Green Skip Services Ltd
Waste management services, sales and consultancy

Administration Building
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Ramla Road,
Maghtab - Naxxar
NXR 6542, Malta.

Co. Reg. No. C13893 VAT: MT1021 8116

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Covering Letter

For the Attention of Ms Christina Pisani – Environment Protection Officer

2nd January 2022

Dear Ms Pisani,

Following your email dated 2nd December 2021 and the attached Notification letter, we are writing this letter as a formal request for the renewal and amendment of our Integrated Pollution Prevention and Control (IPPC) permit. As part of this request, kindly find below a list of the supporting documentation that shall be sent as an attached ZIP file:

1) Document 002_GSS Ltd Cert
2) Document 003_GSR Ltd Cert
3) Document 004_IPPC Report on IP Items Final
4) Document 005_IPPC Form A
5) Document 006_IPPC Form C
6) Document 007_Summary of Requested Changes
7) Document 008_Site Plan Updated

We thank you for your kind assistance and we look forward to our continued cooperation on our way forward.

Signed

MARY GAERTY
Joint Managing Director

Companies Act, 1995

CERTIFICATE OF COMPLIANCE
WITH THE COMPANIES ACT, 1995

Green Skip Services Limited

Name of Commercial Partnership

Sammut Building, Unit 1, Triq id-Dwieli, Burmarrad

SPB 08, Malta

Registered Office

C 13893

Registration No.

This is to certify that the above-mentioned Commercial Partnership which was registered under the Commercial Partnerships Ordinance on the

26 May, 1992

has complied with the provisions of the Companies Act, 1995 in terms of Section 428 of the Act and shall be regulated by the said Act, with effect from the

31 December 1997

O. GRECH

Registrar

Dated this **24th** day of **November,** 19 **97**

Companies Act, 1995

CERTIFICATE OF COMPLIANCE
WITH THE COMPANIES ACT, 1995

G.S. Rec Limited

Name of Commercial Partnership

Sammut Building, Unit 1, Triq id-Dwieli, Burmarrad

SPB 08, Malta

Registered Office

C 17963

Registration No.

This is to certify that the above-mentioned Commercial Partnership which was registered under the Commercial Partnerships Ordinance on the

8 March, 1995

has complied with the provisions of the Companies Act, 1995 in terms of Section 428 of the Act and shall be regulated by the said Act, with effect from the

31 December 1997

O. GRECH

Registrar

Dated this **5th** day of **November,** 19 **97**

Improvement Programme Items

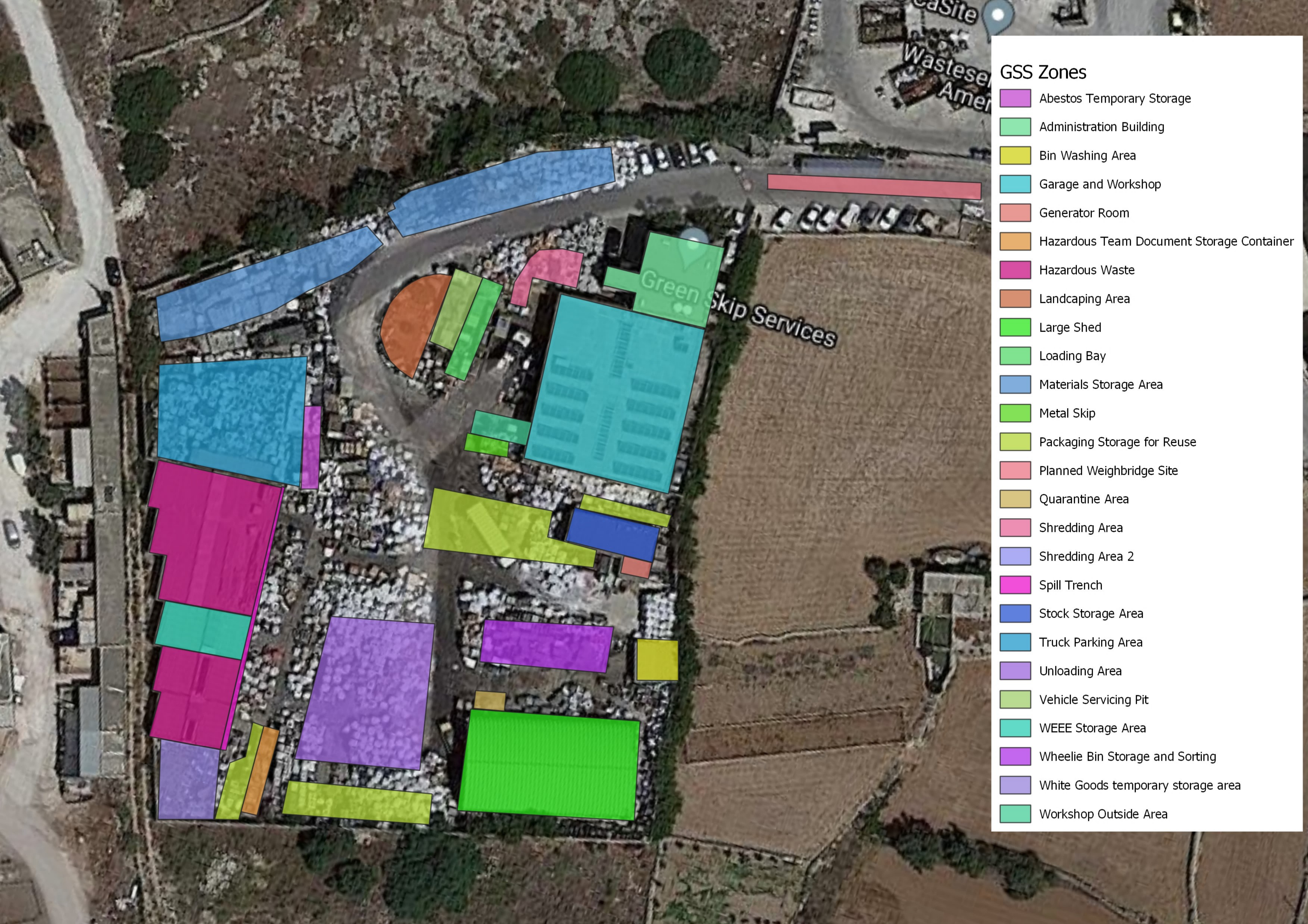
IP Item Reference Number	Requirement	Status
1	Physical delineation and signage of all waste storage areas and quarantine area as per site layout plan submitted as part of the Document 8 of the IPPC application	Signage updated along the entire facility as per our replies to ERA audit. Painted Signs are constantly being repainted as they get worn out.
2	Certification from a competent company or engineer that the relevant fire safety procedures and equipment are in place, including emergency firefighting water supplies for use by the Civil Protection Department.	Firefighting Procedure and File had already been provided with original IPPC Application. In the meantime, we have felt the need to upgrade the firefighting system. Almost all preparations for Civil Protection Department visit are in place. Awaiting delivery of some hoses and other equipment that was delayed due to supply chain issues.
3	Submission of a land and groundwater baseline report in line with the Method Statement dated September 2017 approved by ERA and pursuant to Regulation 9(3) and 16(2) of the Industrial Emissions (IPPC) Regulations and conditions 2.9.4 Submission of an update to baseline report which includes additional testing to be carried out in the dry season.	Completed and compiled by Ensure, report was presented and accepted.
4	Certification by an independent warranted civil engineer or engineer that the fuel retention separator has been constructed in accordance with EN 858, including inspection of the efficiency of operation and site layout plan.	Existing fuel retention separator could not be certified to the quoted standard. We are in contact with a number of suppliers to purchase a

		pre-fabricated unit certified to the quoted standard.
5	To provide the rated thermal input in megawatts thermal (MW), average load in use and annual operating hours of the diesel generator.	The Shredder is a powerful machine and since our electricity supply does not keep up with the energy demand during start up and very heavy loads, the generator is switched on during these times.
6	Certification from a third party warranted engineer or architect showing that the bund for the generator's built-in fuel tank is constructed according to condition 2.2.6.8 below.	Generator fuel Tank was brought in with the generator and is only ever filled up with 25l of fuel. The Generator room was rendered impermeable, up to a capacity of 1196 litres.
7	Installation of collapsible bunding strips within the waste storage sheds to prevent any run off within the sheds from reaching the gutter just outside the sheds.	Reply: The collapsible bunding is no longer available. We have made impermeable up to 15cms the sides of the walls of each storage area. In case of any leakages the garages will themselves hold an amount of liquid because these are large and the liquid will spread. Basically, all liquids are now exported within a period of 1-2 weeks, since the export quantity has increased to 2 trailers per week. In case there is a leak, the running culvert (gutter) and the holding area will offer a substantial amount of storage. Persons leave the facility around 17.00 hrs and the site manager starts at 7-7.30am. leaks will be noticed.

8	Submission and implementation of a procedure for waste-type specific sampling for all different incoming waste delivered in bulk and/or containers in line with the requirements of BAT conclusions as per condition 2.4.1.12.	As indicated previously NO SAMPLING takes place at the facility. Waste ONLY enters the facility once a sample collected by the generator is received and accepted by the treatment facility. The waste code is determined by the generator and approved by us and the foreign facility. Therefore, IP8 is NOT applicable to GSS installation due to small scale operation.
9	Submission of a method statement for carrying out a Noise Monitoring Survey in accordance with condition 2.2.9.4.	Noise report was compiled and submitted recently and we request that the condition be amended to be partially required in case of new equipment being installed, and for that equipment ONLY.
10	Submission of analysis to achieve End of Waste (EoW)	Already presented.
11	A) Submission of a method statement for monitoring of total particulate matter (TPM) and Total Volatile Organic Compounds in accordance with conditions 2.2.1.6. B) Submission of total particulate matter (TPM) and Total Volatile Organic Compounds (TVOC) monitoring in accordance with the approved method statement as per item 11 A) above.	No longer relevant as containers contaminated with hazardous substances are NOT shredded.
12	Submission of details and photographic evidence of the installed weighbridge together with its calibration details.	We have weighbridge quotations in hand, some technicalities with the architect need to be sorted out before ordering and installing the weighbridge. As previously stated,

		in the meantime all material is weighed on a calibrated weighing scale or palletizer equipped with a weighing system.
13	Recertification by a third party warranted engineer or architect of site impermeability including cesspits and spill reservoirs considering the activities taking place within the yard.	The site is fully concreted apart from the access road which is tarmacked. It is not possible to check impermeability of a nearly 8,000 sq mtr site. The cesspit and spill reservoirs were checked by a warranted engineer. There have only been very small spills that were immediately collected by absorbent material (exported as hazardous material). The cesspit is frequently emptied.
14	Submission of an outline decommissioning plan.	Kindly refer to original Master Application Document section B2.9 Cessation of Activity

