional technique on the implementation of a system for the improvement of the efficiency of waste treatment:

A system for the improvement of the waste treatment efficiency typically includes the finding of suitable indicators to report on efficiency and a monitoring program. Some techniques that may be applied to increase the treatment efficiency are:

a. **to provide an assessment of the efficiency of the treatment process in relation to pollutants i.e. in terms of the removal or partition of substances within the process;**

b. to analyse the effect that the variability of the waste composition may have on the performance of waste treatment units;

c. to monitor efficiency. Operational efficiency monitoring may be carried out by instrumentation, direct operator observation, and chemical analysis;

d. to have in place procedures for waste material separation, and in such a way that the recyclability of the separated materials will not be impaired.

Further provisions included in 2006 BREF, that are missing from the revised version, can be useful for the sound implementation of the vaguely-worded BAT 2. These provisions can be found in 2006 BAT 6-10 and 12, and 2006 BREF sections 2.3.2, 4.5.1, 4.5.2 and 5.2.3. Specific, detailed, provisions for the treatment of waste with high calorific value (both hazardous and non-hazardous), for the preparation of waste fuels, can be found in 2006 BAT 117-130. Please find these provisions in Annex I.

Decontamination of equipment containing PCBs (BAT 51):

Dedicated BAT conclusions have been developed for the decontamination and management of equipment containing PCBs, in order to improve the overall environmental performance of the treatment and to reduce emissions of PCBs and organic compounds to air.

An important omission, also recognised by some EU member state experts and by the industry concerned, is that of adequate monitoring requirements to timely detect potential contamination or to verify that there is no e.g. water/groundwater or human contamination.

PCBs represent a significant environmental and health issue. They should be well monitored. There was a major environmental and human health disaster in Germany (Envio AG) , not because the plant was operated illegally but because the monitoring rules were not adequate.

Please bring the below requirements to the attention of your competent authority.

Additional monitoring requirements proposed for the decontamination of equipment containing PCBs:

- *PCBs monitoring in air exhaust, in water exhaust (frequency: daily), in neighbouring agriculture production (e.g. in milk, cereals);*
- *groundwater monitoring;*
- *biological monitoring in the water exhaust receptor (e.g. in fish);*
- *operators blood monitoring (frequency: every 2 years).*

The right to know & participate in the permitting procedure

The IED's Article 24 (and IED Annex IV) concerns *'access to information and public participation in the permit procedure'.* Please find them on Annex V of this report. They describe the minimum standards for how decisions about permits should be publicized, how citizens should be involved in the process, and how information should be made available. There is a clear obligation on authorities to put the tools in place in order to facilitate public participation in decision-making in a proactive manner.

Explicitly, IED article 24 spells out the permit information that must be available to the public, including via the internet, and IED Annex IV outlines the steps to be undertaken by the authority to ensure that the public is given early and effective opportunity to participate in the permitting procedure.

Permit information that must be available on every national authority's website:

- the content of the decision to award a permit;
- a copy of the permit and any subsequent updates;
- the reasons on which the decision is based (the motivations for setting the permit conditions);
- where a derogation is granted in accordance with Article 15 (4) of the Directive, the specific reasons for that derogation;
- information on site remediation measures taken by the operator.

In case you cannot ~~easily~~ find the information needed on the authority's website, you can submit Access-to-information requests[81]. More than half of the EU's Member States are failing to share crucial information about highly-polluting activities effectively online, as revealed by an investigation[82] by the EEB in October 2017.

Another source of information is the European Pollutant Release and Transfer Register (E-PRTR)[83], where information about the annual total emissions of IED installations is reported, even though the reporting thresholds are too high to provide a comprehensive picture. Emission reports are in the form of load data on the main pollutants released to air, water and land with information on off-site transfers of waste water and waste at facility level. With rare exceptions, Member States implemented near identical PRTR models at the national level.

Best practice identified, during the EEB investigation, in few countries that really made the effort to engage citizens and NGOs, included the use of automatic alerts by email or RSS to keep the concerned stakeholders informed about upcoming decisions on new permits / permits renewals and other activities. Your competent authority contact should be able to guide you on the possibilities available.

