



Final Meeting of the Technical Working Group (TWG) for the review of the BAT reference document for Waste Treatment (WT BREF)

Draft conclusions



Scope (1/13) – BP 1.1

These BAT conclusions concern the following activities specified in Annex I to Directive 2010/75/EU, namely:

- 5.1. Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving one or more of the following activities:
 - (a) biological treatment;
 - (b) physico-chemical treatment;
 - (c) blending or mixing prior to submission to any of the other activities listed in points 5.1 and 5.2 of Annex I to Directive 2010/75/EU;
 - (d) repackaging prior to submission to any of the other activities listed in points 5.1 and 5.2 of Annex I to Directive 2010/75/EU;
 - (e) solvent reclamation/regeneration;



Scope (2/13) – BP 1.1

- f) recycling/reclamation of inorganic materials other than metals or metal compounds;
- g) regeneration of acids or bases;
- h) recovery of components used for pollution abatement;
- i) recovery of components from catalysts;
- j) oil re-refining or other reuses of oil;



Scope (3/13) – BP 1.1

- 5.3.
 - (a) Disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day involving one or more of the following activities, and excluding activities covered by Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment:
 - (i) biological treatment;
 - (ii) physico-chemical treatment;
 - (iii) pre-treatment of waste for incineration or co-incineration;
 - (iv) treatment of ashes;
 - (v) treatment in shredders of metal waste, including waste electrical and electronic equipment and end-of-life vehicles and their components.



Scope (4/13) – BP 1.1

(b) Recovery, or a mix of recovery and disposal, of non-hazardous waste with a capacity exceeding 75 tonnes per day involving one or more of the following activities, and excluding activities covered by Directive 91/271/EEC:

- (i) biological treatment;
- (ii) pre-treatment of waste for incineration or co-incineration;
- (iii) treatment of ashes;
- (iv) treatment in shredders of metal waste, including waste electrical and electronic equipment and end-of-life vehicles and their components.

When the only waste treatment activity carried out is anaerobic digestion, the capacity threshold for this activity shall be 100 tonnes per day.



Scope (5/13) – BP 1.1

- 5.5. Temporary storage of hazardous waste not covered under point 5.4 [of Annex I to Directive 2010/75/EU] pending any of the activities listed in points 5.1, 5.2, 5.4 and 5.6 [of Annex I to Directive 2010/75/EU] with a total capacity exceeding 50 tonnes, excluding temporary storage, pending collection, on the site where the waste is generated.
- 6.11. Independently operated treatment of waste water not covered by Directive 91/271/EEC and discharged by an installation [undertaking activities covered under sections points 5.1, 5.3 and 5.5 above

Referring to independently operated treatment of waste water not covered by Directive 91/271/EEC above, these BAT conclusion also cover the combined treatment of waste water from different origins if the main pollutant load originates from the activities covered under sections 5.1, 5.3 and 5.5 of Annex I to Directive 2010/75/EU.].



Scope (6/13) – BP 1.1

These BAT conclusions do not address the following:

- Surface impoundment of waste.
- Disposal or recycling of animal carcasses or of animal waste covered by the activity description in Section 6.5 of Annex I to Directive 2010/75/EU; ~~this may be when~~ covered by the BAT conclusions on the slaughterhouses and animal by-products industries (SA).
- On farm processing of manure when covered by BAT conclusions for intensive rearing of poultry or pigs.



Scope (7/13) – BP 1.1

- Direct recovery (i.e. without pretreatment) of waste as a substitute for raw materials in installations carrying out activities covered by other BAT conclusions, i.e. e.g.:
 - direct recovery of lead (e.g. from batteries), zinc or aluminium salts or recovery of the metals from catalysts; this may be covered by the BAT conclusions for the non-ferrous metals industries (NFM);
 - processing paper for waste recycling; this may be covered by the BAT conclusions for the production of pulp, paper and board (PP);
 - use of waste as fuel/raw material in cement kilns; this may be covered by the BAT conclusions for the production of cement, lime and magnesium oxide (CLM).



Scope (8/13) – BP 1.1

- Waste (co-)incineration, ~~co-incineration~~, pyrolysis and gasification; this may be covered by the BAT conclusions for waste incineration (WI) or the BAT conclusions for large combustion plants (LCP).
- Landfill of waste; this is covered by Directive 1999/31/EC on the landfill of waste. In particular, underground permanent and long-term storage (≥ 1 year before disposal, ≥ 3 years before recovery) are covered by Directive 1999/31/EC.
- *In situ* remediation of contaminated soil (i.e. unexcavated soil).



Scope (9/13) – BP 1.1

- Treatment of slags and bottom ashes ~~solid residues from (co-)incineration or combustion except fly ashes~~; this may be covered by the BAT conclusions for waste incineration (WI) and/or the BAT conclusions for large combustion plants (LCP);
- ~~The~~ smelting of scrap metals and metal-bearing materials; this may be covered in the BAT conclusions for non-ferrous metals industries (NFM), the BAT conclusions for iron and steel production (IS), and/or the BAT conclusions for the smitheries and foundries industry (SF).
- Regeneration of spent acids and alkalis when covered by the BAT conclusions for ferrous metals processing.
- Combustion of fuels when it does not generate hot gases which come into direct contact with the waste. This may be covered in the BAT conclusions for large combustion plants (LCP) or by Directive 2015/2193/EU.



Scope (10/13) – BP 1.1

Other BAT conclusions and reference documents which could be relevant for the activities covered by these BAT conclusions are the following:

- Economics and cross-media effects (ECM);
- Emissions from storage (EFS);
- Energy efficiency (ENE);
- Monitoring of emissions to air and water from IED installations (ROM);
- Production of cement, lime and magnesium oxide (CLM);
- Common waste water and waste gas treatment/management systems in the chemical sector (CWW);
- Intensive rearing of poultry or pigs (IRPP).



General considerations – Emissions to air (1/2) – BP 1.2

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

Unless stated otherwise, emission levels associated with the best available techniques (BAT-AELs) for emissions to air given in these BAT conclusions refer to concentrations (mass of emitted substances per volume of waste gas) under the following standard conditions: dry gas at a temperature of 273.15 K and a pressure of 101.3 kPa, without correction for Θ_2 -oxygen content, and expressed in mg/Nm³ or µg/Nm³.



General considerations – Emissions to air (2/2) – BP 1.2

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

Averaging period	Definition
Daily average	Average over a period of one day based on valid hourly or half-hourly averages.
Average of values obtained during one year	Average of all valid measurement values obtained during one year
Average over the sampling period	Average value of three consecutive measurements of at least 30 minutes each ⁽¹⁾ (2)
⁽¹⁾ For any parameter where, due to sampling or analytical limitations, 30-minute measurement is inappropriate, a more suitable measurement period may be employed (e.g. for odour). (2) For PCDD/F or dioxin-like PCBs, a one sampling period of 6 to 8 hours is used.	

**General considerations in Revised Draft 1****Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (3/64) – BP 1.2****Emission levels associated with the best available techniques (BAT-AELs) for emissions to water**

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

Unless stated otherwise, ~~averaging periods associated with the BAT-AELs refer to the flow-weighted monthly average values of all the following samples taken during that period under normal operating conditions~~ refer to either of the two following cases:



General considerations in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (4/64) – BP 1.2

- in the case of continuous discharge, daily average values, i.e. 24-hour flow-proportional composite sample;
 - 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 grab sample taken before discharge.
- ~~for a continuous discharge or batch discharge with a duration of 24 hours or more: 24-hour flow-proportional composite samples,~~
- ~~— for a batch discharge with a duration of less than 24 hours: flow-proportional composite samples taken over the discharge period,~~



General considerations in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (5/64) – BP 1.2

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

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

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

Where n : number of measurements;

c_i : average concentration during i^{th} measurement;

q_i : average flow rate during i^{th} measurement.

All BAT-AELs for emissions to water apply at the point where the emission leaves the installation.



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (x/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Dissenting views that were expressed:

TWG member	Issue
FI, SE	On averaging periods for emissions to water (General considerations)



Scope in Revised Draft 1

Scope (11/13) – BP 1.1

Reference document	Subject
Economics and Cross-Media Effects (ECM)	Economics and cross-media effects of techniques
Emissions from Storage (EFS)	Storage, transfer and handling of solids and liquids
Energy Efficiency (ENE)	General aspects of energy efficiency
Monitoring of emissions to air and water from IED installations (ROM)	Monitoring of emissions to air and water
Production of Cement, Lime and Magnesium Oxide (CLM)	Waste quality control and safety management for the use of hazardous waste materials
Common Waste Water and Waste Gas Treatment/Management Systems in the Chemical Sector (CWW)	Waste water treatment techniques and treatment of water-based liquid waste



Scope (12/13) – BP 1.1

~~These BAT conclusions apply without prejudice to other relevant legislation, e.g. on health and safety.~~

**Scope (13/13) – BP 1.1****Dissenting views that were expressed:**

TWG member	Issue
HWE, EURITS	On the formulation of the 6.11 activity in the Scope
SE	On the use of "this may be" in the Scope

Conclusions:

- **The Scope of the BREF will be put in line with the Scope of the BAT conclusions.**



Scope (14/14) – BP 1.1

Dissenting views that were expressed:

TWG member	Issue
CEWEP, ESWET	On inclusion in the Scope of fly ash and FGC residues onsite treatment



Definitions – BP 2.2 (x/x)

Term used	Description
General terms	
Fly ash	The fine fraction of the ash that leaves the combustion chamber with the flue-gas. Particles from the combustion chamber or formed within the flue-gas stream that are transported in the flue-gas.



Definitions – BP 2.2 (x/y)

Term used	Description
General terms	
Liquid biodegradable waste	Waste of biological origin with a relatively high water content (e.g. fat separator contents, organic sludges, catering waste).
Water-based liquid waste	Waste consisting of aqueous liquids, acids/alkali or pumpable sludges (e.g. emulsions, waste acids, aqueous marine waste) which is not liquid biodegradable waste.



Definitions – BP 2.2

Term used	Definition
General terms	
Residues	Materials generated by the activities covered by the scope of this document, as waste or by-product.
Output	The treated waste material exiting the waste treatment plant.



Definitions – BP 2.2 (x/x)

Term used	Description
General terms	
Channelled emissions	Emissions of pollutants into the environment through any kind of duct, pipe, stack, etc. This also includes emissions from open top biofilters.
Diffuse emissions	Non-channelled emissions (e.g. of dust, organic compounds VOG , odour) 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 .



Definitions – BP 2.2 (x/x)

Term used	Description
General terms	
Pasty waste	Non-pumpable waste (e.g. sludge). Sludge which is not free-flowing



EMS (1/5) – BP 1.3

BAT 1. In order to improve the overall environmental performance, BAT is to implement and adhere to an environmental management system (EMS) that incorporates all of the following features:

- I. commitment of the management, including senior management;
- II. definition, **by the management**, of an environmental policy that includes the continuous improvement of the **environmental performance of the installation**~~by the management~~;
- III. planning and establishing the necessary procedures, objectives and targets, in conjunction with financial planning and investment;



EMS (2/5) – BP 1.3

IV. implementation of procedures paying particular attention to:

- (a) structure and responsibility,
- (b) recruitment, training, awareness and competence,
- (c) communication,
- (d) employee involvement,
- (e) documentation,
- (f) effective process control,
- (g) maintenance programmes,
- (h) emergency preparedness and response,
- (i) safeguarding compliance with environmental legislation;



EMS (3/5) – BP 1.3

- V. checking performance and taking corrective action, paying particular attention to:
- (a) monitoring and measurement (see also the JRC Reference Report on Monitoring of emissions to air and water from IED installations – ROM),
 - (b) corrective and preventive action,
 - (c) maintenance of records,
 - (d) independent (where practicable) internal or external auditing in order to determine whether or not the EMS conforms to planned arrangements and has been properly implemented and maintained;



EMS (4/5) – BP 1.3

- VI. review, by senior management, of the EMS and its continuing suitability, adequacy and effectiveness;
- VII. following the development of cleaner technologies;
- VIII. consideration for the environmental impacts from the eventual decommissioning of the plant at the stage of designing a new plant, and throughout its operating life;
- IX. application of sectoral benchmarking on a regular basis.
- X. waste **stream management** ~~treatment strategy that includes inventories of waste input streams (see BAT 2 and BAT 14);~~
- XI. ~~procedures to ensure the compatibility of wastes before mixing/blending (see BAT 2);~~



EMS (5/5) – BP 1.3

- XI. residues management plan (see description in Section 6.6.5);
- XII. accident management plan (see description in Section 6.6.5).
- XIII. odour management plan (see BAT 8);
- XIV. noise and vibration management plan (see ~~0~~**BAT 18**);

Applicability

The scope (e.g. level of detail) and nature of the EMS (e.g. standardised or non-standardised) will generally be related to the nature, scale and complexity of the installation, and the range of environmental impacts it may have (determined also by the type and amount of wastes processed).



EMS – BP 1.3

Conclusions of the meeting:

- Relay proposals of wording improvements to the IED Article 13 Forum for considerations.



Generic BAT – BAT 2 – Waste stream management (1/10) – BP 1.4

BAT 2. In order to improve the overall environmental performance of the plant, BAT is to use all of the techniques ~~(a) to (e)~~ given below ~~and, when relevant, also technique (f).~~



**Generic BAT – BAT 2 – Waste stream management
(2/10) – BP 1.4**

Technique		Description
a	To set up and implement waste characterisation and pre-acceptance procedures	These 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. They includes procedures to collect information about the waste input and may include waste sampling and characterisation to achieve sufficient knowledge of the waste composition. Waste pre-acceptance procedures are risk-based on a risk assessment considering, for example, the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, as well as the information provided by the previous waste holder(s).



Generic BAT – BAT 2 – Waste stream management (3/10) – BP 1.4

Technique	Description
<p>b</p> <p>To set up and implement waste acceptance procedures</p>	<p>Acceptance procedures aim to confirm the characteristics of the waste, as identified in the pre-acceptance stage. These procedures define the elements to be verified upon the waste arrival of the waste at the plant as well as the waste acceptance and rejection criteria. They may include waste sampling, inspection and analysis. Waste acceptance procedures are risk-based on a risk assessment considering, for example, the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, as well as the information provided by the previous waste holder(s).</p>



**Generic BAT – BAT 2 – Waste stream management
(4/10) – BP 1.4**

Technique		Description
c	To set up and implement a waste tracking system and inventory	A waste tracking system and inventory aim to track keep control on the location and quantity of waste in the plant. It holds all the information generated during waste pre-acceptance procedures (e.g. date of arrival at the plant and unique reference number of the waste, information on the previous waste holder(s), pre-acceptance and acceptance analysis results, intended treatment route, nature and quantity of waste held on site including all identified hazards), acceptance, storage, treatment and/or transfer off site.



Generic BAT – BAT 2 – Waste stream management
(5/10) – BP 1.4

Technique		Description
c		The waste tracking system is risk-based on a risk assessment considering, for example, the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, as well as the information provided by the previous waste holder(s).



Generic BAT – BAT 2 – Waste stream management
(6/10) – BP 1.4

Technique		Description
c1	To set up and implement an output quality management system	This technique involves setting up and implementing an output quality management system, so as to ensure that the output of the waste treatment is in line with the expectations, using e.g. existing EN standards. This management system also allows the performance of the waste treatment to be monitored and optimised, for this purpose, may include a material flow analysis of some relevant components throughout the waste treatment. The use of a material flow analysis is risk-based on a risk assessment considering, for example, the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, as well as the information provided by the previous waste holder(s).