With reference to IP 0001/12/A:
IP 5: conditions 2.2.1.4 & 2.2.1.5, as per our reply in the covering letter, since the usage of the diesel generator is limited to start-up and relatively rare heavy use conditions, we request these conditions to be removed from permit. Particles generated during shredding are very large and heavy thus they are not airborne.
IP 7: To be considered as closed, due to all possible precautions having been taken and in place. IP to be removed from permit.
IP 8: Not relevant to installation, since no sampling is ever taken on site. IP to be removed from permit.
IP 9: Noise Annual Report to be reconsidered and should be affected only if new equipment is installed. IP to be amended.
IP 10: EoW analysis to be presented only if there is a change in the material being used as a product. IP to be amended
IP 11: No Hazardous Material Shredded on Site. IP to be removed from permit.
IP 13: As per our comments in the covering letter, IP to be removed from permit.
IP 14: Decommissioning plan already submitted in original application. IP to be removed from permit.
To be included: Permit validity for 10 years minimum in line with permits of other EU countries.
With ref to Schedule 9, page 56 of permit, we would like to amend the required sample size and sampling method as per correspondence from our auditor; since all materials are generated from the same client are entered as per material type on a daily basis. The site diary ends up including thousands of entries for both incoming and outgoing. Making a 10% sample size unpleasable and unrepresentative since there would be several repeats from the same client. This can be discussed further with us and our auditor.
Different siting of: • **Asbestos Container** • **Temporary Storage (<week) of WEEE- White Goods pending weekly loading.** • **Use of Sheds** **As per submitted plan.**



GSS Zones
Abestos Temporary Storage
Administration Building
Bin Washing Area
Garage and Workshop
Generator Room
Hazardous Team Document Storage Container
Hazardous Waste
Landcaping Area
Large Shed
Loading Bay
Materials Storage Area
Metal Skip
Packaging Storage for Reuse
Planned Weighbridge Site
Quarantine Area
Shredding Area
Shredding Area 2
Spill Trench
Stock Storage Area
Truck Parking Area
Unloading Area
Vehicle Servicing Pit
WEEE Storage Area
Wheelie Bin Storage and Sorting
White Goods temporary storage area
Workshop Outside Area
Green Skip Services

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Co. Reg. No. C13893 VAT: MT1021 8116

8th February 2023
Environment & Resources Authority
Hexagon House, Spencer Hill,
Marsa, MRS 1441,
Malta

Dear Ms. Ellul and Ms. Pisani,

We are writing this letter to formalise our discussion that took place in our call of the 30th of January 2023. First of all, we would like to express our thanks for finding the time to schedule the aforementioned meeting.

Green Skip Services Ltd (GSS), as part of its operations, receives a quantity of packaging waste such as: cardboard boxes (EWC 15 01 01), wooden pallets and boxes (EWC 15 01 03), plastic drums and plastic pallets (EWC 15 01 02), metal Drums (EWC 15 01 04) and IBCs (EWC 15 01 05).

In line with BAT considerations under BAT 24, GSS would like to reuse as much of this packaging as possible for its own export operations, which would require the declaration of REUSE for this packaging material. This packaging is reused to pack hazardous waste which is finally destined for operation R12 followed by R1, incineration with energy recovery. We would like for ERA to consider this as part of the variations presented already to our IPPC permit.

The attached flowchart shows the process that waste packaging material would undergo prior to reuse.

Some materials can also reach their end of waste through a shredding operation. Wood, Paper/Cardboard.

The operation is a simple shredding operation of only clean material.

Wood; clean, unpainted, non-laminated wood is shredded and through this operation, mulching is produced. This material is utilised as a weed inhibitor and at the same time, it also acts as a barrier to loss of soil and in keeping the soil moist, thus reducing the frequent need for watering. Material is bagged.

Paper/cardboard: paper and cardboard can also undergo the same shredding operation of clean material. The paper used has been tested at an accredited laboratory for any possible contaminants for use as animal bedding. This was given an all-clear and this particular paper can be utilised as such. Clients at times also ask for cardboard to be shredded but for same or different usage.

CONTAMINATED PACKAGING

There is another matter which we would like to bring to ERA's attention. This is the packaging waste fraction that falls under the contaminated packaging (EWC 15 01 10*) which in our opinion could be being omitted from the packaging waste reporting. This has two aspects:

1. The contaminated packaging that is being sold for reuse without it being declared by the generator. This packaging waste, be it plastic, metal, wood etc. arrives in Malta as packaging for a raw material. At a later stage these containers become contaminated packaging and are exported as such by GSS for Incineration with energy recovery (R1).
2. In such circumstances this waste is being recovered, but perhaps not being reported as being such. We would like our clients to start declaring this material as recovered packaging material. The Movement Notification Form declares this process in Box No 11.

The setting up of a specific scheme for contaminated packaging will offer such a solution. GSS is interested in setting up this scheme.

Thank you for your kind consideration.

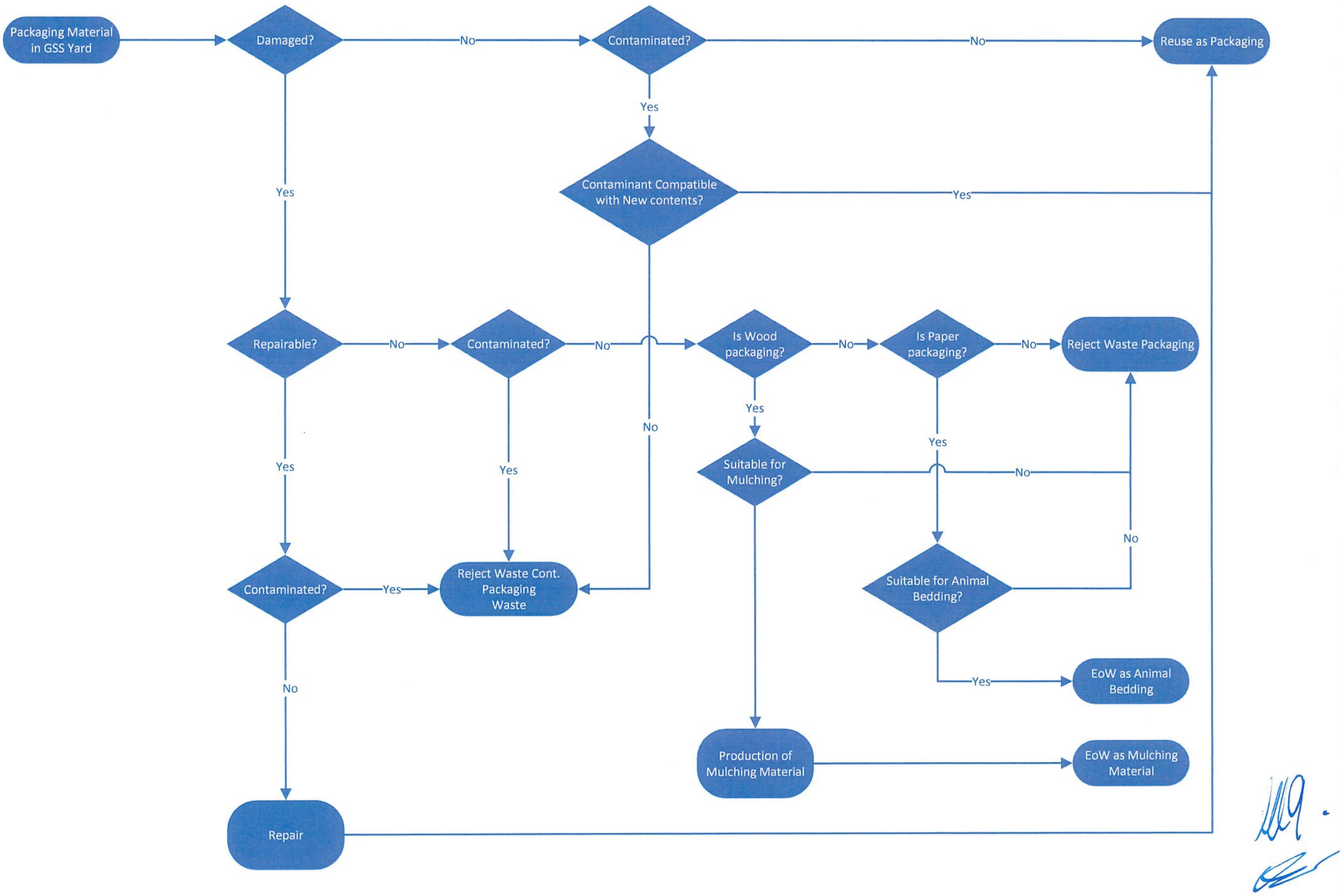
Mary Gaerty

Joint Managing Director

Quinn Sant

Business Development, DGSA

Process for the Reuse of Packaging Material



1. GENERAL BAT CONCLUSIONS

1.1. Overall environmental performance

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;

Yes

COMMENT

Commitment in place since IPPC was applied for and also prior. Management has furthermore decided to heavily invest in technology. The objective is to secure greater granularity and a real-time capability in terms of the waste being managed, as well as creating a more effective way to optimize the carbon footprint of the operation itself.

Whereas until now the “treatment” of any wastes was left to third parties predominantly abroad, management is now actively pursuing new possibilities with clear targets to identify any potential opportunities to treat, recover or destroy waste which may presently be undergoing such treatment, recovery or destruction above. For any such process, appropriate specific measures will be adopted.

II. definition, by the management, of an environmental policy that includes the continuous improvement of the environmental performance of the installation;

YES

As per 2006. The policy is essentially the parameters which bind the facility’s operations. This includes adherence to relevant BAT. This includes all the training, oversight and procedures used internally. All this will be further enhanced as the digital platform rollout is fully implemented.

III. planning and establishing the necessary procedures, objectives and targets, in conjunction with financial planning and investment;

YES

As per 2006. The company has however actively sought to improve its time to delivery of financials at year-end to give management better tools to react to financial fluctuations. Furthermore, a very proactive approach is now being adopted with respect to investment for processes to be completed in Malta. Whereas until now we depended on third-party providers, measures are being taken to shorten the time to delivery of reporting for financials through a quasi automated process via the new ICT system being developed. The objective is to secure a near real-time accounting system as soon as the digitalization is fully implemented.