[81] For more information: http://ec.europa.eu/environment/aarhus/pdf/guide/AR%20Practical%20Guide%20EN.pdf
[82] For more information: https://eeb.org/most-eu-countries-failing-to-ensure-effective-access-to-industrial-pollution-information/
[83] https://prtr.eea.europa.eu/#/home

List of main recommendations

- **Prevention / reduction of diffuse pollutant emissions to air (BAT 14):**
  Depending on the risk posed by the waste in terms of diffuse emissions, NGOs shall demand from the competent authority to properly implement BAT 14(d) in particular *('containment, collection and treatment of diffuse emissions'*). The consideration of BAT 14(d) is mandatory for most installations falling under the scope of these BAT conclusions (with the exception of the installations for the biological treatment of waste) but its proper implementation is not secured due to its non-prescriptive description and vague applicability restrictions.

- **Shredders of metal waste, prevention / reduction of diffuse pollutant emissions to air (additional techniques, not included in the BAT conclusions):**

  NGOs shall bring to the attention of the competent authority the additional techniques of implementing a diffuse emission reduction program and of monitoring of dioxins and dioxin-like PCBs in the vicinity of shredding installations, as well as the techniques identified in the study[84] by VITO on scrap handling, treatment and dismantling, which outlines sector-specific BAT for preventing diffuse dust emissions. These effective techniques were not included in the final text of the BAT conclusions due to lack consensus of the TWG and / or procedural reasons.

- **All mechanical treatments of waste, reduction of emissions to air of dust and of particulate-bound metals, dioxins and dioxin-like PCBs (BAT 25):**

  - The most effective technique in terms of pollution abatement is the fabric filter. A cyclone, for example, is not considered as BAT as a standalone technique as it only abates coarse dust but not the fine fraction incl. $PM_{2,5}$ / PM_{10} which is particularly harmful for health – it should be applied only in combination with the other techniques described.

  - The BAT-AEL set for the dust emissions to air is set to the level of 2-5mg/Nm³ (BAT 25, Table 6.3). This level was opposed by the metals shredding industry, arguing that a fabric filter would not be applicable due to safety issues and demanded a level up to 20mg/Nm³. The final compromise was to allow (through a footnote) a higher level of 10mg/Nm³ *'if a fabric filter is not applicable'* (the reason is to cope with deflagrations). The EEB took the view that this applicability restriction is not valid because pressure relief valves can be implemented to cope with exceptional situations, and in any case, even with wet scrubbers, values below 5 mg/m3 dust can be achieved. A maximum level of 5mg/Nm³ for channeled emissions is therefore to be implemented.

  - No deflagration should occur on plants treating only WEEE. For shredding plants that treat End of Life Vehicles or other wastes the EEB would regard the occurrence of more than 1 deflagration below each 50 000 tonnes throughput of waste treated as significant, requiring further pollution prevention measures such as set within BAT 27 a and BAT27c.

[84] https://emis.vito.be/nl/bbt-voor-schrootverwerking-en-sloperij

- **Monitoring of pollutant emissions to air (BAT 8):**

  - A footnote[85] derogation notes that *'monitoring frequencies may be reduced if the emission levels are proven to be sufficiently stable'*; it should be kept in mind that the opposite is also possible as the frequencies given here are minimum frequencies – meaning that when the data series for a given pollutant show high variability, an increase of the monitoring frequency is justified and it should asked for to the competent authority. Especially regarding the emissions of dust, for treatments with a high emission flow e.g. end-of-life vehicles treatment in shredding installations, the EEB experts asked for continuous monitoring of dust emissions to further have under control the emissions of particulate-bound toxic heavy metals – efficient management of dust is a good, first indicator that the installation has optimized their air pollution abatement system.

  - The EEB further recommends to continuously monitor VFC/VHCs when WEEE containing such substances is treated. VFCs/VHCs, banned under the Montreal Protocol[86] / under the Regulation (EC) No 1005/2009[87] because of very high ozone depleting potential, can fluctuate significantly, so they should be monitored continuously. This approach has been already adopted in Germany[88].

  - The monitoring only applies when the substance concerned is identified as relevant in the waste gas stream based on the inventory mentioned in BAT 3, so it is very important that a comprehensive inventory, including all substances of potential concern, is compiled. Especially for metals and metalloids where an indicative list is given, leaving the specific substances to be monitored to the judgement of the operator/authority.