**Generic BAT – BAT 2 – Waste stream management
(7/10) – BP 1.4**

Technique		Description
d	To ensure waste segregation	Waste is separated kept separated prior to treatment depending on its properties in order to enable easier and environmentally safer storage and treatment. Waste segregation relies on the physical separation of waste and on procedures that define identify when and where wastes are stored., when the mixing of waste is allowed and how it is carried out.



Generic BAT – BAT 2 – Waste stream management
(8/10) – BP 1.4

Technique		Description
e	To assess-ensure waste compatibility prior to mixing or blending of waste	Compatibility is ensured by assessment consists of a set of verification measures and tests in order to detect any unwanted and/or potentially dangerous chemical reactions between wastes (e.g. polymerisation, gas evolution, exothermal reaction, decomposition, crystallisation, precipitation) when mixing, blending, or carrying out other treatment operations. The compatibility tests are defined risk-based on a risk assessment considering, for example, the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, as well as the information provided by the previous waste holder(s).



Generic BAT – BAT 2 – Waste stream management
(9/10) – BP 1.4

Technique		Description
f	To sort incoming solid waste	<p>Waste Sorting of incoming waste ⁽¹⁾ aims to prevent unwanted material to enter from entering the subsequent waste treatment process(es). For solid waste, It may include:</p> <ul style="list-style-type: none">• manual separation by means of visual examination to sort out the recyclables and contaminants;• ferrous metals, non-ferrous metals or all-metals separators;

(¹) Sorting techniques are described in Section 6.6.4.



Generic BAT – BAT 2 – Waste stream management (10/10) – BP 1.4

Technique		Description
f		<ul style="list-style-type: none"> optical separation, e.g. by near-infrared spectroscopy or X-ray systems; density separation, e.g. by air classification, sink-float tanks, vibration tables; size separation by screening/sieving.



**Generic BAT – BAT 2 – Waste stream management
– BP 1.4**

Dissenting views that were expressed:

TWG member	Issue
HWE, EURITS	On absence of a BAT on mixing/blending hazardous waste in relation to dilution



Inventory of waste water and waste gas streams (1/4) – BP 1.5 and 1.8.2

BAT 2bis. In order to facilitate the reduction of emissions to water and air ~~and the reduction of water usage~~, BAT is to establish and to maintain an inventory of waste water and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the following features:

- (i) information about the ~~nature and characteristics of the~~ waste to be treated and the waste treatment processes, including:
 - (a) simplified process flow sheets that show the origin of the emissions;
 - (b) descriptions of process-integrated techniques and waste water/waste gas treatment at source including their performances;



Inventory of waste water and waste gas streams (2/4) – BP 1.5 and 1.8.2

- (ii) information, ~~as comprehensive as is reasonably possible~~, about the characteristics of the waste water streams, such as:
- (a) average values and variability of flow, pH, temperature, and conductivity;
 - (b) average concentration and load values of relevant substances and their variability (e.g. COD/TOC, nitrogen species, phosphorus, metals, **priority substances / micropollutants**);
 - (c) data on bioeliminability (e.g. BOD, BOD to COD ratio, Zahn-Wellens test, biological inhibition potential (e.g. nitrification)) (**see BAT 52bis**);



Inventory of waste water and waste gas streams (3/4) – BP 1.5 and 1.8.2

(iii) information, ~~as comprehensive as is reasonably possible~~, about the characteristics of the waste gas streams, such as:

- (a) average values and variability of flow and temperature;
- (b) average concentration and load values of relevant substances and their variability (e.g. organic compounds, **POPs such as PCBs**);
- (c) flammability, lower and higher explosive limits, reactivity;
- (d) presence of other substances that may affect the waste gas treatment system or plant safety (e.g. oxygen, nitrogen, water vapour, dust).



Inventory of waste water and waste gas streams (4/4) – BP 1.5 and 1.8.2

Applicability

The scope (e.g. level of detail) and nature of the inventory will generally be related to the nature, scale and complexity of the installation, and the range of environmental impacts it may have (determined also by the type and amount of wastes processed).



Storage of waste (1/4) – BP 1.10.1

BAT 23. In order to prevent or, where that is not practicable, to reduce the environmental risk associated with of the storage of waste, BAT is to use all of the techniques given below.

Technique		Description	Applicability
a	Optimised storage location	<p>This includes techniques such as:</p> <ul style="list-style-type: none">the storage is located as far as technically and economically possible from e.g. sensitive receptors, watercourses;the storage is located Storage is located away from watercourses. in such a way so as to eliminate or minimise the unnecessary handling of wastes within the plant (e.g. the same wastes are handled twice or more or the transport distances on site are unnecessarily long).	Generally applicable to new plants.
b	Technique b moved to BAT 13 (technique a1)		



Storage of waste (2/4) – BP 1.10.1

Technique		Description	Applicability
C	Adequate Sufficient Storage capacity	<p>Measures are taken to avoid storage/accumulation of waste, such as:</p> <ul style="list-style-type: none">• a waste acceptance (see BAT 2) plan is used;• the maximum waste storage capacity is clearly established and not exceeded and communicated taking into account the characteristics of the wastes (e.g. regarding the risk of fire) and the treatment capacity;• the quantity of waste stored is regularly verified monitored against the maximum allowed storage capacity;• the maximum residence time of waste is clearly established.	Generally applicable.



Storage of waste (3/4) – BP 1.10.1

Technique		Description	Applicability
d	Safe storage operation	<p>This includes measures such as:</p> <ul style="list-style-type: none">• equipment used for loading, unloading and storing waste is clearly documented and labelled;• waste segregation measures are taken (see BAT 2);• substances wastes known to be sensitive to heat, light, air, water, etc. are protected from such ambient conditions;• containers and drums are fit for purpose and stored securely.	Generally applicable.



Storage of waste (4/4) – BP 1.10.1

Technique		Description	Applicability
e	Separate area for storage and handling of packaged hazardous waste laboratory smalls	When relevant, a dedicated area is used for storage and handling of packaged hazardous waste sorting and repacking laboratory smalls.	Only applicable for plants storing laboratory smalls. Generally applicable.



Handling of waste (1/2) – BP 1.10.2

BAT 24. In order to reduce the environmental risk associated with the handling and transfer of waste, BAT is to use the following technique. set up and implement handling and transfer systems and procedures.

Description

Handling and transfer procedures aim to ensure that wastes are safely handled and transferred to the respective storage or treatment. They include the following elements:

~~This includes:~~

- handling and transfer of waste ~~is~~ are carried out by competent ~~qualified~~ and trained staff;
- handling and transfers and discharges of waste are duly documented, ~~and~~ validated prior to execution ~~and verified after execution~~;



Handling of waste (2/2) – BP 1.10.2

- ~~measures are taken to ensure couplings are correctly fitted when connecting hoses or pipes;~~
- measures are taken to prevent, detect and mitigate spills;
- ~~technical operation and, if relevant, construction design precautions are taken to protect human health and the environment when mixing or blending wastes, depending on the composition and consistency of the wastes to be mixed or blended (e.g. vacuuming dust-like dusty/powdery wastes).~~

Handling and transfer procedures are risk-based ~~on a risk assessment~~ considering the likelihood of accidents and incidents and their environmental impact.



Generic BAT – Key process monitoring for emissions to water (1/1) – BP 1.5

BAT 3bis. For relevant emissions to water as identified by the inventory of waste water streams (see BAT 2bis), BAT is to monitor key process parameters (~~including—e.g.~~ waste water flow, pH, ~~and~~ temperature, conductivity, BOD) at key locations (e.g. at the inlet and/or outlet of the pretreatment, inlet to the final treatment, at the point where the emission leaves the installation. ~~and/or at the inlet to pretreatment and at the inlet to final treatment~~).



Mechanical treatment – Monitoring of emissions to air (1/5) – BP 1.5.3 and 1.11.3

BAT 4. BAT is to monitor channelled emissions to air with at least the frequency given below ~~indicated in Table 6,~~ and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.

~~Table 66.2: Monitoring of channelled emissions to air~~



**Mechanical treatment – Monitoring of emissions to air (2/5) –
BP 1.5.3 and 1.11.3**

Substance / Parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (¹)	Monitoring associated with
NA: Not applicable				
(¹) Monitoring frequencies may be adapted if the data series clearly demonstrate a sufficient stability reduced if the emission levels are proven to be sufficiently stable.				



Generic BAT – Key process monitoring for emissions to air
(3/x) – BP 1.5

Substance / Parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (1)	Monitoring associated with
Dust	EN 13284-1	Thermal treatment of spent activated carbon, waste catalysts and excavated contaminated soil	Once every six months	NA BAT 48
		Treatment Water washing of excavated contaminated soil		NA BAT 49



BAT 4 in Revised Draft 1

Generic BAT – Key process monitoring for emissions to air
(4/x) – BP 1.5

Substance / Parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (1)	Monitoring associated with
TVOC	EN 12619	Thermal treatment of spent activated carbon, waste catalysts and excavated contaminated soil	Once every six months	NA BAT 48
		Treatment Water washing of excavated contaminated soil		NA BAT 49



Generic BAT – Key process monitoring for emissions to air
(5/x) – BP 1.5

Substance / Parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (1)	Monitoring associated with
TVOC	EN 12619	Decontamination of equipment containing POPs-PCBs (3)	Once every six three months	NA BAT 50
(3) The monitoring only applies when solvent is used for cleaning the contaminated device/equipment.				



BAT 4 in Revised Draft 1

Generic BAT – Key process monitoring for emissions to air
(6/x) – BP 1.5

Substance / Parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (1)	Monitoring associated with
HCl	EN 1911	Thermal treatment of spent activated carbon, waste catalysts and excavated contaminated soil (4)	Once every six months	NA-BAT 48
HF	ISO 15713 No EN standard available			NA-BAT 48



BAT 4 in Revised Draft 1

Generic BAT – Key process monitoring for emissions to air
(7/x) – BP 1.5

Substance / Parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (1)	Monitoring associated with
Dioxin- like PCBs	EN 1948- 1, -2, and -4 (2)	Decontamination of equipment containing POPs PCBs	Once every six three months	NA BAT 50



Generic BAT – BAT 8 – Odour management plan (1/2) – BP 1.6.1

BAT 8. In order to prevent or, where that is not practicable, to reduce ~~odourous emissions from the plant~~, BAT is to set up, implement and regularly review an odour management plan, as part of the environmental management system (see BAT 1), that includes all of the following elements:

- A protocol containing actions ~~(see BAT 9)~~ and timelines.
- A protocol for conducting odour monitoring as set out in BAT 6. It may be complemented by measurement/estimation of odour exposure (e.g. according to EN 16841-1 or -2) or estimation of odour impact.
- A protocol for response to identified odour incidents, e.g. complaints.



Generic BAT – BAT 8 – Odour management plan (2/2) – BP 1.6.1

BAT 8. (cont.)

- An odour prevention and reduction programme designed to identify the source(s); to measure/estimate odour exposure, to characterise the contributions of the sources; and to implement prevention and/or reduction measures.

Applicability

The applicability is restricted to cases where an odour nuisance at sensitive receptors can be expected and/or has been substantiated.



Generic BAT – BAT 9 – Odour reduction techniques
(1/3) – BP 1.6.2

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

Technique		Description	Applicability
a	Minimising residence times	Minimising the residence time (e.g. 24 to 72 hours) of (potentially) odorous waste and potentially odorous waste in collection and storage or in handling systems (e.g. pipes, tanks, containers) , in particular under anaerobic conditions. When relevant, adequate provisions are made for the acceptance of seasonal peak volumes of waste.	Generally applicable. — Only applicable to open systems.



Generic BAT – BAT 9 – Odour reduction techniques
(2/3) – BP 1.6.2

Technique		Description	Applicability
b	Using chemical treatment	Using chemicals to destroy or to reduce the formation of odorous compounds (e.g. oxidation to oxidise or precipitation to precipitate of hydrogen sulphide).	Generally applicable. Not applicable if it may hamper the desired output quality.



Generic BAT – BAT 9 – Odour reduction techniques
(3/3) – BP 1.6.2

Technique		Description	Applicability
c	Optimising aerobic treatment	<p>In the case of aerobic treatment of waste, the optimisation can may include:</p> <ul style="list-style-type: none">• controlling the oxygen content;• frequent maintenance of the aeration system. <p>In the case of aerobic treatment of water-based liquid waste, it may include:</p> <ul style="list-style-type: none">• use of pure oxygen;• removal of scum in tanks;• frequent maintenance of the aeration system.	<p>Generally applicable in case of aerobic treatment of waste.</p>



Generic BAT – BAT 10 – Diffuse emissions to air (1/10) – BP 1.7

BAT 10. In order to prevent or, where that is not practicable, to reduce diffuse emissions to air, in particular of dust, organic compounds and odour, BAT is to use ~~one or an~~ appropriate combination of the techniques given below.

Depending on the risk posed by the waste in terms of diffuse emissions to air, BAT 10d is specially relevant.



**Generic BAT – BAT 10 – Diffuse emissions to air
(2/10) – BP 1.7**

Technique		Description	Applicability
a.	Limiting Minimising the number of potential diffuse emission sources	<p>This includes techniques such as:</p> <ul style="list-style-type: none">• appropriate design of piping layout (e.g. minimising pipe run length, reducing the number of flanges and valves, using welded fittings and pipes);• favouring the use of pressure-gravity transfer (e.g. gravity) rather than using pumps;• limiting the drop height of material.• limiting traffic speed, using wind protections;	<p>The design of piping layout is Only applicable to new plants and to major plant upgrades. Generally applicable.</p>



BAT 10 in Revised Draft 1

Generic BAT – BAT 10 – Diffuse emissions to air
(3/10) – BP 1.7

Technique		Description	Applicability
b.	Selection and use of high-integrity equipment	<p>This includes techniques such as:</p> <ul style="list-style-type: none">valves with double packing seals or equally efficient equipment;high-integrity gaskets (such as spiral wound ring joints) for critical applications;pumps/compressors/agitators fitted with mechanical seals instead of packing;magnetically driven pumps/compressors/agitators;	<p>Generally applicable.</p> <p>Magnetically driven equipment may not be applicable in the case of liquids containing ferrous particles.</p> <p>Applicability may be restricted in the case of existing plants due to operability requirements.</p>



**Generic BAT – BAT 10 – Diffuse emissions to air
(4/10) – BP 1.7**

Technique		Description	Applicability
b.		<ul style="list-style-type: none">appropriate service hoses' access ports, piercing piers, drill heads, e.g. when degassing WEEE containing refrigerants VFCs and/or VHCs.	



**Generic BAT – BAT 10 – Diffuse emissions to air
(5/10) – BP 1.7**

Technique		Description	Applicability
C.	Select appropriate materials for equipment Corrosion prevention	<p>This includes techniques such as:</p> <ul style="list-style-type: none">• appropriate selection of construction materials;• lining or coating of equipment and painting of pipes with corrosion inhibitors to prevent corrosion.	Generally applicable.