IV. implementation of procedures paying particular attention to:

YES For All subheadings

Digitalization will streamline all the items below through supporting information on the system available to relevant employees.

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

V. checking performance and taking corrective action, paying particular attention to:

Yes to all

(a) monitoring and measurement (see also the JRC Reference Report on Monitoring of emissions to air and water from IED installations – ROM),

Acceptance procedures define the risks and limit the need to monitor. Since limited processing is undertaken on site the where necessary an “ad hoc”

approach is taken to ensure risks are abated or eliminated. Even so, the volumes managed are always miniscule and typically limited to repackaging.

The site design and procedures in place are such so as to prevent any risks related to chemical contamination of the water reservoir.

Also bunds and draining channels in place ensure the "liquid containment" is secure through testing.

(b) corrective and preventive action,

Usually "ad-hoc" action pertaining to specific containment issues. Very rare thanks to acceptance protocols.

(c) maintenance of records,

Digitalization shall create opportunities for easier reporting, analysis and also better help us serve clients with respect to reporting.

(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;

The EMS is largely a static system in terms of procedures, methods and policies, however when relevant changes are deemed necessary these are accordingly evaluated and when changes are required, these are adopted. An independent auditor audits the reporting procedures and collection of data on a yearly basis. This report which is very cumbersome is presented to ERA on a yearly basis.

VI. review, by senior management, of the EMS and its continuing suitability, adequacy and effectiveness;

YES

The scope of operations is very limited and has not really undergone any major changes since the IPPC was secured other than optimization. However, digitalization was an opportunity to identify means to improve internal accountability, efficiencies and ability to react and adapt when necessary. Employee feedback is key in all this. The key "controller" in managing risks is and has been acceptance protocols.

As new guidelines are provided or new techniques or equipment that reduces risks is introduced, through partner feedback we do tend to make improvements on actual procedures if necessary.

VII. following the development of cleaner technologies;

YES **Actively pursuing reviews and analysis of waste streams to identify opportunities to localize treatment. Any decision is then taken based on commitments from clients and financial considerations. A weighting for the "cleaner" (lesser environmental impact) aspect being put into the mix. We are largely acting as brokers with respect to waste, since treatment and processing is very limited. We try to offer clients choices on potential alternative routes, if these exist, wherein the client may then decide which destination to go with. Furthermore management regularly attends specialized fairs where new technologies, solutions and processes are on show and accordingly identified, researched and evaluated for potential value to our operation and also clients' requirements.**

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;

YES **Site was designed to minimize risks in event of decommissioning.**

IX. application of sectoral benchmarking on a regular basis;

YES **BATS are the main way one can benchmark in our case. If we are applying the Best available methods in the activities we conduct, then there is limited scope aside from this to benchmark.** **Given the activities which are "benchmarkable", ex. comparison of emissions of a power plant, waste water, or residues, or even Energy efficiency in energy recovery processes, all these are not applicable since we are not a BWT plant, Power plant, Water treatment, W2E or other similar facility where several highly comparable operations can provide clear benchmarks. Finding comparable sectoral benchmarking reference points for what is essentially a "brokerage" setup is not "easy". Therefore we can only benchmark activities related to processes which effectively involve the limited scope of the facility. However in decisions pertaining to new investments on treatment solutions, as soon as such activities are introduced, then we shall benchmark with similar installations with comparable use cases. An "absolute" rather than "relative" approach has been the one adopted which is probably more practical. Improvements have progressed with improved Fleet Euro standards, introduction of solar, design of site to capture rainwater, etc. All measures**

which require investment to decrease the environmental impact. Furthermore audits ensure we are in line with our commitments.

X. waste stream management (see BAT 2);

Yes

Manual procedures which are being digitalized.

XI. an inventory of waste water and waste gas streams (see BAT 3);

Yes

Strictly not relevant. There are no waste streams but records are held of discharge from cesspit, where water services usually require pre-testing prior to removal. No gas streams of relevance.

XII. residues management plan (see description in Section 6.5);

No residues of relevance at present. Should the company have such requirements these will be appropriately managed on an ad-hoc basis.

XIII. accident management plan (see description in Section 6.5);

Yes

Training of personnel includes management of accident and emergency situations.

XIV. odour management plan (see BAT 12);

Yes

Odours plan strictly pertains to new products accepted since no odours on site. However in situations where odours could present an issue, ex. the potential treatment of waste, odour management will be part of any such installation. EIAs conducted on site only ever identified odours generated i from nearby farming and the landfill site.

XV. noise and vibration management plan (see BAT 17).

YES

Most of the activities on site represent negligible noise and vibrations. As such this is strictly related to potential new activities. As attested by EIAs conducted in the past and by common sense, the facility does not pose any more of a nuisance beyond the use of trucks. Whereas any equipment such as Generators and shredders have measures which limit sound pollution. The non-proximity of neighbours limits any potential disturbances to third parties. Furthermore operations are not on-going at night. Specific plans would be introduced for any alterations in equipment or processes on site following review of noise levels such activities would cause.

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).

COMMENT:

The facility is primarily a waste reception, consolidation and forwarding facility which also has a limited "processing" function pertaining strictly to the repackaging of waste due to unsuitable containers or the decrease in volume thereof.

The annual Hazardous waste export from Malta is not substantial, and when volumes or weight are such that a full container is potentially loaded from a single site, the company exports directly provided an "accepting" facility is identified.

At times we facilitate clients with no additional storage capacity with temporary storage strictly in the event a temporary issue presents itself with regards to destination facility.

The scope and scale of any potential risks are and have therefore been pro-actively managed through acceptance procedures and monitoring of the on-site inventory. A minimization of on-site inventory in itself represents a considerable risk management tool.

Adopting high standards in the training of personnel and management oversight in the micromanagement and checking of all waste containers entering and being exported or transferred to a final destination ensures the risks along the chain of custody we are entrusted with delivers the highest possible risk mitigation.

The digitalization process will essentially satisfy the need from management, clients and ERA to have improved and more readily available reporting metrics as well as greater accountability and the ability to “react” proactively in providing better solutions.

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

Technique

Description

a. 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 include 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 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).

YES

Waste acceptance protocols are in Place. Passthrough acceptance protocols ensure waste received is suitable for the final destination. Furthermore, if client is unable to present material in the desired final destination packing, we identify solutions and assist the client in securing the desired final packaging or containment.

b. Set up and implement waste acceptance procedures

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 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 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).

YES

We stress that we are not the final destination of the waste, nor a processing site with respect to recovery, destruction or other processing beyond “repackaging” strictly when necessary, with respect to hazardous waste destined for treatment at a foreign facility. Our acceptance is therefore fully dependent on samples provided by clients which are tested by the final destination facility possibly supported by initial test results provided by the producer and conducted by third parties. Recovery operations is done through dismantling of certain WEEE and the eventual export for the recovery of metals at foreign facilities.

KNOWN WASTE : Where the origin of waste is “known” the waste is predictable. Ex. A chemical process with by-products, washing of pharmaceutical plant vessels, etc.

UNKNOWN WASTE: Where the origin of waste is “unknown”, ex. sludge contained within a transport vessel where the composition is potentially anything. In such cases sampling performed by the client together with the relevant Material Safety Data Sheets are forwarded to the end destination and the facility determines procedures, acceptance protocols etc. Guidance from the end destination is therefore key to us accepting it as part of the chain of custody.

c. Set up and implement a waste tracking system and inventory

A waste tracking system and inventory aim to track 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 the waste held on site including all identified hazards), acceptance, storage, treatment and/or transfer off site. The waste tracking system is risk-based 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).

YES
We have one in place and will be undergoing digitalization

d. 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 for example existing EN standards. This management system also allows the performance of the waste treatment to be monitored and optimised, and for this purpose may include a material flow analysis of relevant components throughout the waste treatment. The use of a material flow analysis is risk-based 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).

Yes.
Largely out of scope at present since no waste treatment is performed on site. This with the exception of temporary drying pools for specific sludges where reduction in water content is an acceptance condition of the final destination.

e. Ensure waste segregation

Waste is kept separated 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 identify when and where wastes are stored.

YES
Dedicated storage, labelling and record keeping. Acceptance protocols also account for potential on-site risks and where high risks are identified a direct shipping route is preferred. “Compatible” wastes can be shipped together or stored together whereas incompatible wastes are not.

f. Ensure waste compatibility prior to mixing or blending of waste

Compatibility is ensured by 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 risk-based 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).

YES

Largely out of scope. This is primarily directed towards plants where recovery or incineration is performed. Also where solvents are processed/recovered. In rare cases where different containers are “mixed” the composition would be ascertained to be of a compatible composition which would not create adverse reactions, ex. Redox, Exothermal, Explosive, Gas release, Foaming, or polymerization. One could for example dilute a concentrated solution to meet the accepting site specifications or neutralize highly acidic or alkaline waste. However as indicated, an ad hoc approach with a consultancy of a specialist chemist is sought when new processes are considered necessary.

g. Sort incoming solid waste

Sorting of incoming solid waste (10) aims to prevent unwanted material from entering subsequent waste treatment process(es). It may include:

manual separation by means of visual examinations;

ferrous metals, non-ferrous metals or all-metals separation;

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.

YES

Limited packaging waste sorted and separated visually. No Vehicle dismantling. Limited metal separation based on visual inspection. This is primarily pertaining to automated sorting plants.

BAT 3. In order to facilitate the reduction of emissions to water and air, 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 characteristics of the waste to be treated and the waste treatment processes, including:

Yes **Scope very limited to water since gas emissions essentially limited to Generator and vehicle operations.**

(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;

(ii) information 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. inhibition of activated sludge)) (see BAT 52);

YES **As conducted by WSC when emptying cesspit**

(iii) information 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).

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).

COMMENT: Largely not Applicable. Very limited scope pertaining to cesspit in terms of water discharge, bund containment and channel sealing. No treatment, abatement or other forms of processes on site. This is primarily directed towards the management of effluents from facilities with substantial waste water by-product which would be discharged and could present an environmental hazard if not treated. Ex. Power plant cooling systems, where antirust with hexavalent chromium may have been present.

BAT 4. In order to reduce the environmental risk associated with the storage of waste, BAT is to use all of the techniques given below.