- **Reduction of pollutant emissions to water (BAT 20):**

  - The sound implementation of this BAT conclusion is of utmost importance, especially regarding the BAT-AELs for the heavy metals cadmium (Cd), mercury (Hg), lead (Pb) and nickel (Ni) – Pb and Ni are recognized as Priority Substances under the EU Water Framework Directive[89] which dictates action at source for the reduction of their emissions; Cd and Hg are recognised as Priority Hazardous Substances, for which the aim is to be eliminated and any pollution through discharge, emission or loss must cease or be phased-out.

  - Abatement techniques for metals should be primarily optimized for the removal of mercury and cadmium.

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[85] BAT 8, footnote 1
[86] http://web.unep.org/ozonaction/who-we-are/about-montreal-protocol
[87] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02009R1005-20170419
[88] TA Luft (under review), sections 5.4.8.10 (c) / 5.4.8.11 (c4): https://www.bmu.de/gesetz/entwurf-zur-neufassung-der-ersten-allgemeinen-verwaltungsvorschrift-zum-bundes-immissionsschutzgeset/ (please note that the updated TA Luft should be published end 2019)
TA Luft (2002) in English, sections 5.4.8.10.3 / 5.4.8.11.3:
https://www.bmu.de/fileadmin/Daten_BMU/Download_PDF/Luft/taluft_engl.pdf
[89] EU Water Framework Directive: http://ec.europa.eu/environment/water/water-framework/index_en.html

- The assessment of the installations data collection by the EEB and the BAT-AELs derived by VITO[90] following an analysis of data from plants treating industrial waste water and water-based liquid waste in Flanders (Belgium), demonstrate that much lower pollutant levels can be achieved with the application of BAT.

- Another important parameter to focus on is the Total Suspended Solids (TSS). According to Huybrechts et al., 2016[91] a significant fraction of the pollution in polluted runoff water from waste treatments is associated with particles. Therefore, the Waste Water Treatment (WWT) installation should be designed and operated so as to ensure the efficient removal of TSS. This will also lead to reductions in other parameters, such as heavy metals.

- ***Indirect discharges to a receiving water body:*** the BAT conclusions include monitoring of emissions and BAT-AELs for both direct and indirect discharges[92] to a receiving water body, as common waste water treatment plants may not be fitted to treat toxic heavy metals or other persistent pollutants. However, a worrying footnote derogation[93] has been included in the BAT conclusions, offering flexibility to operators that could undermine effective implementation. The footnote states that the proposed indirect discharge emission levels *'may not apply if the downstream waste water treatment plant abates the pollutants concerned, provided this does not lead to a higher level of pollution in the environment'.*
  In case a local authority intends to grant such derogations, they should make sure that the downstream waste water treatment plant is indeed appropriately designed and equipped to abate the pollutants concerned and is not operating in conformity with its permit because the dilution of substances allows the operator to comply with the prescribed pollutant (concentration) limits.

➢ **Treatment of water-based liquid waste, improving the overall environmental performance of the treatment (BAT 52 and additional techniques, not included in the BAT conclusions):**

- In order to improve the overall environmental performance of the treatment, BAT is to monitor the waste input in terms of e.g. bio-eliminability. This is a great provision in the sense that it guides companies to choose the optimal treatment route. This provision can be further strengthened by including criteria for bio-eliminability that can be used to decide whether a waste water stream is adequately treatable in a common biological waste water treatment plant or should get a pre-treatment. NGOs shall bring the criteria proposed in this report to the attention of the competent authority. These criteria were suggested for inclusion by some EU member state experts and the EEB and endorsed by the hazardous waste industry

[90] VITO: Flemish Institute for Technological Research: https://vito.be/en
[91] D. Huybrechts, E. Verachtert, S. Vander Aa, C. Polders, L. Van den Abeele, Polluted rainwater runoff from waste recovery and recycling companies: Determination of emission levels associated with the best available techniques, Waste Management 2016, 54, pp. 74-82: https://www.ncbi.nlm.nih.gov/pubmed/27184449
[92] indirect discharge: discharge not directly to the environment, but to a sewer or to an off-site waste water treatment plant
[93] BAT 20, table 6.2, footnote 2

representatives during the BREF review. They do not form part of the BAT conclusions merely for procedural reasons.