BAT 10 in Revised Draft 1

Generic BAT – BAT 10 – Diffuse emissions to air
(6/10) – BP 1.7

Technique		Description	Applicability
d.	Ensure Containment, collection and treatment of diffuse emissions	<p>This includes techniques such as:</p> <ul style="list-style-type: none">storing, treating and handling waste and material that may generate diffuse emissions in enclosed equipment or buildings and/or enclosed equipment (e.g. conveyor belts);	<p>Generally applicable</p> <p>The use of enclosed equipment or buildings may be restricted by safety considerations such as the risk of explosion or oxygen depletion.</p> <p>The use of enclosed equipment or buildings may also be constrained by the volume of waste.</p>



**Generic BAT – BAT 10 – Diffuse emissions to air
(7/10) – BP 1.7**

Technique		Description	Applicability
d.		<ul style="list-style-type: none">maintaining the enclosed equipment or buildings under negative an adequate pressure;collecting and directing the emissions to an appropriate abatement system (see Section 6.6.1) via an air extraction system and/or air suction systems close to the emission sources;dampening waste that can generate diffuse dust emissions with water	



Generic BAT – BAT 10 – Diffuse emissions to air (8/10) – BP 1.7

Technique		Description	Applicability
d1	Dampening	Dampening potential sources of diffuse dust emissions (e.g. waste storage, traffic areas, and open handling processes) with water or fog.	Generally applicable.
e.	Moved to BAT 34bis		
f.	Moved to BAT 34bis		



Generic BAT – BAT 10 – Diffuse emissions to air (9/10) – BP 1.7

Technique		Description	Applicability
g.	Maintenance and cleaning washing	<p>This includes techniques such as:</p> <ul style="list-style-type: none"> ensuring access to potentially leaky equipment; regularly controlling protective equipment such as lamellar curtains, fast-action doors; regularly cleaning washing the whole waste treatment area (halls, traffic areas, storage areas, etc.), conveyor bands belts, equipment and containers. 	Generally applicable.
g1	Cleaning of waste treatment and storage areas	<p>This includes techniques such as regularly cleaning the whole waste treatment area (halls, traffic areas, storage areas, etc.), conveyor bands belts, equipment and containers.</p>	Generally applicable.



**Generic BAT – BAT 10 – Diffuse emissions to air
(10/10) – BP 1.7**

Technique		Description	Applicability
h.	Set up and implement a Leak detection and repair (LDAR) programme	See the description of the technique in Section 6.6.1. When emissions of organic compounds are expected, a LDAR programme is set up and implemented using a risk-based approach—assessment, considering in particular the design of the plant and the amount and nature of the organic compounds concerned.	Only applicable to plants that contain a large number of piping components (e.g. valves) and that process a significant amount of lighter hydrocarbons. Generally applicable.



Reduction of water consumption / generation of waste water (1/17) – BP 1.8.1, 1.9 and 1.10.1

BAT 13. In order to optimise water consumption, to reduce the volume of waste water generated and to prevent or, where that is not practicable, to reduce emissions to soil and groundwater ~~reduce water usage and to prevent or, where that is not practicable, to reduce the discharge of pollutants to water from waste treatment,~~ BAT is to use **all an appropriate combination** of the techniques given below.



**Reduction of water consumption / generation of waste water
(2/17) – BP 1.8.1, 1.9 and 1.10.1**

Technique		Description	Applicability
a	Water-saving action plan and water audits	<p>A water-saving plan includes:</p> <ul style="list-style-type: none">• flow diagrams and water mass balance,• establishment of water efficiency objectives,• implementation of water optimisation techniques (e.g. water pinch techniques, minimising use of washing and cleaning water). <p>Water audits are carried out with the aim of increasing the reliability of the control and abatement performance of pollutants, reducing water usage, and preventing water contamination.</p>	



Reduction of water consumption / generation of waste water (3/17) – BP 1.8.1, 1.9 and 1.10.1

Technique	Description	Applicability
a Water management	<p>Water consumption is optimised by using measures which may include:</p> <ul style="list-style-type: none"> • water-saving plans (e.g. establishment of water efficiency objectives, flow diagrams and water mass balances); • optimising the use of washing water (e.g. dry cleaning instead of hosing down, using trigger control on all washing equipment); • reducing the use of water for vacuum generation (e.g. use of liquid ring pumps with high boiling point liquids). 	Generally applicable.



Reduction of water consumption / generation of waste water
(4/17) – BP 1.8.1, 1.9 and 1.10.1

Technique		Description	Applicability
b	Technique b moved down – Technique (a3)		
c	Maximise internal water recycling	Increase the number and/or capacity of water recycling systems. Water streams are recycled within the plant, if necessary after treatment. The degree of recycling is limited by the water balance of the plant, and the content of impurities (e.g. odorous compounds) or the characteristics of the water streams (e.g. nutrient content).	Water recycling may be limited by the content of impurities in the water. Generally applicable.



Reduction of water consumption / generation of waste water
(5/17) – BP 1.8.1, 1.9 and 1.10.1

Technique		Description	Applicability
Ex-technique 20a	Sealed Impermeable surface and retention volume secondary containment	Depending on the risks posed by the waste in terms of soil or water contamination, the surface of the whole waste treatment area (e.g. waste reception, handling, storage, treatment and dispatch areas) is sealed concrete-based or made impermeable to the concerned liquids (e.g. concrete base). Each storage tank for liquids is located in a liquid-proof retention area. Tanks for liquids are located in suitable secondary containment capable of retaining 110 % of the liquids' volume.	Generally applicable.



Reduction of water consumption / generation of waste water
(6/17) – BP 1.8.1, 1.9 and 1.10.1

Technique		Description	Applicability
a1 (ex-technique 23b)	Storage design Techniques to reduce the likelihood and impact of overflows and failures from tanks and vessels	<p>This includes techniques such as:</p> <ul style="list-style-type: none">• overflow detectors;• Measures are taken to prevent, detect and mitigate overflows from tanks and vessels. <p>Vessel overflow pipes that are directed to a contained drainage system (i.e. the relevant bund area secondary containment or another vessel);</p>	Generally applicable.



Reduction of water consumption / generation of waste water
(7/17) – BP 1.8.1, 1.9 and 1.10.1

Technique		Description	Applicability
a1 (ex-technique 23b)	<p>Storage design</p> <p>Techniques to reduce the likelihood and impact of overflows and failures from tanks and vessels</p>	<ul style="list-style-type: none">Tanks for liquids are located in a suitable secondary containment. The volume is normally sized to accommodate the loss of containment of the largest tank within the secondary containment. capable of retaining 110 % of the liquids' volume.isolation of tanks Tanks and, vessels and secondary containment are isolable (e.g. closing of valves).	Generally applicable.



**Reduction of water consumption / generation of waste water
(8/17) – BP 1.8.1, 1.9 and 1.10.1**

Technique		Description	Applicability
a2	Roofing of waste storage and treatment areas	Depending on the risks posed by the waste in terms of soil or water contamination, waste is stored and treated in covered areas to prevent contact with rainwater and thus minimise the volume of contaminated run-off water.	Applicability may be constrained when high volumes of waste are stored or treated (e.g. mechanical treatment in shredders of metal waste)



Reduction of water consumption / generation of waste water
(9/17) – BP 1.8.1, 1.9 and 1.10.1

Technique		Description	Applicability
a3 (ex- technique 13b)	Segregation of different water streams in the water and drainage systems	Each water stream (e.g. road water, surface run-off water, process water) is collected and treated separately, depending based on the pollutant pollution content and on the combination of treatment techniques). Uncontaminated water is reused as much as possible in the substitution of fresh water.	



BAT 13 in Revised Draft 1

Reduction of water consumption / generation of waste water
(10/17) – BP 1.8.1, 1.9 and 1.10.1

Technique		Description	Applicability
a3 (ex- technique 13b)		In particular, uncontaminated waste water streams are segregated from waste water streams that require treatment. Drainages from incompatible wastes are not mixed.	Generally applicable to new plants. Generally applicable to existing plants within the constraints given by associated with the configuration of the water collection system circuits.



Reduction of water consumption / generation of waste water
(11/17) – BP 1.8.1, 1.9 and 1.10.1

Technique		Description	Applicability
Ex- technique 20b	Adequate drainage infrastructure	<p>The waste treatment area is connected to a drainage infrastructure.</p> <p>Run-off—Rainwater falling on the treatment and storage areas is collected in the drainage infrastructure along with tanker—washing water, occasional spillages, drum washings, etc. and, depending on the pollutant content, returned to the waste treatment plant or collected in an interceptor.recycled or collected for further treatment.</p>	<p>Generally applicable to new plants.</p> <p>Generally applicable to existing plants within the constraints associated with the configuration of the water drainage system.</p>



Reduction of water consumption / generation of waste water
(12/17) – BP 1.8.1, 1.9 and 1.10.1

Technique		Description	Applicability
Ex- technique 20b		Interceptors with an overflow have automatic monitoring systems, such as pH checks which can trigger the shutting down of the overflow.	



Reduction of water consumption / generation of waste water
(13/17) – BP 1.8.1, 1.9 and 1.10.1

Technique		Description	Applicability
Ex-technique 20c	Design and maintenance provisions to allow detection and repair of leaks	<p>Regular monitoring for potential leakages is carried out risk based on a risk approach assessment, and, when necessary, equipment is repaired.</p> <p>The use of underground components is minimised. Vessels and pipework are located above ground or When underground components are used, and depending on the risks posed by the waste in terms of soil or water contamination, secondary containment of underground components is put in place.</p>	<p>The use of above-ground components is generally applicable to new plants. It may be limited however by the risk of freezing.</p> <p>The installation of secondary containment may be limited in the case of existing plants.</p>



Reduction of water consumption / generation of waste water
(14/17) – BP 1.8.1, 1.9 and 1.10.1

Technique		Description	Applicability
Ex- technique 20c		Regular monitoring for potential leakages is carried out. When underground pipework is used, it is equipped with suitable inspection channels.	



Reduction of water consumption / generation of waste water (15/17) – BP 1.8.1, 1.9 and 1.10.1

Technique		Description	Applicability
Ex- technique 20d	Security basin	A basin used to collect surges that may be contaminated, e.g. firefighting water.	
	Buffer storage capacity	Appropriate buffer storage capacity is provided for waste water generated during other than normal operating conditions based on a risk assessment (e.g. taking into account the nature of the pollutants, the effects of downstream waste water treatment, and the receiving environment).	



Reduction of water consumption / generation of waste water
(16/17) – BP 1.8.1, 1.9 and 1.10.1

Technique		Description	Applicability
Ex- technique 20d		The discharge of waste water from this basin buffer storage to a receiving water body or to the sewer is only possible after further appropriate measures are taken (e.g. control, treat, reuse).	Generally applicable to new plants. For existing plants, applicability may be limited by space availability and by the configuration of the water collection system.



Reduction of water consumption / generation of waste water (17/17) – BP 1.8.1, 1.9 and 1.10.1

Dissenting views that were expressed:

TWG member	Issue
EEB	On the statement of BAT 13 (an appropriate combination/all).



Techniques for emissions to water
(1/8) – BP 1.8.3

BAT 15. In order to reduce emissions to water ~~(direct or indirect discharges)~~, BAT is to treat waste water ~~before discharge to the environment with~~ using ~~one or an~~ appropriate a combination of the techniques given below.

Technique ⁽¹⁾	Typical pollutants targeted	Applicability
<p>⁽¹⁾ The descriptions of the techniques are given in Section 6.6.3.</p>		



Techniques for emissions to water (2/8) – BP 1.8.3

Technique ⁽¹⁾		Typical pollutants targeted	Applicability
<i>Preliminary and primary treatment, e.g.</i>			
a	Equalisation	All pollutants	Generally applicable.
b	Neutralisation	Acids, alkalis	
c	Physical separation, e.g. screens, sieves, grit separators, grease separators, oil-water separation or primary settlement tanks	Gross solids, suspended solids, oil/grease	



Techniques for emissions to water (3/8) – BP 1.8.3

Technique (¹)		Typical pollutants targeted	Applicability
<i>Physico-chemical treatment, e.g.</i>			
d	Adsorption	Adsorbable dissolved non-biodegradable or inhibitory pollutants, e.g. hydrocarbons, mercury, AOX Organics, inorganics	Generally applicable.
e	Distillation / rectification	Dissolved non-biodegradable or inhibitory pollutants that can be distilled, e.g. some solvents organics	
f	Chemical precipitation	Precipitable dissolved non-biodegradable or inhibitory pollutants, e.g. metals, phosphorus	



Techniques for emissions to water (4/8) – BP 1.8.3

Technique (¹)		Typical pollutants targeted	Applicability
<i>Physico-chemical treatment, e.g.</i>			
g	Chemical oxidation	Oxidisable dissolved non-biodegradable or inhibitory pollutants, e.g. nitrite, cyanide	Generally applicable.
h	Chemical reduction	Reducible dissolved non-biodegradable or inhibitory pollutants, e.g. hexavalent chromium (Cr(VI))	
h1	Evaporation	Soluble contaminants	



Techniques for emissions to water (5/8) – BP 1.8.3

Technique (¹)		Typical pollutants targeted	Applicability
<i>Physico-chemical treatment, e.g.</i>			
i	Ion exchange process	Ionic dissolved non-biodegradable or inhibitory pollutants, e.g. metals	Generally applicable.
j	Stripping	Purgeable pollutants, e.g. hydrogen sulphide (H ₂ S), ammonia (NH ₃), some adsorbable adsorbable organically bound halogens (AOX), hydrocarbons	



Techniques for emissions to water
(6/8) – BP 1.8.3

Technique (¹)		Typical pollutants targeted	Applicability
<i>Biological treatment, e.g.</i>			
k	Activated sludge process	Biodegradable organic compounds	Generally applicable.
l	Membrane bioreactor		



Techniques for emissions to water
(7/8) – BP 1.8.3

Technique ⁽¹⁾		Typical pollutants targeted	Applicability
<i>Nitrogen removal</i>			
m	Nitrification / denitrification when the treatment includes a biological treatment	Total nitrogen, ammonia	Not applicable when the final treatment does not include a biological treatment. Nitrification may not be applicable in the case of high chloride concentrations (i.e. around 10 g/l) and when the reduction of the chloride concentration prior to nitrification would not be justified by the environmental benefits. Nitrification is not applicable when the temperature of the waste water is low (e.g. below 12 °C).



Techniques for emissions to water
(8/8) – BP 1.8.3

Technique (¹)		Typical pollutants targeted	Applicability
<i>Solids removal, e.g.</i>			
n	Coagulation and flocculation	Suspended solids and particulate-bound metals	Generally applicable.
o	Sedimentation		
p	Filtration (e.g. sand filtration, microfiltration, ultrafiltration)		
q	Flotation		



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (2/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

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

Substance/Parameter	BAT-AEL (Monthly average) ⁽¹⁾	Waste treatment process to which the BAT-AEL applies
⁽¹⁾ -The averaging periods may be adapted when the monitoring frequency is reduced (see footnote ⁽⁴⁾ of Table 6 are defined in the General considerations.		

The associated monitoring is given in BAT 3.



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (6/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter	BAT-AEL (Monthly average) ⁽¹⁾	Waste treatment process to which the BAT-AEL applies
Total organic carbon (TOC) ⁽²⁾	10–40–60 mg/l	<ul style="list-style-type: none">• Mechanical treatment of waste• Biological treatment of waste• Physico-chemical treatment waste• All waste treatments except treatment of water-based liquid waste

⁽²⁾ Either the BAT-AEL for COD or the BAT-AEL for TOC applies. TOC monitoring is the preferred option because it does not rely on the use of very toxic compounds.



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (7/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter	BAT-AEL (Monthly average) ⁽¹⁾	Waste treatment process to which the BAT-AEL applies
Chemical oxygen demand (COD) ⁽²⁾	30–120–180 mg/l	<ul style="list-style-type: none">• Mechanical treatment of waste• Biological treatment of waste• Physico-chemical treatment waste• All waste treatments except treatment of water-based liquid waste



Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (8/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

BAT 3. BAT is to monitor emissions to water with at least the frequency ~~given below~~ indicated in Table 6, and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.



Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (9/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Table 6.1: Monitoring of emissions to water

Substance/ parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (¹) (²) (³)	Monitoring associated with
Total organic carbon (TOC) (⁴) (⁶)	EN 1484	All treatments of waste except physico-chemical and/or biological treatment of water-based liquid waste	Once every week month (⁸)	BAT 15
Chemical oxygen demand (COD) (⁴) (⁶)	No EN standard available		Once every week month (⁸)	



Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (9/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Table 6.1: Monitoring of emissions to water

Substance/ parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (¹) (²) (³)	Monitoring associated with
Total organic carbon (TOC) (⁴) (⁶)	EN 1484	All treatments of waste except physico-chemical and/or biological treatment of water-based liquid waste	Once every week month (⁸)	BAT 15
Chemical oxygen demand (COD) (⁴) (⁶)	No EN standard available		Once every week month (⁸)	



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (10/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency ⁽¹⁾ ⁽²⁾ ⁽³⁾	Monitoring associated with
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⁽¹⁾ Monitoring frequencies may be adapted if the data series clearly demonstrate a sufficient stability of emissions over time. reduced if the emission levels are proven to be sufficiently stable.

~~⁽²⁾ The sampling point is located where the emission leaves the installation.~~

~~⁽³⁾ In the case of batch discharge with a duration < 24 hours, once per batch discharge.~~

⁽⁴⁾ Either TOC or COD is monitored. TOC is the preferred option, because its monitoring does not rely on the use of very toxic compounds.

⁽⁶⁾ The monitoring applies only in the case of a direct discharge to a receiving water body.



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (11/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter	BAT-AEL (Monthly average) ⁽¹⁾	Waste treatment process to which the BAT-AEL applies
Total suspended solids (TSS)	5– 35–60 mg/l	<ul style="list-style-type: none">• Mechanical treatment of waste• Biological treatment of waste• Physico-chemical treatment waste• All waste treatments



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring – BP 1.8.4, 1.13.6.4 and 1.5.2

Dissenting views that were expressed:

TWG member	Issue
MWE	On upper end of the range (?)



Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (12/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (¹) (²) (³)	Monitoring associated with
Total suspended solids (TSS) (⁶)	EN 872	All treatments of waste except physico-chemical and/or biological treatment of water-based liquid waste	Once every week month (⁸)	BAT 15
		Physico-chemical and/or biological treatment of water-based liquid waste	Once every day	

(⁸) In the case of batch discharge less frequent than the minimum monitoring frequency, monitoring is carried out once per batch.



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (13/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter	BAT-AEL (Monthly average) ⁽¹⁾	Waste treatment process to which the BAT-AEL applies
Hydrocarbon oil index (HOI)	0.5–5–10 mg/l	<ul style="list-style-type: none">• Mechanical treatment in shredders of metal waste• Mechanical treatment in shredders of WEEE containing refrigerants• Re-refining of waste oil• [LEFTOVER: Physico-chemical treatment of liquid waste with calorific value]• Water washing of excavated contaminated soil• Treatment of water-based liquid waste



BAT 3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (14/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance / parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency ^{(1) (2) (3)}	Monitoring associated with
Hydrocarbon oil index (HOI) ⁽⁷⁾	EN ISO 9377-2	Mechanical treatment in shredders of metal waste	Once every week-month ⁽⁸⁾	BAT 15
		Mechanical treatment in shredders of WEEE containing refrigerants		
		Re-refining of waste oil		

⁽⁷⁾ 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 ~~is designed to cope with and/or to treat~~ abates the pollutants concerned.

⁽⁸⁾ In the case of batch discharges less frequent than the minimum monitoring frequency, monitoring is carried out once per batch.



Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (15/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (¹) (²) (³)	Monitoring associated with
Hydrocarbon oil index (HOI) (⁷)	EN ISO 9377-2	Physico-chemical treatment of liquid waste with calorific value	Once every week month (⁸)	BAT 15
		Water washing of excavated contaminated soil		
		Physico-chemical and/or biological Treatment of water-based liquid waste	Once every day	



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (16/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter	BAT-AEL (Monthly average) ⁽¹⁾	Waste treatment process to which the BAT-AEL applies
Total nitrogen (Total N)	1–25 5–30 mg/l ⁽³⁾ (⁷) (⁸)	<ul style="list-style-type: none">• Biological treatment of waste• Re-refining of waste oil• Physico-chemical and/or biological treatment of water-based liquid waste
(³) The upper end of the range may be up to 40 mg/l for Total N if the abatement efficiency is ≥ 70 % as a monthly average (considering all of the waste water treatment steps carried out).		
(⁷) The higher end of the range may not apply when the temperature of waste water is low (e.g. below 12 °C).		
(⁸) The BAT AEL may not apply in the case of high chloride concentrations (i.e. around 10 g/l in the waste input).		



Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (17/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (¹) (²) (³)	Monitoring associated with
Total nitrogen (TN) (⁶)	EN 12260 EN ISO 11905	Biological treatment of waste All treatments of waste except physico- chemical and/or biological treatment of water-based liquid waste	Once every week month (⁸)	BAT 15
		Re-refining of waste oil Re-refining of waste oil		



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (18/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter	BAT-AEL (Monthly average) ⁽¹⁾	Waste treatment process to which the BAT-AEL applies
Total phosphorus (Total P)	0.3–32 mg/l	• Biological treatment of waste



Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (19/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (¹) (²) (³)	Monitoring associated with
Total phosphorus (TP) (⁶)	Various EN standards available (e.g. EN ISO 15681-1 and -2, EN ISO 6878, EN ISO 11885)	Biological treatment of waste All treatments of waste except physico- chemical and/or biological treatment of water-based liquid waste Re-refining of waste oil	Once every week month (⁸)	BAT 15



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (20/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter	BAT-AEL (Monthly average) (¹)	Waste treatment process to which the BAT-AEL applies
Phenol index	0.05–0.2 mg/l	<ul style="list-style-type: none">• Re-refining of waste oil• [LEFTOVER: Physico-chemical treatment of liquid waste with calorific value]• Physico-chemical and/or biological treatment of water-based liquid waste



Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (21/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (¹) (²) (³)	Monitoring associated with
Phenol index (⁶)	EN ISO 14402	Re-refining of waste oil	Once every week month (⁸)	BAT 15
		Physico-chemical treatment of liquid waste with calorific value		



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (22/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽⁴⁾	Arsenic (expressed as As)	0.01–0.05 mg/l	<ul style="list-style-type: none">• Mechanical treatment in shredders of metal waste• Mechanical treatment in shredders of WEEE containing refrigerants• Mechanical biological treatment of waste

⁽⁴⁾ The BAT-AELs may not only apply when the substance concerned is not identified as relevant present in the waste to be treated in the waste water inventory mentioned in BAT 2bis.



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (23/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽⁴⁾	Arsenic (expressed as As)		<ul style="list-style-type: none">• Re-refining of waste oil• Physico-chemical and/or biological treatment of water-based liquid waste• Physico-chemical treatment of liquid waste with calorific value• Physico-chemical treatment of solid and/or pasty waste• Regeneration of spent solvents• Water washing of excavated contaminated soil



Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (24/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (¹) (²) (³)	Monitoring associated with
Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Nickel (Ni), Lead (Pb), Zinc (Zn) (⁵) (⁷)	Various EN standards available (e.g. EN ISO 11885, EN ISO 17294-2, EN ISO 15586-15585)	Mechanical treatment in shredders of metal waste	Once every week month (⁸)	BAT 15

(⁵) The monitoring ~~may not only~~ applies when the substance concerned is ~~not present~~ identified as relevant in the waste water, ~~based on the~~ inventory mentioned in BAT 2bis



Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (25/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (¹) (²) (³)	Monitoring associated with
Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Nickel (Ni), Lead (Pb), Zinc (Zn) (⁵) (⁷)	Various EN standards available (e.g. EN ISO 11885, EN ISO 17294-2, EN ISO 15586 15585)	Mechanical treatment in shredders of WEEE containing refrigerants	Once every week month (⁸)	BAT 15
		Mechanical biological treatment of waste		
		Re-refining of waste oil		



BAT 3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (26/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (¹) (²) (³)	Monitoring associated with
Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Nickel (Ni), Lead (Pb), Zinc (Zn) (⁵) (⁷)	Various EN standards available (e.g. EN ISO 11885, EN ISO 17294-2, EN ISO 15586 15585)	Physico-chemical treatment of liquid waste with calorific value	Once every week month (⁸)	BAT 15
		Physico-chemical treatment of solid and/or pasty waste		



Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (27/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (¹) (²) (³)	Monitoring associated with
Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Nickel (Ni), Lead (Pb), Zinc (Zn) (⁵) (⁷)	Various EN standards available (e.g. EN ISO 11885, EN ISO 17294-2, EN ISO 15586 15585)	Regeneration of spent solvents	Once every week month (⁸)	BAT 15
		Water washing of excavated contaminated soil		



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (28/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) (1)	Waste treatment process to which the BAT-AEL applies
Metals and metalloids (4)	Cadmium (expressed as Cd)	0.01–0.05 mg/l	<ul style="list-style-type: none">• Mechanical treatment in shredders of metal waste• Mechanical treatment in shredders of WEEE containing refrigerants• Mechanical biological treatment of waste• Re-refining of waste oil



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (29/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽⁴⁾	Cadmium (expressed as Cd)		<ul style="list-style-type: none">Physico-chemical and/or biological treatment of water-based liquid wastePhysico-chemical treatment of waste with calorific valuePhysico-chemical treatment of solid and/or pasty wasteRegeneration of spent solventsWater washing of excavated contaminated soil



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (30/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽⁴⁾	Chromium (expressed as Cr)	0.01–0.050.15 mg/l	<ul style="list-style-type: none">• Mechanical treatment in shredders of metal waste• Mechanical treatment in shredders of WEEE containing refrigerants• Mechanical biological treatment of waste• Re-refining of waste oil



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (31/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽⁴⁾	Chromium (expressed as Cr)		<ul style="list-style-type: none">Physico-chemical and/or biological treatment of water-based liquid wastePhysico-chemical treatment of waste with calorific valuePhysico-chemical treatment of solid and/or pasty wasteRegeneration of spent solventsWater washing of excavated contaminated soil



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (32/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) (1)	Waste treatment process to which the BAT-AEL applies
Metals and metalloids (4)	Copper (expressed as Cu)	0.05– 0.2 0.5 mg/l	<ul style="list-style-type: none">• Mechanical treatment in shredders of metal waste• Mechanical treatment in shredders of WEEE containing refrigerants• Mechanical biological treatment of waste• Re-refining of waste oil



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (33/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽⁴⁾	Copper (expressed as Cu)		<ul style="list-style-type: none">Physico-chemical and/or biological treatment of water-based liquid wastePhysico-chemical treatment of waste with calorific valuePhysico-chemical treatment of solid and/or pasty wasteRegeneration of spent solventsWater washing of excavated contaminated soil



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (34/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽⁴⁾	Lead (expressed as Pb)	0.05–0.1 mg/l ⁽⁵⁾	<ul style="list-style-type: none">• Mechanical treatment in shredders of metal waste• Mechanical treatment in shredders of WEEE containing refrigerants• Mechanical biological treatment of waste• Re-refining of waste oil

⁽⁵⁾ The upper end of the range is 0.3 mg/l for mechanical treatment in shredders of metal waste.



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (35/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽⁴⁾	Lead (expressed as Pb)		<ul style="list-style-type: none">Physico-chemical and/or biological treatment of water-based liquid wastePhysico-chemical treatment of waste with calorific valuePhysico-chemical treatment of solid and/or pasty wasteRegeneration of spent solventsWater washing of excavated contaminated soil



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (36/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) (1)	Waste treatment process to which the BAT-AEL applies
Metals and metalloids (4)	Nickel (expressed as Ni)	0.05–0.5 mg/l	<ul style="list-style-type: none">• Mechanical treatment in shredders of metal waste• Mechanical treatment in shredders of WEEE containing refrigerants• Mechanical biological treatment of waste• Re-refining of waste oil



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (37/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽⁴⁾	Nickel (expressed as Ni)		<ul style="list-style-type: none">Physico-chemical and/or biological treatment of water-based liquid wastePhysico-chemical treatment of waste with calorific valuePhysico-chemical treatment of solid and/or pasty wasteRegeneration of spent solventsWater washing of excavated contaminated soil



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (38/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽⁴⁾	Zinc (expressed as Zn)	0.1–0.5–1 mg/l ⁽⁶⁾	<ul style="list-style-type: none">• Mechanical treatment in shredders of metal waste• Mechanical treatment in shredders of WEEE containing refrigerants• Mechanical biological treatment of waste• Re-refining of waste oil

⁽⁶⁾ The upper end of the range is 2 mg/l for mechanical treatment in shredders of metal waste.



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (39/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽⁴⁾	Zinc (expressed as Zn)		<ul style="list-style-type: none">Physico-chemical and/or biological treatment of water-based liquid wastePhysico-chemical treatment of waste with calorific valuePhysico-chemical treatment of solid and/or pasty wasteRegeneration of spent solventsWater washing of excavated contaminated soil



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (40/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) (1)	Waste treatment process to which the BAT-AEL applies
Metals and metalloids (4)	Mercury (expressed as Hg)	0.001–0.01 mg/l 0.5–5 µg/l	<ul style="list-style-type: none">• Mechanical treatment in shredders of metal waste• Mechanical treatment in shredders of WEEE containing refrigerants• Mechanical biological treatment of waste• Re-refining of waste oil



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (41/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽⁴⁾	Mercury (expressed as Hg)		<ul style="list-style-type: none">Physico-chemical and/or biological treatment of water-based liquid wastePhysico-chemical treatment of waste with calorific valuePhysico-chemical treatment of solid and/or pasty wasteRegeneration of spent solventsWater washing of excavated contaminated soil



Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (42/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (¹) (²) (³)	Monitoring associated with
Mercury (Hg) (⁵) (⁷)	Various EN standards available (e.g. EN ISO 17852, EN ISO 12846)	Mechanical treatment in shredders of metal waste Mechanical treatment in shredders of WEEE containing refrigerants	Once every week month (⁸)	BAT 15



Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (43/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (¹) (²) (³)	Monitoring associated with
Mercury (Hg) (⁵) (⁷)		Mechanical biological treatment of waste	Once every week month (⁸)	BAT 15
		Re-refining of waste oil		
		Physico-chemical treatment of liquid waste with calorific value		
		Physico-chemical treatment of solid and/or pasty waste		



BAT 3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (44/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (¹) (²) (³)	Monitoring associated with
Mercury (Hg) (⁵) (⁷)		Regeneration of spent solvents	Once every week month (⁸)	BAT 15
		Water washing of excavated contaminated soil		



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (45/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter	BAT-AEL (Monthly average) ⁽¹⁾	Waste treatment process to which the BAT-AEL applies
Total organic carbon (TOC) ⁽²⁾	10–100 mg/l ^(3bis) ^(3ter)	• Treatment of water-based liquid waste
<p>^(3bis) The upper end of the range may not apply when:</p> <ul style="list-style-type: none">the abatement efficiency is $\geq 95\%$ as a daily rolling yearly average; andthe waste input shows the following characteristics: TOC > 2 g/l (or COD > 6 g/l) as a daily average and a high proportion of refractory organic compounds (i.e. which are difficult to biodegrade);the chloride concentration in the waste input exceeds e.g. 5 g/l. <p>^(3ter) This BAT-AEL may not apply to plants treating drilling muds/cuttings.</p>		



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (46/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter	BAT-AEL (Monthly average) ⁽¹⁾	Waste treatment process to which the BAT-AEL applies
Total organic carbon (COD) ⁽²⁾	30–300 mg/l ^(3bis) ^(3ter)	• Treatment of water-based liquid waste
^(3ter) This BAT-AEL may not apply to plants treating drilling muds/cuttings.		



Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring – BP 1.8.4, 1.13.6.4 and 1.5.2

Chapter on 'Concluding remarks and recommendations for future work'

- Add a recommendation that information on the salt content in WBLW and its effect on the efficiency of TOC/COD treatment/removal should be collected during the next review of the WT BREF.
- Add a recommendation that information on the effect of salt on the TOC/COD abatement efficiency for drilling muds/cuttings waste should be collected during the next review of the WT BREF.



Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (47/64) – BP 1.2

Abatement efficiency

The calculation of the average abatement efficiency referred to in these BAT conclusions (see Table ~~6.3~~ ~~6.4bis~~) does not include, for COD and TOC, initial treatment steps aiming at separating the bulk organic content from the water-based liquid waste, such as evapo-condensation, emulsion breaking or phase separation.



Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (48/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (¹) (²) (³) (⁸)	Monitoring associated with
Total organic carbon (TOC) (⁴) (⁶)	EN 1484	Physico-chemical and/or biological Treatment of water-based liquid waste	Once every day	BAT 15
Chemical oxygen demand (COD) (⁴) (⁶)	No EN standard available		Once every day	



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (49/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter	BAT-AEL (Monthly average) ⁽¹⁾	Waste treatment process to which the BAT-AEL applies
Total nitrogen (Total N)	10–60 mg/l ^(3ter) ⁽⁷⁾ ⁽⁸⁾	• Treatment of water-based liquid waste
<p>^(3ter) The BAT-AEL only applies when biological treatment of waste water is used. When nitric acid is the main waste input, this BAT-AEL does not apply provided that the abatement efficiency is ≥ 90 % as a daily average.</p> <p>⁽⁷⁾ The higher end of the range may not apply when the temperature of waste water is low (e.g. below 12 °C).</p> <p>⁽⁸⁾ The BAT-AEL may not apply in the case of high chloride concentrations (i.e. around 10 g/l in the waste input).</p>		



Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (50/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (¹) (²) (³)	Monitoring associated with
Total nitrogen (TN) (⁶)	EN 12260	Physico-chemical and/or biological Treatment of water-based liquid waste	Once every day	BAT 15



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (51/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter	BAT-AEL (Monthly average) ⁽¹⁾	Waste treatment process to which the BAT-AEL applies
Total phosphorus (Total P)	1– 5 3 mg/l ^(3^{ter})	• Treatment of water-based liquid waste
^(3^{ter}) This BAT-AEL may not apply to plants treating drilling muds/cuttings.		



Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (52/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (¹) (²) (³)	Monitoring associated with
Total phosphorus (TP) (⁶)	Various EN standards available (e.g. EN ISO 15681-1 and -2, EN ISO 6878, EN ISO 11885)	Physico-chemical and/or biological Treatment of water- based liquid waste	Once every day (⁸)	BAT 15



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (53/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter	BAT-AEL (Monthly average) ⁽¹⁾	Waste treatment process to which the BAT-AEL applies
Phenol index	0.05–0.3 mg/l	. Treatment of water-based liquid waste



Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (54/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (¹) (²) (³)	Monitoring associated with
Phenol index (⁶)	EN ISO 14402	Physico-chemical and/or biological Treatment of water-based liquid waste	Once every day (⁸)	BAT 15



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (55/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter	BAT-AEL (Monthly average) ⁽¹⁾	Waste treatment process to which the BAT-AEL applies
Cyanide (CN ⁻) ⁽⁴⁾	0.02– 0.2 0.1 mg/l	Treatment of water-based liquid waste



Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (56/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (¹) (²) (³)	Monitoring associated with
Easily liberatable Free cyanide (CN ⁻) (⁵) (⁷)	Various EN standards available (e.g. i.e. EN ISO 14403-1 and -2)	Physico-chemical and/or biological Treatment of water- based liquid waste	Once every day (⁸)	BAT 15



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (57/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter	BAT-AEL (Monthly average) ⁽¹⁾	Waste treatment process to which the BAT-AEL applies
Adsorbable organically bound halogens (AOX) ⁽⁴⁾	0.2–1 mg/l	• Treatment of water-based liquid waste



Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (58/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (¹) (²) (³)	Monitoring associated with
Adsorbable organically bound halogens (AOX) (⁵) (⁷)	EN ISO 9562	Physico-chemical and/or biological Treatment of water- based liquid waste	Once every day (⁸)	BAT 15



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (59/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) (¹)	Waste treatment process to which the BAT-AEL applies
Metals and metalloids (⁴)	Arsenic (expressed as As)	0.01–0.1 mg/l	• Treatment of water-based liquid waste
	Cadmium (expressed as Cd)	0.01–0.1 mg/l	
	Chromium (expressed as Cr)	0.01–0.3 mg/l	
	Copper (expressed as Cu)	0.05–0.5 mg/l	
	Lead (expressed as Pb)	0.05–0.3 mg/l	
	Nickel (expressed as Ni)	0.05–1 mg/l	
	Zinc (expressed as Zn)	0.1–2 mg/l	



Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring – BP 1.8.4, 1.13.6.4 and 1.5.2

Chapter on 'Concluding remarks and recommendations for future work'

- Add a recommendation that information on the link/relation between TSS and heavy metals emissions to water, taking into account direct and indirect discharge, is gathered and looked into more detail.



Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (60/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (¹) (²) (³)	Monitoring associated with
Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Nickel (Ni), Lead (Pb), Zinc (Zn) (⁵) (⁷)	Various EN standards available (e.g. EN ISO 11885, EN ISO 17294-2, EN ISO 15586 15585)	Physico-chemical and/or biological Treatment of water-based liquid waste	Once every day (⁸)	BAT 15



Table 6.3 in Revised Draft 1

Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (61/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽⁴⁾	Hexavalent chromium (expressed as Cr(VI))	0.01–0.1 mg/l	• Treatment of water-based liquid waste
	Mercury (expressed as Hg)	1–10 µg/l	



Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (62/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (¹) (²) (³)	Monitoring associated with
Hexavalent chromium (Cr(VI)) (⁵) (⁷)	Various EN standards available (e.g. EN ISO 10304-3, EN ISO 23913)	Physico- chemical and/or biological Treatment of water-based liquid waste	Once every day (⁸)	BAT 15



Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (63/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (¹) (²) (³)	Monitoring associated with
Mercury (Hg) (⁵) (⁷)	Various EN standards available (e.g. EN ISO 17852, EN ISO 12846)	Physico- chemical and/or biological Treatment of water-based liquid waste	Once every day (⁸)	BAT 15



Table 6.3 – BAT-AELs for direct discharges to water and associated monitoring (64/64) – BP 1.8.4, 1.13.6.4 and 1.5.2

Substance/ parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (¹) (²) (³)	Monitoring associated with
Benzene, toluene, ethyl benzene, xylene (BTEX) (⁵) (⁷)	EN ISO 15680, <i>EN ISO 20595 (if adopted)</i>	Physico- chemical and/or biological	Once every day month (⁸)	BAT 15
Manganese (Mn) (⁵) (⁷)	Various EN standards available (e.g. EN ISO 11885, EN ISO 17294-2, EN ISO 15586-15585)	Treatment of water- based liquid waste	Once every day (⁸)	



Table 6.4 in Revised Draft 1

Table 6.4 – BAT-AELs for indirect discharges to water and associated monitoring (1/21) – BP 1.8.5, 1.13.6.4 and 1.5.2

Table 6.4: BAT-associated emission levels (BAT-AELs) for indirect discharges to a receiving water body

Substance/ Parameter	BAT-AEL (Monthly average) (1) (2)	Waste treatment process to which the BAT-AEL applies
Hydrocarbon oil index (HOI)	0.5– 5 10 mg/l	• Mechanical treatment in shredders of metal waste
<p>(1)-The averaging periods may be adapted when the monitoring frequency is reduced (see footnote (4) of Table 6 are defined in the General considerations.</p> <p>(2) The BAT-AELs may not apply if the downstream waste water treatment plant adequately treats abates the pollutants concerned, provided this does not lead to a higher level of pollution in the environment.</p>		

The associated monitoring is given in BAT 3.



Table 6.4 in Revised Draft 1

Table 6.4 – BAT-AELs for indirect discharges to water and associated monitoring (2/21) – BP 1.8.5, 1.13.6.4 and 1.5.2

Substance/ Parameter	BAT-AEL (Monthly average) ⁽¹⁾ ⁽²⁾	Waste treatment process to which the BAT-AEL applies
Hydrocarbon oil index (HOI)		<ul style="list-style-type: none">• Mechanical treatment in shredders of WEEE containing refrigerantsVFCs and/or VHCs• Re-refining of waste oil• Physico-chemical treatment of waste with calorific value• Water washing of excavated contaminated soil• Treatment of water-based liquid waste



Table 6.4 in Revised Draft 1

Table 6.4 – BAT-AELs for indirect discharges to water and associated monitoring (3/21) – BP 1.8.5, 1.13.6.4 and 1.5.2

Substance/ Parameter	BAT-AEL (Monthly average) (¹) (²)	Waste treatment process to which the BAT-AEL applies
Cyanide (CN ⁻) (³)	0.02-0. 2 0.1 mg/l	• Treatment of water-based liquid waste
Adsorbable organically bound halogens (AOX) (³)	0.2-1 mg/l	• Treatment of water-based liquid waste
(³) The BAT-AELs may not only apply when the substance concerned is not identified as relevant in the waste water inventory mentioned in BAT 2bis.		



Table 6.4 in Revised Draft 1

Table 6.4 – BAT-AELs for indirect discharges to water and associated monitoring (4/21) – BP 1.8.5, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾ ⁽²⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽³⁾	Arsenic (expressed as As)	0.01–0.05 mg/l	<ul style="list-style-type: none">• Mechanical treatment in shredders of metal waste• Mechanical treatment in shredders of WEEE containing refrigerantsVFCs and/or VHCs• Mechanical biological treatment of waste• Re-refining of waste oil



Table 6.4 in Revised Draft 1

Table 6.4 – BAT-AELs for indirect discharges to water and associated monitoring (5/21) – BP 1.8.5, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾ ⁽²⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽³⁾	Arsenic (expressed as As)		<ul style="list-style-type: none">• Physico-chemical and/or biological treatment of water-based liquid waste• Physico-chemical treatment of waste with calorific value• Physico-chemical treatment of solid and/or pasty waste• Regeneration of spent solvents• Water washing of excavated contaminated soil



Table 6.4 in Revised Draft 1

Table 6.4 – BAT-AELs for indirect discharges to water and associated monitoring (6/21) – BP 1.8.5, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾ ⁽²⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽³⁾	Cadmium (expressed as Cd)	0.01–0.05 mg/l	<ul style="list-style-type: none">• Mechanical treatment in shredders of metal waste• Mechanical treatment in shredders of WEEE containing refrigerantsVFCs and/or VHCs• Mechanical biological treatment of waste• Re-refining of waste oil



Table 6.4 in Revised Draft 1

Table 6.4 – BAT-AELs for indirect discharges to water and associated monitoring (7/21) – BP 1.8.5, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾ ⁽²⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽³⁾	Cadmium (expressed as Cd)		<ul style="list-style-type: none">• Physico-chemical and/or biological treatment of water-based liquid waste• Physico-chemical treatment of waste with calorific value• Physico-chemical treatment of solid and/or pasty waste• Regeneration of spent solvents• Water washing of excavated contaminated soil



Table 6.4 in Revised Draft 1

Table 6.4 – BAT-AELs for indirect discharges to water and associated monitoring (8/21) – BP 1.8.5, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾ ⁽²⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽³⁾	Chromium (expressed as Cr)	0.01–0.050.15 mg/l	<ul style="list-style-type: none">• Mechanical treatment in shredders of metal waste• Mechanical treatment in shredders of WEEE containing refrigerants VFCs and/or VHCs• Mechanical biological treatment of waste• Re-refining of waste oil



Table 6.4 in Revised Draft 1

Table 6.4 – BAT-AELs for indirect discharges to water and associated monitoring (9/21) – BP 1.8.5, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾ ⁽²⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽³⁾	Chromium (expressed as Cr)		<ul style="list-style-type: none">• Physico-chemical and/or biological treatment of water-based liquid waste• Physico-chemical treatment of waste with calorific value• Physico-chemical treatment of solid and/or pasty waste• Regeneration of spent solvents• Water washing of excavated contaminated soil



Table 6.4 in Revised Draft 1

Table 6.4 – BAT-AELs for indirect discharges to water and associated monitoring (10/21) – BP 1.8.5, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾ ⁽²⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽³⁾	Copper (expressed as Cu)	0.05–0.20.5 mg/l	<ul style="list-style-type: none">• Mechanical treatment in shredders of metal waste• Mechanical treatment in shredders of WEEE containing refrigerantsVFCs and/or VHCs• Mechanical biological treatment of waste• Re-refining of waste oil



Table 6.4 in Revised Draft 1

Table 6.4 – BAT-AELs for indirect discharges to water and associated monitoring (11/21) – BP 1.8.5, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾ ⁽²⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽³⁾	Copper (expressed as Cu)		<ul style="list-style-type: none">• Physico-chemical and/or biological treatment of water-based liquid waste• Physico-chemical treatment of waste with calorific value• Physico-chemical treatment of solid and/or pasty waste• Regeneration of spent solvents• Water washing of excavated contaminated soil



Table 6.4 in Revised Draft 1

Table 6.4 – BAT-AELs for indirect discharges to water and associated monitoring (12/21) – BP 1.8.5, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾ ⁽²⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽³⁾	Lead (expressed as Pb)	0.05–0.1 mg/l ⁽⁴⁾	<ul style="list-style-type: none">• Mechanical treatment in shredders of metal waste• Mechanical treatment in shredders of WEEE containing refrigerantsVFCs and/or VHCs• Mechanical biological treatment of waste• Re-refining of waste oil

⁽⁴⁾ The upper end of the range is 0.3 mg/l for mechanical treatment in shredders of metal waste.



Table 6.4 in Revised Draft 1

Table 6.4 – BAT-AELs for indirect discharges to water and associated monitoring (13/21) – BP 1.8.5, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾ ⁽²⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽³⁾	Lead (expressed as Pb)		<ul style="list-style-type: none">• Physico-chemical and/or biological treatment of water-based liquid waste• Physico-chemical treatment of waste with calorific value• Physico-chemical treatment of solid and/or pasty waste• Regeneration of spent solvents• Water washing of excavated contaminated soil



Table 6.4 in Revised Draft 1

Table 6.4 – BAT-AELs for indirect discharges to water and associated monitoring (14/21) – BP 1.8.5, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾ ⁽²⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽³⁾	Nickel (expressed as Ni)	0.05–0.5 mg/l	<ul style="list-style-type: none">• Mechanical treatment in shredders of metal waste• Mechanical treatment in shredders of WEEE containing refrigerantsVFCs and/or VHCs• Mechanical biological treatment of waste• Re-refining of waste oil



Table 6.4 in Revised Draft 1

Table 6.4 – BAT-AELs for indirect discharges to water and associated monitoring (15/21) – BP 1.8.5, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾ ⁽²⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽³⁾	Nickel (expressed as Ni)		<ul style="list-style-type: none">• Physico-chemical and/or biological treatment of water-based liquid waste• Physico-chemical treatment of waste with calorific value• Physico-chemical treatment of solid and/or pasty waste• Regeneration of spent solvents• Water washing of excavated contaminated soil



Table 6.4 in Revised Draft 1

Table 6.4 – BAT-AELs for indirect discharges to water and associated monitoring (16/21) – BP 1.8.5, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾ ⁽²⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽³⁾	Mercury (expressed as Hg)	0.001–0.01 mg/l 0.5–5 µg/l	<ul style="list-style-type: none">• Mechanical treatment in shredders of metal waste• Mechanical treatment in shredders of WEEE containing refrigerantsVFCs and/or VHCs• Mechanical biological treatment of waste• Re-refining of waste oil



Table 6.4 in Revised Draft 1

Table 6.4 – BAT-AELs for indirect discharges to water and associated monitoring (17/21) – BP 1.8.5, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾ ⁽²⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽³⁾	Mercury (expressed as Hg)		<ul style="list-style-type: none">• Physico-chemical and/or biological treatment of water-based liquid waste• Physico-chemical treatment of waste with calorific value• Physico-chemical treatment of solid and/or pasty waste• Regeneration of spent solvents• Water washing of excavated contaminated soil



Table 6.4 in Revised Draft 1

Table 6.4 – BAT-AELs for indirect discharges to water and associated monitoring (18/21) – BP 1.8.5, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾ ⁽²⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽³⁾	Zinc (expressed as Zn)	0.1–0.5–1 mg/l ⁽⁵⁾	<ul style="list-style-type: none">• Mechanical treatment in shredders of metal waste• Mechanical treatment in shredders of WEEE containing refrigerantsVFCs and/or VHCs• Mechanical biological treatment of waste• Re-refining of waste oil

⁽⁵⁾ The upper end of the range is 2 mg/l for mechanical treatment in shredders of metal waste.