Technique / Description / Applicability

a. Optimised storage location

This includes techniques such as:

the storage is located as far as technically and economically possible from sensitive receptors, watercourses, etc.;

the storage is located 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.

YES

Design accounted for environmental protection concerns by requiring the lining of the facility floor with concrete which is regularly maintained. The Hazardous waste being isolated within a section of the site. Also testing and maintenance of the waste water drains and channels and water containment and bunds is ascertained. Furthermore acceptance protocols support lowering of risks.

b. Adequate storage capacity

Measures are taken to avoid accumulation of waste, such as:

the maximum waste storage capacity is clearly established and not exceeded 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 monitored against the maximum allowed storage capacity;

the maximum residence time of waste is clearly established.

Generally applicable.

YES **Acceptance protocols, inventory management but primarily item is directed to much larger volumes of waste typically on site in larger facilities which treat. Waste storage is kept to the minimum necessary to accommodate efficient shipping economics.**

c. Safe storage operation

This includes measures such as: equipment used for loading, unloading and storing waste is clearly documented and labelled;

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.

YES **Covered well ventilated sheds protected from direct sunlight and containment is strictly monitored and checked as part of the procedures.**

d. Separate area for storage and handling of packaged hazardous waste

When relevant, a dedicated area is used for storage and handling of packaged hazardous waste.

Yes **Dedicated areas in place**

BAT 5. In order to reduce the environmental risk associated with the handling and transfer of waste, BAT is to set up and implement handling and transfer 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:

handling and transfer of waste are carried out by competent staff;

handling and transfer of waste are duly documented, validated prior to execution and verified after execution;

measures are taken to prevent, detect and mitigate spills;

operation and design precautions are taken when mixing or blending wastes (e.g. vacuuming dusty/powdery wastes).

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

Yes to all

Procedures in place and ADR trained staff and specific instructions provided ad hoc in cases where waste is repackaged on site. Acceptance protocols support a minimization of on-site repackaging. Furthermore, inspection of accepted product ensures minimization of risks associated with container leaks. When container transfer necessary, facilities are in place to address risks of spillage and personnel are fully made aware of the chemicals they are handling and the protocols associated thereto including the MSDS relevant to potential chemicals present.

1.2. Monitoring

BAT 6. For relevant emissions to water as identified by the inventory of waste water streams (see BAT 3), BAT is to monitor key process parameters (e.g. waste water flow, pH, temperature, conductivity, BOD) at key locations (e.g. at the inlet and/or outlet of the pretreatment, at the inlet to the final treatment, at the point where the emission leaves the installation).

OUT OF SCOPE. With the exception of cesspit which is managed by Water Services Corporation. Testing performed to ensure suitability of water for collection.

BAT 7. BAT is to monitor emissions to water with at least the frequency given below, 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.

OUT OF SCOPE. With the exception of cesspit which is managed by Water Services Corporation. Testing performed to ensure suitability of water for collection.

Substance/parameter

Standard(s)

Waste treatment process

Minimum monitoring frequency (11) (12)

Monitoring associated with

Adsorbable organically bound halogens (AOX) (13) (14)

EN ISO 9562

Treatment of water-based liquid waste

Once every day

BAT 8. BAT is to monitor channelled emissions to air with at least the frequency given below, 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.

OUT OF SCOPE

APPLICABLE TO TREATMENT PLANTS

FUNCTION OF FACILITY IS THAT OF A WASTE FORWARDING NATURE

treatment of solid and/or pasty waste (18)

BAT 9. BAT is to monitor diffuse emissions of organic compounds to air from the regeneration of spent solvents, the decontamination of equipment containing POPs with solvents, and the physico-chemical treatment of solvents for the recovery of their calorific value, at least once per year using one or a combination of the techniques given below.

OUT OF SCOPE

NO TREATMENT OF SOLID OR PASTY WASTE OR RECOVERY ON SITE

BAT 10. BAT is to periodically monitor odour emissions.

NO TREATMENT ON SITE AND SEALED CONTAINMENT ENSURES NO EMISSIONS OF ODOUR. SIZE AND SCALE OF ANY ON SITE PROCESSING RESTRICTED TO DRYING OF KNOWN SLUDGES AND ACCEPTANCE PROTOCOLS MITIGATE ODOUR RISKS

BAT 11. BAT is to monitor the annual consumption of water, energy and raw materials as well as the annual generation of residues and waste water, with a frequency of at least once per year.

Description

Monitoring includes direct measurements, calculation or recording, e.g. using suitable meters or invoices. The monitoring is broken down at the most appropriate level (e.g. at process or plant/installation level) and considers any significant changes in the plant/installation.

OUT OF SCOPE WITH EXCEPTIONS

Water consumed for washing of equipment is from rain water collected since no supply of water was available until year 2018. Substantial rain water storage and renewable energy (Solar) PV installation substantially create self-sufficency. Mains water are used for personal hygiene only (kitchen, showers and lavatories).

Not viable to recycle the rain water since discharged waste water ensures capacity exists in reservoir for fresh rainfall.

No mains drainage either. WSC monitors all Cesspit discharge.

1.3. Emissions to air

NEGLIGIBLE AND OUT OF SCOPE

Limited to vehicles which undergo VRT and occasional use of Generator.

BAT 12. In order to prevent or, where that is not practicable, to reduce odour emissions, 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 and timelines;

a protocol for conducting odour monitoring as set out in BAT 10;

a protocol for response to identified odour incidents, e.g. complaints;

an odour prevention and reduction programme designed to identify the source(s); 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 is expected and/or has been substantiated.

OUT OF SCOPE. However in the event new equipment is brought in, management has already accounted for potential odour management aspects both of temporarily stored materials and also the processing facility itself.

BAT 13. In order to prevent or, where that is not practicable, to reduce odour 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 of (potentially) odorous waste in 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.

Only applicable to open systems.

b. Using chemical treatment

Using chemicals to destroy or to reduce the formation of odorous compounds (e.g. to oxidise or to precipitate hydrogen sulphide).

Not applicable if it may hamper the desired output quality.

c. Optimising aerobic treatment

In the case of aerobic treatment of water-based liquid waste, it may include:

use of pure oxygen;

removal of scum in tanks;

frequent maintenance of the aeration system.

In the case of aerobic treatment of waste other than water-based liquid waste, see BAT 36.

Generally applicable.

OUT OF SCOPE. However acceptance protocols and minimization of storage time frames of any sealed contained hazardous waste on site is ensured through proper logistics scheduling.

BAT 14. 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 an appropriate combination of the techniques given below.

Depending on the risk posed by the waste in terms of diffuse emissions to air, BAT 14d is especially relevant.

Technique

Description

Applicability

a. Minimising the number of potential diffuse emission sources

This includes techniques such as:

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 gravity transfer rather than using pumps;

limiting the drop height of material;

limiting traffic speed;

using wind barriers.

Generally applicable.

NOT RELEVANT in context of operations.

b. Selection and use of high-integrity equipment

This includes techniques such as:

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;

appropriate service hose access ports, piercing pliers, drill heads, e.g. when degassing WEEE containing VFCs and/or VHCs.

Applicability may be restricted in the case of existing plants due to operability requirements.

NOT RELEVANT

c. Corrosion prevention

This includes techniques such as:

appropriate selection of construction materials;

lining or coating of equipment and painting of pipes with corrosion inhibitors.

Generally applicable.

NOT RELEVANT

d. Containment, collection and treatment of diffuse emissions

This includes techniques such as: storing, treating and handling waste and material that may generate diffuse emissions in enclosed buildings and/or enclosed equipment (e.g. conveyor belts);

maintaining the enclosed equipment or buildings under an adequate pressure;

collecting and directing the emissions to an appropriate abatement system (see Section 6.1) via an air extraction system and/or air suction systems close to the emission sources.

The use of enclosed equipment or buildings may be restricted by safety considerations such as the risk of explosion or oxygen depletion.

The use of enclosed equipment or buildings may also be constrained by the volume of waste.

NOT RELEVANT

e. Dampening

Dampening potential sources of diffuse dust emissions (e.g. waste storage, traffic areas, and open handling processes) with water or fog.

Generally applicable.

NOT RELEVANT SINCE WASTE ALWAYS CONTAINED

f. Maintenance

This includes techniques such as:

ensuring access to potentially leaky equipment;

regularly controlling protective equipment such as lamellar curtains, fast-action doors.

Generally applicable.

NOT RELEVANT

g. Cleaning of waste treatment and storage areas

This includes techniques such as regularly cleaning the whole waste treatment area (halls, traffic areas, storage areas, etc.), conveyor belts, equipment and containers.

YES **Areas where any spills result are instantly addressed on identification of issue.**

h. Leak detection and repair (LDAR) programme

See Section 6.2. When emissions of organic compounds are expected, a LDAR programme is set up and implemented using a risk-based approach, considering in particular the design of the plant and the amount and nature of the organic compounds concerned.

Generally applicable.

NOT RELEVANT

BAT 15. BAT is to use flaring only for safety reasons or for non-routine operating conditions (e.g. start-ups, shutdowns) by using both of the techniques given below.

NOT RELEVANT

BAT 16. In order to reduce emissions to air from flares when flaring is unavoidable, BAT is to use both of the techniques given below.

NOT RELEVANT

BAT 17. In order to prevent or, where that is not practicable, to reduce noise and vibration emissions, BAT is to set up, implement and regularly review a noise and vibration management plan, as part of the environmental management system (see BAT 1), that includes all of the following elements:

NOT RELEVANT. ONLY APPLICABLE IF NEW EQUIPMENT IS INSTALLED AND DUE CONSIDERATION SHALL BE GIVEN.

I. a protocol containing appropriate actions and timelines;
II. a protocol for conducting noise and vibration monitoring;
III. a protocol for response to identified noise and vibration events, e.g. complaints;
IV. a noise and vibration reduction programme designed to identify the source(s), to measure/estimate noise and vibration exposure, to characterise the contributions of the sources and to implement prevention and/or reduction measures.

Applicability

The applicability is restricted to cases where a noise or vibration nuisance at sensitive receptors is expected and/or has been substantiated.

BAT 18. In order to prevent or, where that is not practicable, to reduce noise and vibration emissions, BAT is to use one or a combination of the techniques given below.

NOT RELEVANT. SAME AS BAT 17. However Generator system is used only during the day and has a noise reduction system in place. Whereas the shredder

noise level is very low since it is not a large shredder. Shredder located in a shed to minimize noise pollution. The isolated location of the site also reduces the disturbance to third parties.