- NGOs shall bring to the attention of the competent authority an additional technique concerning the monitoring of acute toxicity in the effluent. Acute toxicity tests allow for an integrated assessment of the potential environmental impact of a waste water stream that cannot be achieved by analysing single substances or other chemical sum parameters. This was also suggested for inclusion by some EU member state experts and the EEB and endorsed by the hazardous waste industry representatives during the BREF review. It does not form part of the BAT conclusions merely for procedural reasons.

➢ **Monitoring of pollutant emissions to water (BAT 7):**

- A footnote[94] derogation notes that *'monitoring frequencies may be reduced if the emission levels are proven to be sufficiently stable'*; it should be kept in mind that the opposite is also possible as the frequencies given here are minimum frequencies – meaning that when the data series for a given pollutant show high variability, an increase of the monitoring frequency is justified and it should be asked for to the competent authority.

- The monitoring only applies when the substance concerned is identified as relevant in the waste water inventory of the installation (see BAT 3) so it is important that a comprehensive inventory, including all substances of potential concern, is compiled.

- For parameters/substances COD, phenol index, TOC linked to organics, there is a further footnote[95] derogation noting that *'the monitoring applies only in the case of direct discharge to a receiving water body'* assuming that in the case of indirect discharge, the downstream waste water treatment plant will cope with the organics load. However, for indirect discharge after a biological treatment of water-based liquid waste, it is important for the authority to again ensure that the downstream waste water treatment plant will not receive a high concentration of non-biodegradable organics which won't be adequately treated. It is therefore strongly recommended to monitor organics in this case as well, when the bio-eliminability criteria (mentioned in this report) are not fulfilled after a biological treatment of water-based liquid waste.

➢ **Treatment of hazardous waste (BAT 2 and additional techniques, not included in the BAT conclusions):**

BAT 2 outlines techniques aiming at the improvement of the overall environmental performance of the plants, such as the establishment of waste characterisation procedures. These techniques are relevant to all waste streams but become of greater importance when it comes to the treatment of hazardous waste. The problematic point is that is that the wording of BAT 2 is very vague: the purpose of the techniques is described but not the techniques themselves. NGOs shall bring to the attention of the competent authority the additional techniques included in this report regarding

[94] BAT 7, footnote 1
[95] BAT 7, footnote 6

waste pre-acceptance and acceptance procedures, as well as a further technique proposed by EEB, one EU member state delegation and the hazardous waste industry representatives themselves addressing the issue of hazardous substances dilution when mixing/blending hazardous wastes. It should be highlighted that current illegal practice in quite a few member states, leads to hazardous wastes being diluted (in order to showcase lower thresholds for hazardous substances) and being re-directed to cheaper, inefficient treatment options, posing a risk to health and the environment.

- **Decontamination of equipment containing PCBs (BAT 51):**

Dedicated BAT conclusions have been developed for the decontamination and management of equipment containing PCBs. An important omission, also recognised by some EU member state experts and by the industry concerned, is that of adequate monitoring requirements to timely detect potential contamination or to verify that there is no e.g. water/groundwater or human contamination. NGOs shall bring to the attention of the competent authority the monitoring requirements included in this report, namely require the daily monitoring of air exhaust and possible deposition in the neighbouring agriculture production e.g. in milk, cereals, groundwater monitoring, biological monitoring in water emissions receptors (e.g. fish). Blood monitirong of workers should take place at least every 2 years.

Annexes

Annex I: the BAT conclusions of the original Waste Treatment BREF (2006)

The BAT conclusions of the predecessor Waste Treatment BREF (2006) are available here, the full version of the 2006 WT BREF is available here.

Annex II: the split view submitted by EEB regarding the levels of odour from biological treatment

BAT conclusion/BAT-AEL to which the split view refers to: BAT 34, table 6.7, odour BAT-AEL.

Proposal: This split view proposes to add a footnote in table 6.7 regarding the BAT-AEL for odour:

'The upper level of the BAT-AEL is 500 OUE/Nm3 in the proximity of sensitive receptors'.

Rationale:

A level of 500 OUE/Nm3 can be achieved with the application of appropriate techniques as shown by the results of the data collection*. Furthermore, installations are already regulated to this level in Germany (installations regulated by the German regulation TA Luft[96]). The initial EIPPCB proposal of 100-400 OUE/Nm3 in previous draft has now been considerably increased to 200-1000 OUE/Nm3 without justification based on the available data. At least in the case where an installation is located close to sensitive receptors, the competent authority should be supported by the BAT conclusions to set the permit level at 500 OUE/Nm3 or lower.