Table 6.4 in Revised Draft 1

Table 6.4 – BAT-AELs for indirect discharges to water and associated monitoring (19/21) – BP 1.8.5, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾ ⁽²⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽³⁾	Zinc (expressed as Zn)		<ul style="list-style-type: none">• Physico-chemical and/or biological treatment of water-based liquid waste• Physico-chemical treatment of waste with calorific value• Physico-chemical treatment of solid and/or pasty waste• Regeneration of spent solvents• Water washing of excavated contaminated soil



Table 6.4 in Revised Draft 1

Table 6.4 – BAT-AELs for indirect discharges to water and associated monitoring (20/21) – BP 1.8.5, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾ ⁽²⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽³⁾	Arsenic (expressed as As)	0.01–0.1 mg/l	• Treatment of water- based liquid waste
	Cadmium (expressed as Cd)	0.01–0.1 mg/l	
	Chromium (expressed as Cr)	0.01–0.3 mg/l	
	Hexavalent chromium (expressed as Cr(VI))	0.01–0.1 mg/l	



Table 6.4 in Revised Draft 1

Table 6.4 – BAT-AELs for indirect discharges to water and associated monitoring (21/21) – BP 1.8.5, 1.13.6.4 and 1.5.2

Substance/ Parameter		BAT-AEL (Monthly average) ⁽¹⁾ ⁽²⁾	Waste treatment process to which the BAT-AEL applies
Metals and metalloids ⁽³⁾	Copper (expressed as Cu)	0.05–0.5 mg/l	• Treatment of water- based liquid waste
	Lead (expressed as Pb)	0.05–0.3 mg/l	
	Nickel (expressed as Ni)	0.05–1 mg/l	
	Mercury (expressed as Hg)	1–10 µg/l	
	Zinc (expressed as Zn)	0.1–2 mg/l	



Table 6.4 in Revised Draft 1

Table 6.4 – BAT-AELs for indirect discharges to water and associated monitoring (21/21) – BP 1.8.5, 1.13.6.4 and 1.5.2

Substance/ parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (¹) (²) (³)	Monitoring associated with
PFOS (⁵)	EN ISO 21675 (<i>if adopted</i>)	All treatments of waste	Once every six months (⁸)	BAT 15
PFOA (⁵)				



Tables 6.3 and 6.4 – BAT-AELs for direct and indirect discharges to water and associated monitoring – BP 1.8.5, 1.13.6.4 and 1.5.2 1.8.4, 1.13.6.4 and 1.5.2

Dissenting views that were expressed:

TWG member	Issue
FR, UK	On setting of BAT-AELs for indirect discharges to water (Table 6.4)
BE	On BAT-AELs for cadmium and mercury for direct and indirect discharges (Tables 6.3 and 6.4)
EEB	On BAT-AELs for cadmium for direct and indirect discharges (Tables 6.3 and 6.4)



Title of Section (1/1) – BP 1.11.1

6.2 BAT conclusions for mechanical treatment of waste

Unless otherwise stated, the BAT conclusions presented in this section apply to the mechanical treatment of waste when it is not combined with biological treatment, and in addition to the general BAT conclusions of Section 6.1.



Mechanical treatment – Emissions to air – Abatement techniques (1/3) – BP 1.11.2.1

BAT 25. In order to reduce **channelled** emissions to air of dust, and of particulate-bound metals, PCDD/Fs and dioxin-like PCBs, **BAT is to apply BAT 10d and to use one or a combination of the techniques given below.**

Technique		Description	Applicability
a	Cyclone	See Section 6.6.1. Cyclones are mainly used as preliminary separators for coarse dust.	Generally applicable.



Mechanical treatment – Emissions to air – Abatement techniques (2/3) – BP 1.11.2.1

Technique		Description	Applicability
b	Fabric filter	See Section 6.6.1.	May not be applicable to exhaust air ducts directly connected to the mill shredder when the effects of there is a risk of deflagration on the fabric filter cannot be mitigated (e.g. by using pressure relief valves) for mechanical treatment in shredders of metal waste.
c	Wet scrubber	See Section 6.6.1.	Not applicable to mechanical treatment of mercury-containing equipment. Generally applicable.



Mechanical treatment – Emissions to air – Abatement techniques (3/3) – BP 1.11.2.1

Technique		Description	Applicability
d	Water injection into the shredder mill	<p>The shredded material waste to be shredded is made damp by injecting water into the shredder mill. The amount of water injected is regulated in relation to the amount of waste being shredded (which may be monitored via the energy consumed by the main shredder motor).</p> <p>The airflow waste gas that contains residual dust is directed to cyclone(s) and/or a wet (venturi) scrubber.</p>	<p>Only applicable to mechanical treatment in shredder of metal waste in combination with Techniques (a) and/or (b), within the constraints imposed by associated with local meteorological conditions (e.g. low temperature, drought).</p>



Table 6.5 in Revised Draft 1

Mechanical treatment – BAT-AEL for dust emissions to air (1/1) – BP 1.11.2.2

Table 6.5: BAT-associated emission levels (BAT-AELs) for channelled dust emissions to air from mechanical treatment of waste

Parameter	Unit	BAT-AEL (Daily average or average over the sampling period of samples obtained during one year)
Dust	mg/Nm ³	2–5 ⁽¹⁾
⁽¹⁾ When a fabric filter is not applicable cannot be applied in shredders of metal waste for safety reasons, the higher end of the range is 10 mg/Nm ³ .		

The associated monitoring is given in BAT 4.



**Mechanical treatment – Monitoring of emissions to air (3/5) –
BP 1.5.3 and 1.11.3**

Substance / Parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (¹)	Monitoring associated with
Dust	EN 13284-1	Mechanical treatment of waste	Once every six months	BAT 25
TVOC	EN 12619	Mechanical treatment in shredders of metal waste	Once every six months	BAT 25



Mechanical treatment – Monitoring of emissions to air (4/5) – BP 1.5.3 and 1.11.3

Substance / Parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency ⁽¹⁾	Monitoring associated with
PCDD/F ⁽⁴⁾	EN 1948-1, -2, -3, and -4 ⁽²⁾	Mechanical treatment in shredders of metal waste	Once every year	BAT 25
Dioxin-like PCBs	EN 1948-1, -2, and -4 ⁽²⁾	Mechanical treatment in shredders of metal waste ⁽⁴⁾	Once every year	BAT 25
Brominated flame retardants	No EN standard	Mechanical treatment in shredders of metal waste ⁽⁴⁾	Once every year	BAT 25

⁽²⁾ Instead of EN 1948-1, sampling may also be carried out with—according to CEN/TS 1948-5.

⁽⁴⁾ The monitoring only applies when the substance concerned is identified as relevant in the waste gas, based on the inventory mentioned in BAT 2bis.



BAT 4 in Revised Draft 1

Mechanical treatment – Monitoring of emissions to air (5/5) – BP 1.5.3 and 1.11.3

Substance / Parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency ⁽¹⁾	Monitoring associated with
Relevant Metals and metalloids except mercury (e.g. As, Cd, Co, Cr, Cu, Mn, Ni, Pb, Sb, Se, Ti, V) (4)	EN 14385	Mechanical treatment shredders in of metal waste	Once every year-six months	NA-BAT 25



Mechanical treatment – Monitoring of emissions to air (6/6) – BP 1.5.3 and 1.11.3

Dissenting views that were expressed:

TWG member	Issue
FR, EFR	On the upper end of BAT-AEL range for dust emissions to air set in Footnote ⁽¹⁾ Table 6.5
EFR	<ul style="list-style-type: none"> On applicability for fabric filter (in BAT 25b) On adding of brominated flame retardants in BAT 4 on monitoring
RO	On BAT-AEL range for dust emissions to air set in Table 6.5



Title of Section (1/1) – Not in BP

6.2.2 BAT conclusions for the mechanical treatment in shredders of metal waste

Unless otherwise stated, the BAT conclusions presented in this section apply to the mechanical treatment in shredders of metal waste, in addition to BAT 25.



MT – Shredders of metal waste – General environmental performance (1/2) – BP 1.11.3.1

BAT 26. In order to improve the general overall environmental performance, and to ~~reduce the risk of~~ prevent emissions due to accidents and incidents, BAT is to use **BAT 10 g1** and all of the techniques given below:

- a. ~~set up and implementation of~~ a detailed baled material inspection procedure for baled waste before shredding;



MT – Shredders of metal waste – General environmental performance (2/2) – BP 1.11.3.1

- b. ~~removal of remove and return to the owner dangerous items (e.g. gas cylinders, dirty drums, EoLVs, with dangerous parts) left in from the waste input stream, by mistake and their safe disposal (e.g. gas cylinders, dirty drums, non-depolluted EoLVs, non-depolluted WEEE, items contaminated with PCBs or mercury, radioactive items with dangerous parts);~~
- c. ~~reception and acceptance treatment of drums and containers only when accompanied by a declaration certificate of cleanliness.~~



MT – Shredders of metal waste – Deflagrations (1/4) – BP 1.11.3.2

BAT 27. In order to prevent ~~or reduce~~ deflagrations and to reduce emissions when deflagrations occur ~~related diffuse emissions~~, BAT is to use **both technique a and one or a combination of techniques b and c** of the techniques given below.



MT – Shredders of metal waste – Deflagrations (2/4)
– BP 1.11.3.2

Technique		Description	Applicability
Technique (a) moved below Technique (b)			
b a	To set and implement procedures to reduce the number of deflagrations Deflagration management plan	This includes: <ul style="list-style-type: none">a protocol containing appropriate actions and timelines;a protocol for conducting deflagration monitoring;	Generally applicable



MT – Shredders of metal waste – Deflagrations (3/4)
– BP 1.11.3.2

Technique		Description	Applicability
b a		<ul style="list-style-type: none">• a deflagration reduction programme designed to identify the source(s), and to implement elimination and/or reduction measures to prevent deflagration occurrences, e.g. inspection of waste input as described in BAT 26a, removal of dangerous items as described in BAT 26b, and management of prohibited materials preliminary shredding of waste at low speed;• a review of historical deflagration incidents and remedies and the dissemination of deflagration knowledge.	
		<ul style="list-style-type: none">• a protocol for response to deflagration incidents;	



MT – Shredders of metal waste – Deflagrations (4/4)
– BP 1.11.3.2

Technique		Description	Applicability
a b	To use pressure-relief dampers equipment	In order to control deflagrations, Pressure-relief dampers are installed to relieve pressure waves coming from deflagrations that would otherwise cause major damage and subsequent emissions. They are equipped with rubber flaps preventing diffuse emissions in normal operation.	Generally applicable.



MT – Shredders of metal waste – Deflagrations (4/4)
– BP 1.11.3.2

Technique		Description	Applicability
c	Pre-shredding	Use of a shredder which operates at a low speed installed upstream of the main shredder.	Generally applicable for new plants, depending on the input material. Applicable for major plant upgrades where a significant number of deflagrations have been substantiated.



Title of Section (1/1) – Not in BP

6.2.3 BAT conclusions for the ~~mechanical~~ treatment ~~in shredders~~ of ~~equipment~~ WEEE containing ~~refrigerants~~ VFCs and/or VHCs

Unless otherwise stated, the BAT conclusions presented in this section apply to the ~~mechanical~~ treatment ~~in shredders~~ of WEEE containing ~~refrigerants~~ VFCs and/or VHCs, in addition to BAT 25.



MT – Shredders of WEEE containing **VFCs and/or VHCs** – Emissions to air (1/4) – BP 1.11.4.1

BAT 29. In order to prevent or, where that is not practicable, to reduce , emissions of organic compounds to air, BAT is to apply BAT 10d, BAT 10h and to use technique a1 and one or both of the techniques a and b given below.



MT – Shredders of WEEE containing VFCs and/or VHCs – Emissions to air (4/4) – BP 1.11.4.1

Technique		Description
a1.	Optimised removal and capture of refrigerants and oils	All refrigerants and oils are removed from the WEEE containing VFCs and/or VHCs and captured by a vacuum suction system (e.g. achieving refrigerant removal of at least 90 %). Refrigerants are separated from oils and the oils are degassed. The amount of oil remaining in the compressor is reduced to a minimum (so that the compressor is non-dripping).



MT – Shredders of WEEE containing VFCs and/or VHCs – Emissions to air (2/4) – BP 1.11.4.1

Technique		Description
a.	<p>Removal of VOC from the shredding area and treatment by Cryogenic condensation</p>	<p>Waste gas containing organic compounds such as VFCs/VHCs is extracted from the shredding area, and inert gas (e.g. N₂) is blown in to reduce the O₂ concentration below 4 vol-%. This waste gas is then sent to a cryogenic condensation unit where they are it is liquefied (see description in Section 6.6.1). The liquefied gas is stored in pressure vessels tanks for further treatment. The inert gas is recovered and reused to reduce the O₂ concentration.</p>



MT – Shredders of WEEE containing **VFCs and/or VHCs – Emissions to air (3/4) – BP 1.11.4.1**

Technique		Description
b.	Removal of VOG from the shredding area and treatment by Adsorption	Waste gas containing organic compounds such as VFCs/VHCs is extracted from the shredding area and led into adsorption filters systems (see description in Section 6.6.1). The spent activated carbon is regenerated by means of heated air pumped into the filter to desorb the organic compoundsevaporate trapped VFCs/VHCs. After the filter Subsequently, the gas is compressed and cooled in order to liquefy the organic compounds VFCs/VHCs (in some cases by cryogenic condensation). The liquefied gas is then stored in pressure vessels tanks. The emitted gas waste gas from the compression stage is usually led back into the adsorbing filter adsorption system in order to minimise recover any residual VFC/VHC emissions.



Table 6.6 in Revised Draft 1

MT – Shredders of WEEE containing VFCs and/or VHCs – BAT-AELs for emissions to air (1/1) – BP 1.11.4.2

Table 6.6: BAT-associated emission levels (BAT-AELs) for channelled TVOC and VCFC emissions to air from the mechanical treatment in shredders of equipment WEEE containing refrigerants VFCs /or VHCs

Parameter	Unit	BAT-AEL (Average over the sampling period of samples obtained during one year)
TVOC	mg/Nm ³	2-3-15
CFCs	mg/Nm ³	0.5-10

The associated monitoring is given in BAT 4.