Technique

Description

Applicability

a. Appropriate location of equipment and buildings

Noise levels can be reduced by increasing the distance between the emitter and the receiver, by using buildings as noise screens and by relocating building exits or entrances.

For existing plants, the relocation of equipment and building exits or entrances may be restricted by a lack of space or excessive costs.

b.Operational measures

This includes techniques such as:

(i) inspection and maintenance of equipment;
(ii) closing of doors and windows of enclosed areas, if possible;
(iii) equipment operation by experienced staff;
(iv) avoidance of noisy activities at night, if possible;
(v) provisions for noise control during maintenance, traffic, handling and treatment activities.

Generally applicable.

b. Low-noise equipment
c. This may include direct drive motors, compressors, pumps and flares.
d. Noise and vibration control equipment

This includes techniques such as:

(i) noise reducers;
(ii) acoustic and vibrational insulation of equipment;
(iii) enclosure of noisy equipment;
(iv) soundproofing of buildings.

Applicability may be restricted by a lack of space (for existing plants).

e. Noise attenuation

Noise propagation can be reduced by inserting obstacles between emitters and receivers (e.g. protection walls, embankments and buildings).

Applicable only to existing plants, as the design of new plants should make this technique unnecessary. For existing plants, the insertion of obstacles may be restricted by a lack of space.

For mechanical treatment in shredders of metal wastes, it is applicable within the constraints associated with the risk of deflagration in shredders.

1.5. Emissions to water

BAT 19. 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 water, BAT is to use an appropriate combination of the techniques given below.

COMMENT

Limited scope. Water supply from Water services corporation mains supply is limited to personal hygiene for employees. Only renewable source used (rain) used for washing of bins. Cesspit connected to drain channels ensures water collection in areas where risk of contamination exists is contained. This is also supported by concrete liners.

No recirculation necessary due to limited use of water and need to create capacity for new rainfall.

Technique

Description

Applicability

a. Water management

Water consumption is optimised by using measures which may include:

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.

b. Water recirculation

Water streams are recirculated within the plant, if necessary after treatment. The degree of recirculation is limited by the water balance of the plant, the content of impurities (e.g. odorous compounds) and/or the characteristics of the water streams (e.g. nutrient content).

Generally applicable.

N/A at present.

c. Impermeable surface. Depending on the risks posed by the waste in terms of soil and/or water contamination, the surface of the whole waste treatment area (e.g. waste reception, handling, storage, treatment and dispatch areas) is made impermeable to the liquids concerned.

Generally applicable.

YES. Facility surface lined. All areas are concreted and impermeable. General ongoing maintenance ensures that surfaces are kept in optimal condition.

d. Techniques to reduce the likelihood and impact of overflows and failures from tanks and vessels
Depending on the risks posed by the liquids contained in tanks and vessels in terms of soil and/or water contamination, this includes techniques such as:
overflow detectors;
overflow pipes that are directed to a contained drainage system (i.e. the relevant secondary containment or another vessel);
tanks for liquids that 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;
isolation of tanks, vessels and secondary containment (e.g. closing of valves).
Generally applicable.

e. Roofing of waste storage and treatment areas

Depending on the risks posed by the waste in terms of soil and/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).

YES.. Area for storage of hazardous waste is covered. Whereas no metal shredding or other processing of materials which could lead to risks associated with water contamination exists in the non-hazardous aspects.

f. Segregation of water streams

Each water stream (e.g. surface run-off water, process water) is collected and treated separately, based on the pollutant content and on the combination of treatment techniques. In particular, uncontaminated waste water streams are segregated from waste water streams that require treatment.

Generally applicable to new plants.

Generally applicable to existing plants within the constraints associated with the layout of the water collection system.

Yes

Already in place. Oil water separator being upgraded . Channels for water flow from rainfall have sieves to collect any solid particles. These are regularly maintained.

g. Adequate drainage infrastructure

The waste treatment area is connected to drainage infrastructure.

Rainwater falling on the treatment and storage areas is collected in the drainage infrastructure along with washing water, occasional spillages, etc. and, depending on the pollutant content, recirculated or sent for further treatment.

Generally applicable to new plants.

Generally applicable to existing plants within the constraints associated with the layout of the water drainage system.

Yes

Already in place

h. Design and maintenance provisions to allow detection and repair of leaks

Regular monitoring for potential leakages is risk-based, and, when necessary, equipment is repaired.

The use of underground components is minimised. When underground components are used, and depending on the risks posed by the waste contained in those components in terms of soil and/or water contamination, secondary containment of underground components is put in place.

The use of above-ground components is generally applicable to new plants. It may be limited however by the risk of freezing.

The installation of secondary containment may be limited in the case of existing plants.

NOT APPLICABLE OTHER THAN BUNDS AND DRAINAGE CHANNELS WHICH ARE REGULARLY VISUALLY INSPECTED AND CHECKED FOR SEAL

i. Appropriate buffer storage capacity

Appropriate buffer storage capacity is provided for waste water generated during other than normal operating conditions using a risk-based approach (e.g. taking into account the nature of the pollutants, the effects of downstream waste water treatment, and the receiving environment).

The discharge of waste water from this buffer storage is only possible after appropriate measures are taken (e.g. monitor, treat, reuse).

Generally applicable to new plants.

For existing plants, applicability may be limited by space availability and by the layout of the water collection system.

BAT 20. In order to reduce emissions to water, BAT is to treat waste water using an appropriate combination of the techniques given below.

LIMITED APPLICABILITY

Any products treated on-site are temporarily stored for forwarding to final destination. It may be desirable to neutralize highly acidic or alkaline materials to reduce risks in transit or necessity to process. To this end, when specific "pure" chemicals are treated, an ad hoc approach is taken to ascertain the Best Available Technique to be applied. In general, a highly predictable and certain

chemical output is resulting when a very specific neutralization reaction is required and performed. For this reason and when required, Chemical process consultancy for very simple processes is available in a quasi-inhouse situation.

Technique (23)

Typical pollutants targeted

Applicability

Preliminary and primary treatment, e.g.

a. Equalisation

All pollutants

Generally applicable.

b. Neutralisation

Acids, alkalis

LIMITED SCOPE

c. Physical separation, e.g. screens, sieves, grit separators, grease separators, oil-water separation or primary settlement tanks

Gross solids, suspended solids, oil/grease

Physico-chemical treatment, e.g.

d. Adsorption

Adsorbable dissolved non-biodegradable or inhibitory pollutants, e.g. hydrocarbons, mercury, AOX

Generally applicable.

e. Distillation/rectification

Dissolved non-biodegradable or inhibitory pollutants that can be distilled, e.g. some solvents

f. Precipitation

Precipitable dissolved non-biodegradable or inhibitory pollutants, e.g. metals, phosphorus

g. Chemical oxidation

Oxidisable dissolved non-biodegradable or inhibitory pollutants, e.g. nitrite, cyanide

h. Chemical reduction

Reducible dissolved non-biodegradable or inhibitory pollutants, e.g. hexavalent chromium (Cr(VI))

i. Evaporation

Soluble contaminants

j. Ion exchange

Ionic dissolved non-biodegradable or inhibitory pollutants, e.g. metals

k. Stripping

Purgeable pollutants, e.g. hydrogen sulphide (H2S), ammonia (NH3), some adsorbable organically bound halogens (AOX), hydrocarbons

Biological treatment, e.g.

l. Activated sludge process

Biodegradable organic compounds

Generally applicable.

m. Membrane bioreactor

Nitrogen removal

n. Nitrification/denitrification when the treatment includes a biological treatment

   Total nitrogen, ammonia

   Nitrification may not be applicable in the case of high chloride concentrations (e.g. above 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).

   Solids removal, e.g.

o. Coagulation and flocculation Suspended solids and particulate-bound metals

Generally applicable.

p. Sedimentation
q. Filtration (e.g. sand filtration, microfiltration, ultrafiltration)
r. Flotation

Table 6.1

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

Substance/Parameter

BAT-AEL (24)

Waste treatment process to which the BAT-AEL applies

Total organic carbon (TOC) (25)

10-60 mg/l

All waste treatments except treatment of water-based liquid waste

10-100 mg/l (26) (27)

Treatment of water-based liquid waste

Chemical oxygen demand (COD) (25)

30-180 mg/l

All waste treatments except treatment of water-based liquid waste

30-300 mg/l (26) (27)

Treatment of water-based liquid waste

Total suspended solids (TSS)

5-60 mg/l

All waste treatments

Hydrocarbon oil index (HOI)

0,5-10 mg/l

Mechanical treatment in shredders of metal waste

Treatment of WEEE containing VFCs 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

Total nitrogen (Total N)

1-25 mg/l (28) (29)

Biological treatment of waste

Re-refining of waste oil

10-60 mg/l (28) (29) (30)

Treatment of water-based liquid waste

Total phosphorus (Total P)

0,3-2 mg/l

Biological treatment of waste

1-3 mg/l (27)

Treatment of water-based liquid waste

Phenol index

0,05-0,2 mg/l

Re-refining of waste oil

Physico-chemical treatment of waste with calorific value

0,05-0,3 mg/l

Treatment of water-based liquid waste

Free cyanide (CN-) (31)

0,02-0,1 mg/l

Treatment of water-based liquid waste

Adsorbable organically bound halogens (AOX) (31)

0,2-1 mg/l

Treatment of water-based liquid waste

Metals and metalloids (31)

Arsenic (expressed as As)

0,01-0,05 mg/l

Mechanical treatment in shredders of metal waste

Treatment of WEEE containing VFCs and/or VHCs

Mechanical biological treatment of waste

Re-refining of waste oil

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

Cadmium (expressed as Cd)

0,01-0,05 mg/l

Chromium (expressed as Cr)

0,01-0,15 mg/l

Copper (expressed as Cu)

0,05-0,5 mg/l

Lead (expressed as Pb)

0,05-0,1 mg/l (32)

Nickel (expressed as Ni)

0,05-0,5 mg/l

Mercury (expressed as Hg)

0,5-5 µg/l

Zinc (expressed as Zn)

0,1-1 mg/l (33)

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

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

Mercury (expressed as Hg)

1-10 µg/l

Zinc (expressed as Zn)

0,1-2 mg/l

The associated monitoring is given in BAT 7.