*Data collection results[97]:

aerobic treatment of waste: installation 372 (Italy) reports odour levels of 160,5 to 222 OUE/Nm3 (even with a high flow of 108.000 Nm3/h); end-of-pipe techniques: combination of wet scrubber and biofilter. The permit Emission Limit Value (ELV) is set at 300 OUE/Nm3. Installations 544 and 548 (UK) report ELVs of 500 OUE/Nm3; such performance is achieved by merely implementing the appropriate input control measures and by process optimisation.

anaerobic treatment of waste: installation 020 (Austria) reports odour levels of 59 to 275 OUE/Nm3. The permit ELV is set at 300 OUE/Nm3. Installations 251 and 255 (Germany) report odour levels of 38 – 240 (biofilter used) and 149 OUE/Nm3 respectively and the permit ELV is set for both at 500 OUE/Nm3; to add that installation 255 reports a high flow of 53.000 Nm3/h but the odour levels are still kept low by the combination of wet scrubber and biofilter. Installation 349 (Italy) reports odour levels of 75-115 and 65-100 OUE/Nm3 (two different emission points) even with a high flow of 64.100 Nm3/h; end-of-pipe technique: biofilter. ELV is set at 400 OUE/Nm3. Installation 377 (Italy) reports max odour level of 270 OUE/Nm3 from its multiple emission points even with a high flow of circa 23.000 Nm3/h. ELV is set at 400 OUE/Nm3; end-of-pipe techniques: water scrubbing, acid scrubbing, biofilter.

MBT: installation 019 (Austria) reports odour levels of 120-380 OUE/Nm3 (even with a high flow of 88.933 Nm3/h). ELV is set at 500 OUE/Nm3; end-of-pipe techniques: biofilter, acid scrubber. Installation 037 (Austria) reports odour levels of 136-427 OUE/Nm3 (even with a high flow of 80.000 Nm3/h). ELV is set at

[96] TA Luft (under review): https://www.bmu.de/gesetz/entwurf-zur-neufassung-der-ersten-allgemeinen-verwaltungsvorschrift-zum-bundes-immissionsschutzgeset/ (please note that the updated TA Luft should be published end 2019)
TA Luft (2002) in English: https://www.bmu.de/fileadmin/Daten_BMU/Download_PDF/Luft/taluft_engl.pdf

[97] for more information regarding the performance of the installations below please contact the respective EU member states/observer countries using the indicated codes

200 OUE/Nm3; end-of-pipe techniques: bioscrubber, biofilter, water scrubber. Installation 243 (Germany) reports odour levels of 61-223 OUE/Nm3 (even with a high flow of 74.826 Nm3/h). ELV is set at 500 OUE/Nm3; end-of-pipe techniques: biofilter, acid scrubber, RTO. Installation 257 (Germany) reports odour levels of 160-381 OUE/Nm3 (even with a high flow of 32.969 Nm3/h). ELV is set at 500 OUE/Nm3; end-of-pipe technique: RTO. Installation 338 (Italy) reports odour levels of 60-95 OUE/Nm3 (even with a high flow of 27.915 Nm3/h). ELV is set at 500 OUE/Nm3; end-of-pipe technique: biofilter. Installation 628 (Germany) reports odour levels of 200-400 OUE/Nm3 (even with a high flow of 40.000 Nm3/h). ELV is set at 500 OUE/Nm3; end-of-pipe technique: RTO.

Annex III: the split view submitted by EEB regarding the levels of cadmium (Cd) emissions to water

BAT conclusion/BAT-AEL to which the split view refers to: BAT 20, tables 6.1 and 6.2, Cd BAT-AEL (direct and indirect discharge)

Proposal: This split view proposes to amend the BAT-AELs for Cd for both direct and indirect discharge. **The BAT-AEL should be < 4µg/l for all treatments except the treatment of water-based liquid waste (wblw) and should be set at < 1-50 µg/l for the treatment of wblw.**

Rationale[98]:

The upper end of the BAT-AEL range is unacceptable and not justified by the data collection results. Cd is classified as Priority Hazardous Substance under the EU Water Framework Directive, which dictates that any emission should be phased out.