BAT 4 in Revised Draft 1

**MT – Shredders of WEEE containing VFCs and/or VHCs –
Monitoring of emissions to air (1/2) – BP 1.5.3 and 1.11.3**

Substance / Parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (1)	Monitoring associated with
TVOC	EN 12619	Mechanical —Treatment in shredders of equipment WEEE containing refrigerants VFCs and/or VHCs	Once every six months	BAT 29



BAT 4 in Revised Draft 1

**MT – Shredders of WEEE containing VFCs and/or VHCs –
Monitoring of emissions to air (2/2) – BP 1.5.3 and 1.11.3**

Substance / Parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency ⁽¹⁾	Monitoring associated with
V CFCs	No EN standard available	Mechanical —Treatment in shredders of WEEE containing refrigerants VFCs and/or VHCs	Once every six months	BAT 29 26



**MT – Shredders of WEEE containing refrigerants – Explosions
(1/1) – BP 1.11.4.1**

BAT 29bis. In order to prevent emissions due to explosions when treating WEEE containing **VFCs and/or VHCs–refrigerants**, BAT is to use either of the techniques given below.

Technique		Description
a.	Inert atmosphere	By injecting inert gas (e.g. nitrogen), the oxygen concentration in enclosed equipment (e.g. in enclosed shredders, crushers, dust and foam collectors) is reduced (e.g. to 4 vol-%).
b.	Forced ventilation	By using forced ventilation, the hydrocarbon concentration in enclosed equipment (e.g. in enclosed shredders, crushers, dust and foam collectors) is reduced to < 25 % of the lower explosion limit.



Title of Section 6.2.4 (1/1) – Not in BP

6.2.4 BAT conclusions for the mechanical treatment of waste with calorific value

~~Unless otherwise stated, the BAT conclusions presented in this section apply to the mechanical treatment of waste with calorific value, in addition to BAT 25. In addition to BAT 25, the BAT conclusions presented in this section apply to the mechanical treatment of waste with calorific value covered by points 5.3, a) iii) and 5.3 b) ii) of Annex I to Directive 2010/75/EU.~~



MT of waste ~~with calorific value~~ – Emissions to air (1/1) – BP 1.11.1

BAT 29ter. In order to reduce **channelled** emissions to air of organic compounds, BAT is **to apply BAT 10d and** to use one or a combination of the techniques given below.

Technique		Description
a.	Adsorption	See Section 6.6.1.
b.	Biofilter	
c.	Thermal oxidation	
d.	Wet scrubbing	



Table 6.6bis in Revised Draft 1

**MT of waste with calorific value – Emissions to air – BAT-AELs
(1/1) – BP 1.11.1**

Table 6.6bis: BAT-associated emission levels (BAT-AELs) for channelled TVOC emissions to air from the mechanical treatment of **[solid waste before incineration or co-incineration ~~with calorific value~~]**

Parameter	Unit	BAT-AEL (Average over the sampling period)
TVOC	mg/Nm ³	10–30 mg/Nm³ ⁽¹⁾
⁽¹⁾ The BAT-AEL only applies when organic compounds are identified as relevant in the waste gas streams inventory mentioned in BAT 2bis.		

The associated monitoring is given in BAT 4.



**MT of waste with calorific value – Emissions to air – Monitoring
(1/1) – BP 1.5.3**

Substance / Parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency ⁽¹⁾	Monitoring associated with
TVOC	EN 12619	Mechanical treatment of solid waste before incineration or co- incineration with calorific value ⁽⁴⁾	Once every six months	BAT 29ter



Title of Section (1/1) – Not in BP

6.2.5 BAT conclusions for the mechanical treatment of ~~mercury-containing equipment~~ WEEE containing mercury

Unless otherwise stated, the BAT conclusions presented in this section apply to the mechanical treatment of WEEE containing mercury, in addition to BAT 25.



MT of WEEE containing Hg – Emissions to air (1/2) – BP 1.11.5.1

BAT 30. ~~In order to prevent or, where that is not practicable, to reduce mercury emissions to air, BAT is to use the technique given below. collect mercury emissions at source, to send them to abatement devices and to carry out adequate~~ **monitoring surveillance.**

Description

This includes all of the following:

- ~~Processes equipment~~ used to treat mercury-containing equipment **WEEE containing mercury** ~~are-is~~ enclosed, under negative pressure and connected to a local exhaust ventilation system (LEV);



MT of WEEE containing Hg – Emissions to air (2/2) – BP 1.11.5.1

- ~~Extracted air~~ waste gas from the processes is treated by dedusting techniques such as cyclones, fabric filters, and HEPA filters, ~~as well as followed by~~ adsorption on activated carbon filters (see Section 6.6.1);
- ~~Treated air is either released outside the buildings or recycled.~~
- ~~the air flow from the local exhaust ventilation system (LEV) and mercury concentration in the air extracted from the LEV are monitored to enable the assessment of the effectiveness of the waste gas treatment LEV performance efficiency of the waste gas treatment is monitored;~~
- mercury levels ~~in ambient air in~~ the treatment and storage areas ~~vicinity of the equipment~~ are measured ~~regularly~~ frequently (e.g. once every week) ~~around the processes~~ to detect potential mercury leaks.



Table 6.7 in Revised Draft 1

MT of WEEE containing Hg – Emissions to air – BAT-AELs (1/1)
– BP 1.11.5.2

Table 6.7: BAT-associated emission levels (BAT-AELs) for channelled mercury emissions to air from mechanical treatment of mercury-containing waste WEEE containing mercury

Parameter	Unit	BAT-AEL (Daily average or average over the sampling period of samples obtained during one year)
Mercury (Hg)	µg/Nm ³	2–7

The associated monitoring is given in BAT 4



MT of WEEE containing Hg – Emissions to air – Monitoring (1/1)
– BP 1.5.3

Substance / Parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency ⁽¹⁾	Monitoring associated with
Hg (total)	EN 13211	Treatment of mercury- containing waste WEEE containing mercury	Once every six three months	BAT 30



Titles of Sections (1/1) – BP 1.12.1

6.3 BAT conclusions for biological treatment of ~~solid and non-pumpable~~ waste

Unless otherwise stated, the BAT conclusions presented in this section apply to biological treatment of ~~solid and non-pumpable~~ waste, and in addition to the general BAT conclusions mentioned in Section 6.1. This does not cover the treatment of water-based liquid waste.



Biological – General – Overall performance (1/1) – BP 1.12.1

BAT 31. In order to ~~reduce odour~~**minimise the generation of odorous** emissions and to improve the ~~general~~**overall** environmental performance, **BAT is to select the waste input**~~use the technique given below.~~

Description

The technique consists of carrying out the pre-acceptance, acceptance, and sorting of the waste input (see BAT 2) so as to ensure the suitability of the waste input for the waste treatment, e.g. in terms of ~~enable an appropriate~~ nutrient balance, moisture or toxic compounds which may reduce the, ~~and to prevent toxic compounds (i.e. toxic in terms of reducing biological activity) entering the biological systems.~~



**Biological – General – Emissions to air
(1/3) – BP 1.12.2.1 and 1.12.5.2**

BAT 32. In order to reduce channelled emissions to air of dust, organic compounds and odorous compounds substances, including H₂S and NH₃, BAT is to ~~apply BAT 10d and to use~~ one or a combination of the techniques given below: ~~a biofilter (See Section 6.6.1).~~

Technique		Description
a	Adsorption	See Section 6.6.1.



**Biological – General – Emissions to air
(2/3) – BP 1.12.2.1 and 1.12.5.2**

Technique		Description
b	Biofilter	<p>See Section 6.6.1.</p> <p>A pretreatment of the waste gas before the biofilter (e.g. with a water or acid scrubber) may be needed in the case of high NH₃ content (e.g. 5–40 mg/Nm³) in order to control the media pH and to limit the formation of N₂O in the biofilter.</p> <p>Some other odorous compounds (e.g. mercaptans, H₂S) can cause acidification of the biofilter media and necessitate the use of a water or alkaline scrubber as pretreatment of the waste gas before the biofilter.</p>



Biological – General – Emissions to air (3/3) – BP 1.12.2.1 and 1.12.5.2

Technique		Description
c	Fabric filter	See Section 6.6.1. The fabric filter is used in the case of mechanical biological treatment of waste.
d	Thermal oxidation	See Section 6.6.1.
e	Wet scrubbing	See Section 6.6.1. Water, acid or alkaline scrubbers are used in combination with a biofilter, thermal oxidation or adsorption on activated carbon.



Dissenting views that were expressed:

TWG member	Issue
EEB, IT	On deleting the reference to BAT 10d in BAT 32 statement



Biological – General – Emissions to air – BAT-AELs (1/3) – BP 1.12.2.2 and 1.12.5.3

Table 6.8. BAT-associated emission levels (BAT-AELs) for channelled NH_3 , and H_2S , dust and TVOC emissions to air from the biological treatment of ~~solid and non-pumpable~~ waste



Table 6.8 in Revised Draft 1

Biological – General – Emissions to air – BAT-AELs (2/3)
– BP 1.12.2.2 and 1.12.5.3

Parameter	Unit	BAT-AEL (Average over the sampling period of samples obtained during one year)	Waste treatment process
NH ₃ ⁽¹⁾ ⁽²⁾	mg/Nm ³	0.3-0.1-10 20	All biological treatments of solid and non-pumpable waste
H₂S ⁽¹⁾	mg/Nm³	≤ 0.6-0.1-1 ⁽¹⁾	
Odour ⁽¹⁾ ⁽²⁾	ou _F /Nm ³	200 – 1000	

~~⁽¹⁾ The lower end of the range is associated with the use of a wet scrubber before the biofilter~~

~~⁽¹⁾ A BAT-AEL for odour of 100–400 OU_F/Nm³ is an alternative to the BAT-AELs for NH₃ and H₂S. Either the BAT-AEL for NH₃ or the BAT-AEL for odour applies.~~

~~⁽²⁾ This BAT-AEL does not apply to the treatment of waste composed mainly of manure.~~



Biological – General – Emissions to air – BAT-AELs (2/3) – BP 1.12.2.2 and 1.12.5.3

Chapter on 'Concluding remarks and recommendations for future work'

- Add a recommendation that information on the H₂S emissions from biological treatment should be collected during the next review of the WT BREF.



Biological – General – Emissions to air – Monitoring (1/2)
– BP 1.5.3

Substance/ Parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency ⁽¹⁾	Monitoring associated with
NH ₃	No EN standard available	All biological treatments of solid and non-pumpable waste ⁽⁵⁾	Once every three-six months	BAT 32
H ₂ S	No EN standard available	All biological treatments of solid and non-pumpable waste ⁽⁵⁾	Once every three-six months	BAT 32

⁽⁵⁾ Odour may be monitored instead, with the same frequency and according to EN 13725.



Table 6.8 in Revised Draft 1

Biological – General – Emissions to air – BAT-AELs (3/3)
– BP 1.12.2.2 and 1.12.5.3

Parameter	Unit	BAT-AEL (Daily average or average over the sampling period of samples obtained during one year)	Waste treatment process
Dust	mg/Nm ³	2–5	Mechanical biological treatment of waste
TVOC	mg/Nm ³	5–20 15–40 ⁽¹⁾	
⁽¹⁾ The lower end of the range can be achieved by using thermal oxidation.			

The associated monitoring is given in BAT 4.



BAT 4 in Revised Draft 1

Biological – General – Emissions to air – Monitoring (2/2)
– BP 1.5.3

Substance/ Parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (1)	Monitoring associated with
Dust	EN 13284-1	Mechanical biological treatment of waste	Once every three ^{six} months	BAT 32
TVOC	EN 12619	Mechanical biological treatment of waste	Once every three ^{six} months	BAT 32



Dissenting views that were expressed:

TWG member	Issue
ECN, EBA, MWE	On the upper end of the BAT-AEL range for odour emissions to air as set in the Table 6.8
CZ	On the upper end of the BAT-AEL range for NH₃ and TVOC emissions to air for MBT as set in the Table 6.8



Biological – Aerobic – Overall environmental performance (1/3) – BP 1.12.3.1

BAT 34. In order to reduce emissions to air and to improve the ~~general~~ **overall** environmental performance, BAT is to monitor ~~the process and to~~ **and/or** control the key **waste and** process parameters ~~as mentioned below.~~



Biological – Aerobic – Overall environmental performance (2/3) – BP 1.12.3.1

Description

~~Proper m~~Monitoring and/or control of key waste and process parameters, including:

- waste input characteristics (e.g. C: to N ratio, particle size);
- temperature and moisture content at different points in the windrow;
- ~~water content;~~
- aeration of the windrow (e.g. via the windrow turning frequency, O₂ and/or CO₂ concentration in the windrow, temperature of air streams in the case of forced aeration);
- windrow porosity, height and width ~~air diffusion through the waste.~~
- ~~Temperature~~



Biological – Aerobic – Overall environmental performance (3/3) – BP 1.12.3.1

Applicability

Monitoring of the ~~water~~moisture content in the windrow is not applicable to enclosed processes when health and/or safety issues have been identified. In that case, the moisture content can be monitored before loading the waste into the enclosed composting stage and adjusted when it exits the enclosed composting stage.



BAT 34bis in Revised Draft 1

Biological – Aerobic – Odour and diffuse emissions to air
(1/4) – BP 1.7

BAT 34bis. In order to reduce diffuse emissions to air of dust, odour and bioaerosols from open-air treatment steps, BAT is to use one or both of the techniques given below.

Technique		Description	Applicability
ex- Technique BAT 10e	Use of with semipermeable membrane covers and forced positive aeration	Active composting windrows heaps are located in positively aerated plants covered by with under semipermeable membranes and sealed closed and aerated with positive (pressure) aeration.	Only applicable to aerobic treatment of waste. Generally applicable.



Biological – Aerobic – Odour and diffuse emissions to air
(2/4) – BP 1.7

Technique		Description	Applicability
Ex- Technique BAT 10f	<p>Limit potential generation of odour, dust and bioaerosols by considering meteorological conditions in the operation of the plant</p> <p>Adaptation of operations to the meteorological conditions</p>	<p>This includes techniques such as the following:</p>	<p>Only applicable to aerobic treatment of waste, when techniques (d) and (e) are not used.</p> <p>Generally applicable.</p>



Biological – Aerobic – Odour and diffuse emissions to air
(3/4) – BP 1.7

Technique		Description	Applicability
Ex- Technique BAT 10f		<ul style="list-style-type: none">Monitoring weather conditions and wind direction and taking those conditions into account weather conditions and forecasts when undertaking major outdoor process activities. For instance, avoiding formation or turning of windrows or piles, screening or shredding on windy days. in the case of adverse meteorological conditions in terms of emissions dispersion (e.g. undertaking screening and shredding when the wind speed is too low, or too high, or the wind blows in the direction is away from of sensitive receptors)-.	



Biological – Aerobic – Odour and diffuse emissions to air
(4/4) – BP 1.7

Technique		Description	Applicability
Ex- Technique BAT 10f		<ul style="list-style-type: none">Orientating windrows, so that the considering the direction of the prevailing wind. The smallest possible area of composting mass is exposed to the prevailing wind, to reduce ‘stripping’ of the dispersion of pollutants from the windrow surface. The windrows and piles are preferably located and at the lowest elevation within the overall site layout.	



Biological – Anaerobic – Overall environmental performance (1/3) – BP 1.12.4.1

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

Description

Implement a manual and/or automatic monitoring system to:

- ensure a stable ~~reactor~~ **digester** operation;
- minimise operational difficulties, such as foaming, which may lead to odour **emissions** ~~problems~~;
- provide sufficient early warning of system failures which may lead to loss of containment and, ~~potentially~~, explosions.