OUT OF SCOPE FOR ALL

Table 6.2

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

Substance/Parameter

BAT-AEL (34) (35)

Waste treatment process to which the BAT-AEL applies

Hydrocarbon oil index (HOI)

0,5-10 mg/l

Mechanical treatment in shredders of metal waste

Treatment of WEEE containing VFCs 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

Free cyanide (CN^-) (36)

0,02-0,1 mg/l

Treatment of water-based liquid waste

Adsorbable organically bound halogens (AOX) (36)

0,2-1 mg/l

Treatment of water-based liquid waste

Metals and metalloids (36)

Arsenic (expressed as As)

0,01-0,05 mg/l

Mechanical treatment in shredders of metal waste

Treatment of WEEE containing VFCs and/or VHCs

Mechanical biological treatment of waste

Re-refining of waste oil

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

Cadmium (expressed as Cd)

0,01-0,05 mg/l

Chromium (expressed as Cr)

0,01-0,15 mg/l

Copper (expressed as Cu)

0,05-0,5 mg/l

Lead (expressed as Pb)

0,05-0,1 mg/l (37)

Nickel (expressed as Ni)

0,05-0,5 mg/l

Mercury (expressed as Hg)

0,5-5 µg/l

Zinc (expressed as Zn)

0,1-1 mg/l (38)

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

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

Mercury (expressed as Hg)

1-10 µg/l

Zinc (expressed as Zn)

0,1-2 mg/l

The associated monitoring is given in BAT 7.

1.6. Emissions from accidents and incidents

LIMITED SCOPE. THE FOCUS IS ON ENSURING ACCIDENTS ARE PREVENTED AND ANY SCALE OF ACCIDENT REDUCED IN SIZE THROUGH MANAGEMENT OF WASTE VOLUMES ON SITE. FURTHERMORE MINIMIZATION OF ACTIVITIES ON SITE FURTHER LIMITS RISKS.

BAT 21. In order to prevent or limit the environmental consequences of accidents and incidents, BAT is to use all of the techniques given below, as part of the accident management plan (see BAT 1).

YES Plan and equipment in place in context necessary and suited to the scale and scope of the facility. Feedback look to limit and avoid recurrences.

Technique

Description

a. Protection measures

These include measures such as:

protection of the plant against malevolent acts;

fire and explosion protection system, containing equipment for prevention, detection, and extinction;

accessibility and operability of relevant control equipment in emergency situations.

b. Management of incidental/accidental emissions

Procedures are established and technical provisions are in place to manage (in terms of possible containment) emissions from accidents and incidents such as emissions from spillages, firefighting water, or safety valves.

c. Incident/accident registration and assessment system

This includes techniques such as:

a log/diary to record all accidents, incidents, changes to procedures and the findings of inspections;

procedures to identify, respond to and learn from such incidents and accidents.

1.7. Material efficiency

BAT 22. In order to use materials efficiently, BAT is to substitute materials with waste..

NO.

Not Meaningful in context of facility. Sourcing recycled or "spent" chemicals for a neutralization process adds a complexity which is unnecessary given the need for such services is very rare and volumes handled negligible. Would be considered "ad hoc" in the event a larger quantity or situation exists which necessitates action which could have a meaningful environmental impact mitigation.

Description

Waste is used instead of other materials for the treatment of wastes (e.g. waste alkalis or waste acids are used for pH adjustment, fly ashes are used as binders).

Applicability

Some applicability limitations derive from the risk of contamination posed by the presence of impurities (e.g. heavy metals, POPs, salts, pathogens) in the waste that substitutes other materials. Another limitation is the compatibility of the waste substituting other materials with the waste input (see BAT 2).

1.8. Energy efficiency

BAT 23. In order to use energy efficiently, BAT is to use both of the techniques given below.

YES

RENEWABLE ENERGY LARGELY USED. Measures to address increased efficiency in the fleet are being considered. Very limited scope for meaningful

improvements on site in terms of energy consumption which on a net basis is very low. Data readily available and metrics could be utilized to deliver to clients an actual CO2 footprint on waste management. But currently not in place. Fleet has all been changed to Euro V.

Technique

Description

a. Energy efficiency plan

An energy efficiency plan entails defining and calculating the specific energy consumption of the activity (or activities), setting key performance indicators on an annual basis (for example, specific energy consumption expressed in kWh/tonne of waste processed) and planning periodic improvement targets and related actions. The plan is adapted to the specificities of the waste treatment in terms of process(es) carried out, waste stream(s) treated, etc.

b. Energy balance record

An energy balance record provides a breakdown of the energy consumption and generation (including exportation) by the type of source (i.e. electricity, gas, conventional liquid fuels, conventional solid fuels, and waste). This includes:

(i) nformation on energy consumption in terms of delivered energy;
(ii) information on energy exported from the installation;
(iii) energy flow information (e.g. Sankey diagrams or energy balances) showing how the energy is used throughout the process.

The energy balance record is adapted to the specificities of the waste treatment in terms of process(es) carried out, waste stream(s) treated, etc.

1.9. Reuse of packaging

BAT 24. In order to reduce the quantity of waste sent for disposal, BAT is to maximise the reuse of packaging, as part of the residues management plan (see BAT 1).

LIMITED SCOPE

Not Official, but in Practice yes. Management always favours Eco friendly measures. Pallets, carton, drums and IBCs for example are reused if deemed

suitable. No reporting is presently in place but the company has always adopted a policy which supports a high reusability and repurposing of containers and packaging. A formalization of this BAT 24 is in progress whereas in practice reusability /suitability is determined on an ad hoc basis based on prior use and potential application.

Some materials which are non-hazardous in nature are recycled or repurposed.

Description

Packaging (drums, containers, IBCs, pallets, etc.) is reused for containing waste, when it is in good condition and sufficiently clean, depending on a compatibility check between the substances contained (in consecutive uses). If necessary, packaging is sent for appropriate treatment prior to reuse (e.g. reconditioning, cleaning).

Applicability

Some applicability restrictions derive from the risk of contamination of the waste posed by the reused packaging.

2. BAT CONCLUSIONS FOR THE MECHANICAL TREATMENT OF WASTE

Unless otherwise stated, the BAT conclusions presented in Section 2 apply to the mechanical treatment of waste when it is not combined with biological treatment, and in addition to the general BAT conclusions in Section 1.

2.1. General BAT conclusions for the mechanical treatment of waste

2.1.1. Emissions to air

BAT 25. In order to reduce emissions to air of dust, and of particulate-bound metals, PCDD/F and dioxin-like PCBs, BAT is to apply BAT 14d and to use one or a combination of the techniques given below.

NOT APPLIABLE IN TERMS OF PLANT SCOPE OF USE OF SHREDDER

Technique

Description

Applicability

a. Cyclone

See Section 6.1.

Cyclones are mainly used as preliminary separators for coarse dust.

Generally applicable.

b. Fabric filter

See Section 6.1.

May not be applicable to exhaust air ducts directly connected to the shredder when the effects of deflagration on the fabric filter cannot be mitigated (e.g. by using pressure relief valves).

c. Wet scrubbing

See Section 6.1.

Generally applicable.

d. Water injection into the shredder

The waste to be shredded is damped by injecting water into the shredder. 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 shredder motor).The waste gas that contains residual dust is directed to cyclone(s) and/or a wet scrubber. Only applicable within the constraints associated with local conditions (e.g. low temperature, drought).

Table 6.3

BAT-associated emission level (BAT-AEL) for channelled dust emissions to air from the mechanical treatment of waste

Parameter

Unit

BAT-AEL

(Average over the sampling period)

Dust

mg/Nm3

2-5 (39)

The associated monitoring is given in BAT 8.

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.

2.2.1. Overall environmental performance

NOT APPLIABLE IN TERMS OF PLANT SCOPE OF USE OF SHREDDER

BAT 26. In order to improve the overall environmental performance, and to prevent emissions due to accidents and incidents, BAT is to use BAT 14g and all of the techniques given below:

(a) implementation of a detailed inspection procedure for baled waste before shredding;
(b) removal of dangerous items from the waste input stream and their safe disposal (e.g. gas cylinders, non-depolluted EoLVs, non-depolluted WEEE, items contaminated with PCBs or mercury, radioactive items);
(c) (treatment of containers only when accompanied by a declaration of cleanliness.

2.2.2. Deflagrations

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

OUT OF SCOPE. Since no metal waste processed on site, ex.aerosols or gas containers, this item is not directly a risk. Since only wood, paper and plastic which is adequately checked and manually sorted prior to processing could be shredded, the prevention is a direct consequence of other internal procedures.

Technique

Description

Applicability

a. Deflagration management plan

This includes:

a deflagration reduction programme designed to identify the source(s), and to implement 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;

a review of historical deflagration incidents and remedies and the dissemination of deflagration knowledge;

a protocol for response to deflagration incidents.

Generally applicable.

b. Pressure relief dampers

Pressure relief dampers are installed to relieve pressure waves coming from deflagrations that would otherwise cause major damage and subsequent emissions.

c. Pre-shredding

Use of a low-speed shredder 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.

2.2.3. Energy efficiency

BAT 28. In order to use energy efficiently, BAT is to keep the shredder feed stable.

YES. **Employee training for shredder use.**

Description

The shredder feed is equalised by avoiding disruption or overload of the waste feed which would lead to unwanted shutdowns and start-ups of the shredder.

2.3. BAT conclusions for the treatment of WEEE containing VFCs and/or VHCs

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

2.3.1. Emissions to air

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 14d, BAT 14h and to use technique a. and one or both of the techniques b. and c. given below.

NO PROCESSING ON SITE SO NOT APPLICABLE.

Technique

Description

a. 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 does not drip).

b. Cryogenic condensation

Waste gas containing organic compounds such as VFCs/VHCs is sent to a cryogenic condensation unit where they are liquefied (see description in Section 6.1). The liquefied gas is stored in pressurised vessels for further treatment.

c. Adsorption

Waste gas containing organic compounds such as VFCs/VHCs is led into adsorption systems (see description in Section 6.1). The spent activated carbon is regenerated by means of heated air pumped into the filter to desorb the organic compounds. Subsequently, the regeneration waste gas is compressed and cooled in order to liquefy the organic compounds (in some cases by cryogenic condensation). The liquefied gas is then stored in pressurised vessels. The remaining waste gas from the compression stage is usually led back into the adsorption system in order to minimise VFC/VHC emissions.

Table 6.4

BAT-associated emission levels (BAT-AELs) for channelled TVOC and CFC emissions to air from the treatment of WEEE containing VFCs and/or VHCs

Parameter

Unit

BAT-AEL

(Average over the sampling period)

TVOC

mg/Nm3

3-15

CFCs

mg/Nm3

0,5-10

The associated monitoring is given in BAT 8.