All treatments apart from treatment of wblw:

The upper end of the range is set on the basis of shredder 571 (Portugal). However, all the other seven shredders participating in the data collection meet the emission levels at the lower end of the BAT-AEL range with various combinations of techniques. It seems that the solid removal phase of plant 571 (air flotation) is not an effective technique to remove cadmium. Lower values are obtained by plant 455_1 (Spain), achieved with oil separation and decantation only. There are several plants performing physico-chemical treatment (PCT) and mechanical biological treatment (MBT) of waste meeting the lower BAT-AEL of <0.01mg/l. Plant 427 (PCT of solids, Norway) treats a variety of waste inputs and achieved an average level of 0,0019 mg/l in 2010 and 0,0035mg/l in 2011. The Maximum Allowable Concentration limit under the EU Water Framework Directive is set at 1.5µg/l. Please see the data of plants: shredders 478 (Sweden), 364-366 (Italy), 541 (UK), 095C (Denmark), 282C (Germany), 293C (Germany); PCT plants 092 (Denmark), 353-359 (Italy), 620 (Italy), 40 (Austria), 56_1 (Belgium), 427 (Norway) and 336 (Italy); MBT plants 019 (Austria), 243 and 244 (Germany).

Treatment of wblw:

The reference plants on basis of which the upper end of the BAT-AEL range has been derived report no measured data; they should have therefore been excluded from the dataset: reference plants 04 (Austria) and 569 (Portugal) report the permit Emission Limit Values (ELVs) of 0,1mg/l and 0,2 mg/l respectively, but not measured values. Plants 401_2W (Netherlands), 471_AI (Spain) report detection limits, but not measured values.

[98] for more information regarding the performance of the installations below please contact the respective EU member states/observer countries using the indicated codes

Annex IV: the split view submitted by the representatives of the hazardous waste industry (and supported by the EEB) regarding the issue of hazardous substances dilution when mixing/blending hazardous wastes

BAT conclusion/BAT-AEL to which the split view refers to: BAT 2.

Proposal: This split view proposes to introduce a BAT conclusion on mixing and blending.

Proposal for new technique in BAT 2 of the revised BAT conclusions:

Technique: To prevent dilution by mixing/blending of waste with hazardous properties

Description: When the mixing/blending of a hazardous waste with one (or more) other materials or wastes, without chemical transformation, has the purpose of lowering the concentration of one (or more) component present in the hazardous waste and subsequently allowing the diluted hazardous waste to be sent to a treatment or recycling operation which is not allowed to treat the non-diluted hazardous waste, the operation of mixing/blending is forbidden.

Applicability: This applies to authorised mixing of hazardous wastes.

Or, re-introduce the existing BAT 13 from the original WTBREF 2006:

'Have and apply mixing/blending rules oriented to restrict the types of wastes that can be mixed/blended together in order to avoid increasing pollution emission of down-stream waste treatments. These rules need to consider the type of waste (e.g. hazardous, non-hazardous), waste treatment to be applied as well as the following steps that will be carried out to the waste OUT'

Rationale:

- WT BREF 2006 established a generic BAT 13 on mixing/blending. In addition, there are some more specific BAT 72f, 78c, 79a, 80a on particular considerations for certain waste streams. The revision of the WT BREF should add to the existing knowledge and only remove BAT if there is a very strong justification that they are no longer relevant. There has been no data or reasoning that justifies the removal of existing BAT on mixing;
- WT BREF 2006 already requests further work on mixing and blending. Chapter 7, point 6: *'Some lack of information have been identified on some issues covered by this document and some have limited the BAT conclusions. These are: (…) mixing and blending treatments. This issue is identified as very important in the sector but it has not been well developed. The BAT chapter lacks further conclusions on this issue';*
- The Waste Framework Directive (WFD 2008/98/EC) Article 18 sets out a ban on mixing of hazardous wastes, however Article 18 (2) sets out specific conditions under which mixing of hazardous waste can be allowed. Article 18 (2) (c) specifically cross-references BAT: *'the mixing operation conforms to best available techniques'.* Without relevant BAT on mixing this condition cannot be met. If there is no BAT for describing authorized mixing/blending, there is a big loophole in the regulation framework. (…).

Withdrawing the existing BAT 13 on mixing/blending rules from the BAT Conclusions creates a loophole by cutting the cross-reference between the Waste Framework Directive (WFD 2008/98/EC) and the Waste Treatment BAT Conclusions document;

- The European Commission adopted Guidance on the Waste Framework Directive cross-references BAT.