Biological – Anaerobic – Overall environmental performance (2/3) – BP 1.12.4.1

This includes monitoring and/or control of key waste and process parameters, e.g. such as:

- pH and alkalinity of the digester feed;
- digester operating temperature and temperature distribution;
- hydraulic and organic loading rates of the digester feed;
- organic loading rate including total solids and volatile solids fractions;
- concentration of volatile fatty acids (VFA) and ammonia within the digester and digestate;
- Ammonia;
- C:N ratio;



Biological – Anaerobic – Overall environmental performance (3/3) – BP 1.12.4.1

- biogas quantity ~~generation, and~~, composition (e.g. H₂S) and pressure;
- ~~gas pressure;~~
- ~~H₂S concentration in the gas;~~
- liquid and foam levels in the digester.



Biological – MBT – Emissions to air
(1/3) – BP 1.12.5.1

BAT 36. In order to prevent or, where that is not practicable, to reduce emissions to air, BAT is to use all both of the techniques given below.

Technique		Description	Applicability
a.	<div>Separate collection of air flows</div> <div>Segregation of the waste gas streams</div>	<div>Splitting of the total volume waste gas stream flow that is to be treated into heavily polluted exhaust air waste gas streams with a high pollutant content and lightly polluted exhaust air waste gas streams with a low pollutant content, as identified in BAT 2bis.</div>	<div>Generally applicable to new plants.</div> <div>Generally applicable to existing plants within the constraints imposed by associated with the configuration of the air circuits.</div>



Biological – MBT – Emissions to air
(2/3) – BP 1.12.5.1

Technique		Description	Applicability
b.	Partial reuse of exhaust air in the biological process Recirculation of waste gas	Use the exhausted air from the delivery waste input area (such as low bunkers and underground bunkers with or without mechanical treatment), or reuse the treated air as air supply (process air) for biological degradation.	Generally applicable to new plants. Generally applicable to existing plants within the constraints imposed by associated with the configuration of the air circuits.



Biological – MBT – Emissions to air
(3/3) – BP 1.12.5.1

Technique		Description	Applicability
b.		<p>Recirculation of waste gas with a low pollutant content in the biological process followed by waste gas treatment adapted to the concentration of pollutants (see BAT 32).</p> <p>The use of waste gas in the biological process may be limited by the waste gas temperature and the pollutant content.</p> <p>It may be necessary to condense the water vapour contained in the exhausted air waste gas before reuse. In this case, cooling is necessary, and the condensed water is recirculated when possible (see BAT 33) or treated before discharge.</p>	



PCT of solid and/or pasty waste – Overall environmental performance (1/2) – BP 1.13.2.1

BAT 38. In order to improve the general overall environmental performance, BAT is to monitor the waste input as part of the waste pre-acceptance and acceptance procedures (see BAT 2): ~~use the technique given below.~~

Description

Monitoring the waste input, e.g. in terms of:

- ~~● The waste input content of e.g.:~~
- content of organics, oxidising agents, metals (e.g. mercury), salts, odorous compounds;
 - ~~○ solid cyanides;~~
 - ~~○ oxidising agents;~~
 - ~~○ mercury;~~



PCT of solid and/or pasty waste – Overall environmental performance (2/2) – BP 1.13.2.1

- H_2 formation potential upon mixing of emissions when fly ashes or air pollution control (APC) residues, e.g. fly ashes, are mixed with water.

Applicability

Controlling H_2 emissions is only applicable when the fly ashes or APC residues contain carbonate



**PCT of solid and/or pasty waste – Emissions to air (1/1) – BP
1.13.2.2**

BAT 39. In order to reduce emissions of dust, organic compounds ~~VOC~~ and ~~NH₃ emissions to air~~, BAT is to apply BAT 10d and to use one or a combination of the techniques given below.

Technique		Description
a	Adsorption	See Section 6.6.1.
b	Biofilter	
c	Fabric filter	
d	Wet scrubber	



Table 6.8 in Revised Draft 1

PCT of solid and/or pasty waste – Emissions to air
– BAT-AELs (1/1) – BP 1.13.2.2

Table 6.8: BAT-associated emission levels (BAT-AELs) for channelled emissions of dust, ~~TVOC and NH₃~~ emissions to air from the physico-chemical treatment of solid and/or pasty waste.

Parameter	Unit	BAT-AEL (Average over the sampling period of samples obtained during one year)
Dust	mg/Nm ³	2–5
TVOC		2–15
NH₃		0.1–5

The associated monitoring is given in BAT 4.



PCT of solid and/or pasty waste – Emissions to air – Monitoring (1/2) – BP 1.5.3

Substance/ Parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (1)	Monitoring associated with
Dust	EN 13284-1	Physico-chemical treatment of solid and/or pasty waste	Once every six months	BAT 39



**PCT of solid and/or pasty waste – Emissions to air
– Monitoring (2/2) – BP 1.5.3**

Substance/ Parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency ⁽¹⁾	Monitoring associated with
TVOC	EN 12619	Physico-chemical treatment of solid and/or pasty waste ⁽⁴⁾	Once every six months	BAT 39
NH ₃	No EN standard available	Physico-chemical treatment of solid and/or pasty waste ⁽⁴⁾	Once every six months	BAT 39



**PCT– Re-refining of waste oil – Emissions to air
(1/1) – BP 1.13.3.1**

BAT 41. In order to reduce emissions of organic compounds ~~VOC emissions~~ to air, BAT is to apply BAT 10d and to use one or a combination of the techniques given below.

Technique		Description
a.	Adsorption	See Section 6.6.1.
b.	Thermal oxidation	See Section 6.6.1. This includes when the waste gas is sent to may also be fed into a process furnace or a boiler.
c.	Wet scrubber	See Section 6.6.1.

The BAT-AEL set out in Section 6.4.5 applies.

The associated monitoring is given in BAT 4.



Title of Section 6.4.3 (1/1) – BP 1.13.4.1

6.4.3 BAT conclusions for the physico-chemical treatment of ~~liquid~~ waste with calorific value



**PCT– Liquid waste with calorific value – Emissions to air
(1/1) – BP 1.13.4.1**

BAT 43. In order to reduce emissions of organic compounds VOC emissions to air from plants performing physico-chemical treatment of liquid and semi-liquid waste with calorific value, BAT is to apply BAT 10d and to use one or a combination of the techniques given below.

Technique		Description
a.	Adsorption	See Section 6.6.1
b.	Cryogenic condensation	
c.	Thermal oxidation	
d.	Wet scrubbering	

The BAT-AEL set in Section 6.4.5 applies.
The associated monitoring is given in BAT 4.



PCT – Regeneration of spent solvents – Emissions to air (1/4) – BP 1.13.5.1

BAT 45. In order to ~~prevent or, where that is not practicable, to reduce~~ emissions of organic compounds ~~VOC emissions to air~~, BAT is to apply BAT 10d and to use a ~~suitable~~ combination of the techniques given below



PCT – Regeneration of spent solvents – Emissions to air
(2/4) – BP 1.13.5.1

Technique		Description	Applicability
a	Recirculation of waste process off-gases from solvents regeneration process in a steam boiler	<p>Collected waste gas is cooled and chilled to condense and partially separate solvents. This waste gas with remaining solvents is fed to the steam boiler supplying the plant. If the steam boiler is not in operation or the waste gas volume would exceeds the steam boiler air demand, the pretreated waste gas is treated by activated carbon filters before release.</p> <p>The waste process off-gases from the condensers are sent to the steam boiler supplying the plant.</p>	May not be applicable to the treatment of halogenated solvent wastes, in order to avoid generating and emitting PCBs and/or PCDD/F.



BAT 45 in Revised Draft 1

PCT – Regeneration of spent solvents – Emissions to air
(3/4) – BP 1.13.5.1

Technique		Description	Applicability
b (ex c)	Activated carbon Adsorption	See Section 6.6.1 for the description of the technique.	There may be limitations to the applicability of the technique due to safety reasons (e.g. activated carbon beds tend to self-ignite when loaded with ketones).
e	Thermal oxidation	See Section 6.6.1	May not be applicable to the treatment of halogenated solvent wastes, in order to avoid generating and emitting PCBs and/or PCDD/F.



PCT – Regeneration of spent solvents – Emissions to air
(4/4) – BP 1.13.5.1

Technique		Description	Applicability
c (ex b)	Condensation/ or cryogenic condensation	See Section 6.6.1 for the description of the techniques. Adequate control of condenser parameters is essential to minimise VOC emissions from the condenser vents. Condenser (cooling) failure results in an automatic process shutdown.	Generally applicable.
d	Wet scrubbing	See Section 6.6.1 for the description of the technique.	Generally applicable.

The BAT-AEL set in Section 6.4.5 applies.

The associated monitoring is given in BAT 4.



Title of Section 6.4.5 (1/1) – BP 1.13.4.1

6.4.5 BAT-AEL for emissions of organic compounds to air from re-refining of waste oil, physico-chemical treatment of ~~liquid~~ waste with calorific value and regeneration of spent solvents



Table 6.13bis in Revised Draft 1

PCT – Re-refining of waste oil, liquid waste with calorific value, regeneration of spent solvents – Emissions to air – BAT-AELs (1/1) – BP 1.13.3.2, 1.13.4.2 and 1.13.5.2

Table 6.13bis: BAT-associated emission levels (BAT-AELs) for channelled emissions of TVOC to air from the re-refining of waste oil, the physico-chemical treatment of liquid waste with calorific value and the regeneration of spent solvents

Parameter	Unit	BAT-AEL ⁽¹⁾ (Average over the sampling period)
TVOC	mg/Nm ³	5–30

⁽¹⁾ The BAT AEL does not only applies when the emission load is above below 4–2 kg/h at the emission point provided that no CMR substances are identified as relevant in the waste gas, based on the inventory mentioned in BAT 2bis.



Table 6.13bis in Revised Draft 1

PCT – Re-refining of waste oil, liquid waste with calorific value, regeneration of spent solvents – Emissions to air – BAT-AELs (1/1) – BP 1.13.3.2, 1.13.4.2 and 1.13.5.2

Chapter on 'Concluding remarks and recommendations for future work'

- Add a recommendation that information should be collected during the next review of the WT BREF to consider the specificities of these sectors in particular taking into account the variability of the waste input and its effect on emissions to air.

Dissenting views that were expressed:

TWG member	Issue
EUCOPRO	On the upper end of the BAT-AEL range of TVOC emissions to air (Table 6.13bis)



BAT 4 in Revised Draft 1

PCT – Re-refining of waste oil, ~~liquid~~ waste with calorific value, regeneration of spent solvents – Emissions to air – Monitoring (1/1) – BP 1.5.3

Substance/ parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency (¹) (²) (³)	Monitoring associated with
TVOC	EN 12619	Re-refining of waste oil	Once every six months	BAT 41
		Physico-chemical treatment of liquid waste with calorific value		BAT 43
		Regeneration of spent solvents		BAT 45



Treatment of water-based liquid waste – Overall environmental performance (1/1) – BP 1.13.6.1

BAT 52bis. 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 (see BAT 2).

Description

Monitoring the waste input, e.g. in terms of :

- bioeliminability (e.g. BOD, BOD to COD ratio, Zahn-Wellens test, biological inhibition potential, **activated sludge inhibition test**);
- feasibility of emulsion breaking, e.g. by means of laboratory-scale tests.



Treatment of water-based liquid waste – Emissions to air (1/1) –
BP 1.13.6.2

BAT 52. In order to reduce emissions of HCl, NH₃ and organic compounds ~~VOC channelled emissions to air~~, BAT is to apply BAT 10d and to use one or a combination of the techniques given below.

Technique		Description
a	Adsorption	See Section 6.6.1.
b	Biofilter	
c	Thermal oxidation	
d	Wet scrubber	



Table 6.12 in Revised Draft 1

Treatment of water-based liquid waste – Emissions to air
– BAT-AELs (1/2) – BP 1.13.6.2

Table 6.12: BAT-associated emission levels (BAT-AELs) for channelled emissions of HCl ~~NH₃~~ and TVOC-emissions to air from ~~physico-chemical and/or biological~~ the treatment of water-based liquid waste.

Parameter	Unit	BAT-AEL ⁽¹⁾ (Average over the sampling period of samples obtained during one year)
Hydrogen chloride (HCl)	mg/Nm ³	1–5.3 ⁽¹⁾
Ammonia (NH ₃)		0.1–5
<div>(¹) These BAT-AELs only apply when the substance concerned is identified as relevant in the waste gas, based on the inventory mentioned in BAT 2bis.</div> <div>(¹) This BAT-AEL does not apply if only biological treatment is carried out.</div>		

The associated monitoring is given in BAT 4.



Table 6.12 in Revised Draft 1

**Treatment of water-based liquid waste – Emissions to air
– BAT-AELs (2/2) – BP 1.13.6.2**

Parameter	Unit	BAT-AEL ⁽¹⁾ (Average over the sampling period of samples obtained during one year)
TVOC	mg/Nm ³	3–20 ⁽²⁾
⁽²⁾ The upper end of the range is 45 mg/Nm ³ when the emission load is below 0.5 kg/h at each emission point.		



Treatment of water-based liquid waste – Emissions to air – Monitoring (1/2) – BP 1.5.3

Substance/ Parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency ⁽¹⁾	Monitoring associated with
HCl	EN 1911	Physico-chemical and/or biological Treatment of water- based liquid waste ⁽⁴⁾	Once every six months	BAT 52
NH ₃	No EN standard available	Physico-chemical and/or biological Treatment of water- based liquid waste ⁽⁴⁾	Once every six months	BAT 52



Treatment of water-based liquid waste – Emissions to air
– Monitoring (2/2) – BP 1.5.3

Substance/ Parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency ⁽¹⁾	Monitoring associated with
TVOC	EN 12619	Physico-chemical and/or biological Treatment of water- based liquid waste ⁽⁴⁾	Once every six months	BAT 52



**Description of techniques in
Revised Draft 1**

**Description of techniques – Channelled emissions to air (12/15)
– BP 2.19.1**

Technique	Typical pollutant(s) abated	Description
Thermal oxidation	Volatile organic compounds	The oxidation of combustible gases and odorants in a waste gas stream by heating the mixture of contaminants with air or oxygen to above its auto-ignition point in a combustion chamber and maintaining it at a high temperature long enough to complete its combustion to carbon dioxide and water.



Description of techniques in
Revised Draft 1

Description of techniques – Channelled emissions to air (13/15)
– BP 2.19.1

Technique	Typical pollutant(s) abated	Description
		When the waste gas contains halogenated compounds, the oxidation temperature exceeds 1100 °C with a minimum residence time of 2 seconds, and with subsequent rapid cooling of exhaust gases to prevent the <i>de novo</i> synthesis of PCDD/F.



Description of techniques in
Revised Draft 1

Description of techniques – Emissions to water
– BP 2.19.2

Technique	Typical pollutant(s) abated	Description
Chemical oxidation	Oxidisable dissolved Soluble non-biodegradable or inhibitory pollutants contaminants, e.g. nitrite, cyanide	Organic compounds are oxidised into less harmful and more easily biodegradable compounds. Techniques include wet air oxidation or oxidation with ozone or hydrogen peroxide, optionally supported by catalysts or UV radiation. to convert them Chemical oxidation is the conversion of pollutants by chemical oxidising agents other than oxygen/air, or by bacteria, into similar but less harmful or hazardous compounds and/or into short-chained and more easily degradable or biodegradable organic components.



Description of techniques in Revised Draft 1

Description of techniques – Management techniques (1/1) – BP 2.19.4

Technique	Description
Residues management plan	A residues management plan is part of the EMS (see BAT 1) and is a set of measures aiming to 1) minimise the generation of residues arising from the treatment of waste, 2) optimise the reuse, or regeneration, recycling and/or recovery of energy of the residues, and 3) ensure the proper disposal of internal residues or waste.