2.3.2. Explosions

BAT 30. In order to prevent emissions due to explosions when treating WEEE containing VFCs and/or VHCs, BAT is to use either of the techniques given below

NO SUCH TREATMENT ON SITE

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 explosive limit.

2.4. BAT conclusions for the mechanical treatment of waste with calorific value

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.

2.4.1. Emissions to air

BAT 31. In order to reduce emissions to air of organic compounds, BAT is to apply BAT 14d and to use one or a combination of the techniques given below.

NO SUCH RELEVANT ACTIVITIES ON SITE

Technique

Description

a. Adsorption

See Section 6.1.

b. Biofilter
c. Thermal oxidation
d. Wet scrubbing

Table 6.5

BAT-associated emission level (BAT-AEL) for channelled TVOC emissions to air from the mechanical treatment of waste with calorific value

Parameter

Unit

BAT-AEL

(Average over the sampling period)

TVOC

mg/Nm3

10-30 (40)

The associated monitoring is given in BAT 8.

2.5. BAT conclusions for the mechanical treatment of 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.

2.5.1. Emissions to air

BAT 32. In order to reduce mercury emissions to air, BAT is to collect mercury emissions at source, to send them to abatement and to carry out adequate monitoring.

NO SUCH RELEVANT ACTIVITIES ON SITE

Description

This includes all of the following measures:

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

waste gas from the processes is treated by dedusting techniques such as cyclones, fabric filters, and HEPA filters, followed by adsorption on activated carbon (see Section 6.1);

the efficiency of the waste gas treatment is monitored;

mercury levels in the treatment and storage areas are measured frequently (e.g. once every week) to detect potential mercury leaks.

Table 6.6

BAT-associated emission level (BAT-AEL) for channelled mercury emissions to air from the mechanical treatment of WEEE containing mercury

Parameter

Unit

BAT-AEL

(Average over the sampling period)

Mercury (Hg)

µg/Nm3

2-7

The associated monitoring is given in BAT 8.

3. BAT CONCLUSIONS FOR THE BIOLOGICAL TREATMENT OF WASTE

Unless otherwise stated, the BAT conclusions presented in Section 3 apply to the biological treatment of waste, and in addition to the general BAT conclusions in Section 1. The BAT conclusions in Section 3 do not apply to the treatment of water-based liquid waste.

3.1. General BAT conclusions for the biological treatment of waste

3.1.1. Overall environmental performance

BAT 33. In order to reduce odour emissions and to improve the overall environmental performance, BAT is to select the waste input.

NOT APPLICABLE **NO ON-SITE BIOLOGICAL TREATMENT OF WASTE**

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 nutrient balance, moisture or toxic compounds which may reduce the biological activity.

3.1.2. Emissions to air

BAT 34. In order to reduce channelled emissions to air of dust, organic compounds and odorous compounds, including H_2S and NH_3, BAT is to use one or a combination of the techniques given below.

NOT APPLICABLE **NO ON-SITE BIOLOGICAL TREATMENT OF WASTE**

Technique

Description

a. Adsorption

See Section 6.1.

b. Biofilter

See Section 6.1.

A pretreatment of the waste gas before the biofilter (e.g. with a water or acid scrubber) may be needed in the case of a high NH_3 content (e.g. 5-40 mg/Nm^3) in order to control the media pH and to limit the formation of N_2O in the biofilter.

Some other odorous compounds (e.g. mercaptans, H_2S) can cause acidification of the biofilter media and necessitate the use of a water or alkaline scrubber for pretreatment of the waste gas before the biofilter.

c. Fabric filter

See Section 6.1. The fabric filter is used in the case of mechanical biological treatment of waste.

d. Thermal oxidation

See Section 6.1.

e. Wet scrubbing

See Section 6.1. Water, acid or alkaline scrubbers are used in combination with a biofilter, thermal oxidation or adsorption on activated carbon.

Table 6.7

BAT-associated emission levels (BAT-AELs) for channelled NH_3, odour, dust and TVOC emissions to air from the biological treatment of waste

Parameter

Unit

BAT-AEL

(Average over the sampling period)

Waste treatment process

NH_3 (41) (42)

mg/Nm^3

0,3-20

All biological treatments of waste

Odour concentration (41) (42)

ouE/Nm3

200-1 000

Dust

mg/Nm3

2-5

Mechanical biological treatment of waste

TVOC

mg/Nm3

5-40 (43)

The associated monitoring is given in BAT 8.

3.1.3. Emissions to water and water usage

BAT 35. In order to reduce the generation of waste water and to reduce water usage, BAT is to use all of the techniques given below.

NOT APPLICABLE

NO ON-SITE BIOLOGICAL TREATMENT OF WASTE

Technique

Description

Applicability

a. Segregation of water streams

Leachate seeping from compost piles and windrows is segregated from surface run-off water (see BAT 19f).

Generally applicable to new plants.

Generally applicable to existing plants within the constraints associated with the layout of the water circuits.

b. Water recirculation

Recirculating process water streams (e.g. from dewatering of liquid digestate in anaerobic processes) or using as much as possible other water streams (e.g. water condensate, rinsing water, surface run-off water). The degree of recirculation is limited by the water balance of the plant, the content of impurities (e.g. heavy metals, salts, pathogens, odorous compounds) and/or the characteristics of the water streams (e.g. nutrient content).

Generally applicable.

c. Minimisation of the generation of leachate

Optimising the moisture content of the waste in order to minimise the generation of leachate.

Generally applicable.

3.2. BAT conclusions for the aerobic treatment of waste

Unless otherwise stated, the BAT conclusions presented in this section apply to the aerobic treatment of waste, and in addition to the general BAT conclusions for the biological treatment of waste in Section 3.1.

3.2.1. Overall environmental performance

BAT 36. In order to reduce emissions to air and to improve the overall environmental performance, BAT is to monitor and/or control the key waste and process parameters.

NOT APPLICABLE **NO ON-SITE AEROBIC TREATMENT OF WASTE**

Description

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;

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.

Applicability

Monitoring of the 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.

3.2.2. Odour and diffuse emissions to air

BAT 37. 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.

NOT APPLICABLE

NO ON-SITE AEROBIC TREATMENT OF WASTE

Technique

Description

Applicability

a. Use of semipermeable membrane covers

Active composting windrows are covered by semipermeable membranes.

Generally applicable.

b. Adaptation of operations to the meteorological conditions

This includes techniques such as the following:

Taking 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 in the case of adverse meteorological conditions in terms of emissions dispersion (e.g. the wind speed is too low or too high, or the wind blows in the direction of sensitive receptors).

Orientating windrows, so that the smallest possible area of composting mass is exposed to the prevailing wind, to reduce the dispersion of pollutants from the windrow surface. The windrows and piles are preferably located at the lowest elevation within the overall site layout.

Generally applicable.

3.3. BAT conclusions for the anaerobic treatment of waste

Unless otherwise stated, the BAT conclusions presented in this section apply to the anaerobic treatment of waste, and in addition to the general BAT conclusions for the biological treatment of waste in Section 3.1.

3.3.1. Emissions to air

BAT 38. In order to reduce emissions to air and to improve the overall environmental performance, BAT is to monitor and/or control the key waste and process parameters.

NOT APPLICABLE **NO ON-SITE AEROBIC TREATMENT OF WASTE**

Description

Implementation of a manual and/or automatic monitoring system to:

ensure a stable digester operation;

minimise operational difficulties, such as foaming, which may lead to odour emissions;

provide sufficient early warning of system failures which may lead to a loss of containment and explosions.

This includes monitoring and/or control of key waste and process parameters, e.g.: pH and alkalinity of the digester feed;

digester operating temperature;

hydraulic and organic loading rates of the digester feed;

concentration of volatile fatty acids (VFA) and ammonia within the digester and digestate;

biogas quantity, composition (e.g. H2S) and pressure;

liquid and foam levels in the digester.

3.4. BAT conclusions for the mechanical biological treatment (MBT) of waste

Unless otherwise stated, the BAT conclusions presented in this section apply to MBT, and in addition to the general BAT conclusions for the biological treatment of waste in Section 3.1.

The BAT conclusions for the aerobic treatment (Section 3.2) and anaerobic treatment (Section 3.3) of waste apply, when relevant, to the mechanical biological treatment of waste.

3.4.1. Emissions to air

BAT 39. In order to reduce emissions to air, BAT is to use both of the techniques given below.

NOT APPLICABLE **NO ON-SITE AEROBIC TREATMENT OF WASTE**

Technique

Description

Applicability

a. Segregation of the waste gas streams

Splitting of the total waste gas stream into waste gas streams with a high pollutant content and waste gas streams with a low pollutant content, as identified in the inventory mentioned in BAT 3.

Generally applicable to new plants.

Generally applicable to existing plants within the constraints associated with the layout of the air circuits.

b. Recirculation of waste gas

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 34).

The use of waste gas in the biological process may be limited by the waste gas temperature and/or the pollutant content.

It may be necessary to condense the water vapour contained in the waste gas before reuse. In this case, cooling is necessary, and the condensed water is recirculated when possible (see BAT 35) or treated before discharge.

4. BAT CONCLUSIONS FOR THE PHYSICO-CHEMICAL TREATMENT OF WASTE

Unless otherwise stated, the BAT conclusions presented in Section 4 apply to the physico-chemical treatment of waste, and in addition to the general BAT conclusions in Section 1.

4.1. BAT conclusions for the physico-chemical treatment of solid and/or pasty waste

4.1.1. Overall environmental performance

BAT 40. 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).

LIMITED SCOPE **The physico-chemical treatment of waste is limited to neutralizations and repackaging. Only where necessary to be ADR compliant.**

Description

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

content of organics, oxidising agents, metals (e.g. mercury), salts, odorous compounds;

H_2 formation potential upon mixing of flue-gas treatment residues, e.g. fly ashes, with water.

4.1.2. Emissions to air

BAT 41. In order to reduce emissions of dust, organic compounds and NH_3 to air, BAT is to apply BAT 14d and to use one or a combination of the techniques given below.

Technique

Description

a. Adsorption

See Section 6.1.

b. Biofilter
c. Fabric filter
d. Wet scrubbing

Table 6.8

BAT-associated emission level (BAT-AEL) for channelled emissions of dust to air from the physico-chemical treatment of solid and/or pasty waste

Parameter

Unit

BAT-AEL

(Average over the sampling period)

Dust

mg/Nm3

2-5

The associated monitoring is given in BAT 8.