Mixing and blending of hazardous waste with other hazardous waste or other waste or materials could lead to improper downstream treatment of the mixed waste by waste treatment processes unsuitable for the original wastes causing impact on environment and health by producing more emission of pollutants to the air, to the water, to the soil or by contaminating substances, mixtures or objects reintroduced in industrial processes by recovery or recycling. Any such mixing or blending to dilute substances often only serves lower-quality, cheaper waste treatment operations.

Annex V: Article 24 of the Industrial Emissions Directive (IED) on *'access to information and public participation in the permit procedure' (and IED Annex IV on 'public participation in decision-making')*

Article 24 on the Industrial Emissions Directive – "Access to information and public participation in the permit procedure"

1. Member States shall ensure that the public concerned are given early and effective opportunities to participate in the following procedures:
   a) the granting of a permit for new installations;
   b) the granting of a permit for any substantial change;
   c) the granting or updating of a permit for an installation where the application of Article 15(4) is proposed
   d) the updating of a permit or permit conditions for an installation in accordance with Article 21(5)(a).

The procedure set out in Annex IV shall apply to such participation.

2. When a decision on granting, reconsideration or updating of a permit has been taken, the competent authority shall make available to the public, including via the Internet in relation to points (a), (b) and (f), the following information:
   g) the content of the decision, including a copy of the permit and any subsequent updates;
   h) the reasons on which the decision is based;
   i) the results of the consultations held before the decision was taken and an explanation of how they were taken into account in that decision;
   j) the title of the BAT reference documents relevant to the installation or activity concerned;
   k) how the permit conditions referred to in Article 14, including the emission limit values, have been determined in relation to the best available techniques and emission levels associated with the best available techniques;
   l) where a derogation is granted in accordance with Article 15(4), the specific reasons for that derogation based on the criteria laid down in that paragraph and the conditions imposed.

3. The competent authority shall also make available to the public, including via the Internet at least in relation to point (a):
   a) relevant information on the measures taken by the operator upon definitive cessation of activities in accordance with Article 22;
   b) the results of emission monitoring as required under the permit conditions and held by the competent authority.

4. Paragraphs 1, 2 and 3 of this Article shall apply subject to the restrictions laid down in Article 4(1) and (2) of Directive 2003/4/EC.

ANNEX IV

Public participation in decision-making

1. The public shall be informed (by public notices or other appropriate means such as electronic media where available) of the following matters early in the procedure for the taking of a decision or, at the latest, as soon as the information can reasonably be provided:

   (a) the application for a permit or, as the case may be, the proposal for the updating of a permit or of permit conditions in accordance with Article 21, including the description of the elements listed in Article 12(1);

   (b) where applicable, the fact that a decision is subject to a national or transboundary environmental impact assessment or to consultations between Member States in accordance with Article 26;

   (c) details of the competent authorities responsible for taking the decision, those from which relevant information can be obtained, those to which comments or questions can be submitted, and details of the time schedule for transmitting comments or questions;

   (d) the nature of possible decisions or, where there is one, the draft decision;

   (e) where applicable, the details relating to a proposal for the updating of a permit or of permit conditions;

   (f) an indication of the times and places where, or means by which, the relevant information will be made available;

   (g) details of the arrangements for public participation and consultation made pursuant to point 5.

2. Member States shall ensure that, within appropriate time-frames, the following is made available to the public concerned:

   (a) in accordance with national law, the main reports and advice issued to the competent authority or authorities at the time when the public concerned were informed in accordance with point 1;

   (b) in accordance with Directive 2003/4/EC, information other than that referred to in point 1 which is relevant for the decision in accordance with Article 5 of this Directive and which only becomes available after the time the public concerned was informed in accordance with point 1.

3. The public concerned shall be entitled to express comments and opinions to the competent authority before a decision is taken.

4. The results of the consultations held pursuant to this Annex must be taken into due account in the taking of a decision.

5. The detailed arrangements for informing the public (for example by bill posting within a certain radius or publication in local newspapers) and consulting the public concerned (for example by written submissions or by way of a public inquiry) shall be determined by the Member States. Reasonable time-frames for the different phases shall be provided, allowing sufficient time to inform the public and for the public concerned to prepare and participate effectively in environmental decision-making subject to this Annex.