4.2. BAT conclusions for the re-refining of waste oil

4.2.1. Overall environmental performance

BAT 42. 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).

NOT APPLICABLE

Description

Monitoring of the waste input in terms of content of chlorinated compounds (e.g. chlorinated solvents or PCBs).

BAT 43. In order to reduce the quantity of waste sent for disposal, BAT is to use one or both of the techniques given below.

NOT APPLICABLE

Technique

Description

a. Material recovery

Using the organic residues from vacuum distillation, solvent extraction, thin film evaporators, etc. in asphalt products, etc.

b. Energy recovery

Using the organic residues from vacuum distillation, solvent extraction, thin film evaporators, etc. to recover energy.

4.2.2. Emissions to air

BAT 44. In order to reduce emissions of organic compounds to air, BAT is to apply BAT 14d and to use one or a combination of the techniques given below.

NOT APPLICABLE

Technique

Description

a. Adsorption

See Section 6.1.

b. Thermal oxidation

See Section 6.1. This includes when the waste gas is sent to a process furnace or a boiler.

c. Wet scrubbing

See Section 6.1.

The BAT-AEL set in Section 4.5 applies.

The associated monitoring is given in BAT 8.

4.3. BAT conclusions for the physico-chemical treatment of waste with calorific value

4.3.1. Emissions to air

BAT 45. In order to reduce emissions of organic compounds to air, BAT is to apply BAT 14d and to use one or a combination of the techniques given below.

NOT APPLICABLE

Technique

Description

a. Adsorption

See Section 6.1

b. Cryogenic condensation
c. Thermal oxidation
d. Wet scrubbing

The BAT-AEL set in Section 4.5 applies.

The associated monitoring is given in BAT 8.

4.4. BAT conclusions for the regeneration of spent solvents

4.4.1. Overall environmental performance

BAT 46. In order to improve the overall environmental performance of the regeneration of spent solvents, BAT is to use one or both of the techniques given below.

NO RECOVERY OR REGENERATION OF SPENT SOLVENTS ON SITE

Technique

Description

Applicability

a. Material recovery

Solvents are recovered from the distillation residues by evaporation.

Applicability may be restricted when the energy demand is excessive with regards to the quantity of solvent recovered.

b. Energy recovery

The residues from distillation are used to recover energy.

Generally applicable.

4.4.2. Emissions to air

BAT 47. In order to reduce emissions of organic compounds to air, BAT is to apply BAT 14d and to use a combination of the techniques given below.

NO RECOVERY OR REGENERATION OF SPENT SOLVENTS ON SITE

Technique

Description

Applicability

a. Recirculation of process off-gases in a steam boiler

The process off-gases from the condensers are sent to the steam boiler supplying the plant.

May not be applicable to the treatment of halogenated solvent wastes, in order to avoid generating and emitting PCBs and/or PCDD/F.

b. Adsorption

See Section 6.1.

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).

c. Thermal oxidation

See Section 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.

d. Condensation or cryogenic condensation

See Section 6.1.

Generally applicable.

e. Wet scrubbing

See Section 6.1.

Generally applicable.

The BAT-AEL set in Section 4.5 applies.

The associated monitoring is given in BAT 8.

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

NO RE-REFINING OF WASTE OIL, THE PHYSICO-CHEMICAL TREATMENT OF WASTE WITH CALORIFIC VALUE AND THE REGENERATION OF SPENT SOLVENTS ON SITE

Table 6.9

BAT-associated emission level (BAT-AEL) for channelled emissions of TVOC to air from the re-refining of waste oil, the physico-chemical treatment of waste with calorific value and the regeneration of spent solvents

Parameter

Unit

BAT-AEL (44)

(Average over the sampling period)

TVOC

mg/Nm3

5-30

4.6. BAT conclusions for the thermal treatment of spent activated carbon, waste catalysts and excavated contaminated soil

4.6.1. Overall environmental performance

BAT 48. In order to improve the overall environmental performance of the thermal treatment of spent activated carbon, waste catalysts and excavated contaminated soil, BAT is to use all of the techniques given below.

No thermal treatment of spent activated carbon, waste catalysts and excavated contaminated soil on site

Technique

Description

Applicability

a. Heat recovery from the furnace off-gas

Recovered heat may be used, for example, for preheating of combustion air or for the generation of steam, which is also used in the reactivation of the spent activated carbon.

Generally applicable.

b. Indirectly fired furnace

An indirectly fired furnace is used to avoid contact between the contents of the furnace and the flue-gases from the burner(s).

Indirectly fired furnaces are normally constructed with a metal tube and applicability may be restricted due to corrosion problems.

There may be also economic restrictions for retrofitting existing plants.

c. Process-integrated techniques to reduce emissions to air

This includes techniques such as:

control of the furnace temperature and of the rotation speed of the rotary furnace;

choice of fuel;

use of a sealed furnace or operation of the furnace at a reduced pressure to avoid diffuse emissions to air.

Generally applicable.

4.6.2. Emissions to air

BAT 49. In order to reduce emissions of HCl, HF, dust and organic compounds to air, BAT is to apply BAT 14d and to use one or a combination of the techniques given below.

No thermal treatment of spent activated carbon, waste catalysts and excavated contaminated soil on site

Technique

Description

a. Cyclone

See Section 6.1. The technique is used in combination with further abatement techniques.

b. Electrostatic precipitator (ESP)

See Section 6.1.

c. Fabric filter
d. Wet scrubbing

e. Adsorption
f. Condensation
g. Thermal oxidation (45)

The associated monitoring is given in BAT 8.

4.7. BAT conclusions for the water washing of excavated contaminated soil

4.7.1. Emissions to air

BAT 50. In order to reduce emissions of dust and organic compounds to air from the storage, handling, and washing steps, BAT is to apply BAT 14d and to use one or a combination of the techniques given below.

No Water washing of contaminated soil on site.

Technique

Description

a. Adsorption

See Section 6.1.

b. Fabric filter
c. Wet scrubbing

The associated monitoring is given in BAT 8.

4.8. BAT conclusions for the decontamination of equipment containing PCBs

4.8.1. Overall environmental performance

BAT 51. In order to improve the overall environmental performance and to reduce channelled emissions of PCBs and organic compounds to air, BAT is to use all of the techniques given below.

No decontamination of equipment containing PCBs on site

Technique

Description

a. Coating of the storage and treatment areas

This includes techniques such as: resin coating applied to the concrete floor of the whole storage and treatment area.

b. Implementation of staff access rules to prevent dispersion of contamination

This includes techniques such as:

access points to storage and treatment areas are locked;

special qualification is required to access the area where the contaminated equipment is stored and handled;

separate ‘clean’ and ‘dirty’ cloakrooms to put on/remove individual protective outfit.

c. Optimised equipment cleaning and drainage

This includes techniques such as:

external surfaces of the contaminated equipment are cleaned with anionic detergent;

emptying of the equipment with a pump or under vacuum instead of gravity emptying;

procedures are defined and used for filling, emptying and (dis)connecting the vacuum vessel;

a long period of drainage (at least 12 hours) is ensured to avoid any dripping of contaminated liquid during further treatment operations, after the separation of the core from the casing of an electrical transformer.

d. Control and monitoring of emissions to air

This includes techniques such as:

the air of the decontamination area is collected and treated with activated carbon filters;

the exhaust of the vacuum pump mentioned in technique c. above is connected to an end-of-pipe abatement system (e.g. a high-temperature incinerator, thermal oxidation or adsorption on activated carbon);

the channelled emissions are monitored (see BAT 8);

the potential atmospheric deposition of PCBs is monitored (e.g. through physico-chemical measurements or biomonitoring).

e. Disposal of waste treatment residues

This includes techniques such as:

porous, contaminated parts of the electrical transformer (wood and paper) are sent to high-temperature incineration;

PCBs in the oils are destroyed (e.g. dechlorination, hydrogenation, solvated electron processes, high-temperature incineration).

f. Recovery of solvent when solvent washing is used

Organic solvent is collected and distilled to be reused in the process.

The associated monitoring is given in BAT 8.

5. BAT CONCLUSIONS FOR THE TREATMENT OF WATER-BASED LIQUID WASTE

Unless otherwise stated, the BAT conclusions presented in Section 5 apply to the treatment of water-based liquid waste, and in addition to the general BAT conclusions in Section 1.

5.1. Overall environmental performance

BAT 52. In order to improve the overall environmental performance, BAT is to monitor the waste input as part of the waste pre-acceptance and acceptance procedures (see BAT 2).

NO TREATMENT OF WATER-BASED LIQUID WASTE ON SITE

COMMENT: SUCH WASTE ACCEPTANCE PROTOCOL IS A PASSTHROUGH ACCEPTANCE OF FOREIGN OR LOCAL TREATMENT PARTNER. CLIENT PROVIDED SAMPLES ARE ANALYSED BY THE FINAL DESTINATION PARTNER. WASTE MAY OR MAY NOT BE RECEIVED ON SITE FOR TEMPORARY STORAGE.

Description

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

bioeliminability (e.g. BOD, BOD to COD ratio, Zahn-Wellens test, biological inhibition potential (e.g. inhibition of activated sludge));

feasibility of emulsion breaking, e.g. by means of laboratory-scale tests.

5.2. Emissions to air

BAT 53. In order to reduce emissions of HCl, NH3 and organic compounds to air, BAT is to apply BAT 14d and to use one or a combination of the techniques given below.

Technique

Description

a. Adsorption

See Section 6.1.

b. Biofilter
c. Thermal oxidation
d. Wet scrubbing

Table 6.10

BAT-associated emission levels (BAT-AELs) for channelled emissions of HCl and TVOC to air from the treatment of water-based liquid waste

Parameter

Unit

BAT-AEL (46)

(Average over the sampling period)

Hydrogen chloride (HCl)

mg/Nm3

1-5

TVOC

3-20 (47)

The associated monitoring is given in BAT 8.

6. DESCRIPTION OF TECHNIQUES

6.1. Channelled emissions to air

NO WASTE TREATMENT RELATED CHANNELLED EMISSIONS TO AIR ON SITE

Technique

Typical pollutant(s) abated

Description

Adsorption

Mercury, volatile organic compounds, hydrogen sulphide, odorous compounds

Adsorption is a heterogeneous reaction in which gas molecules are retained on a solid or liquid surface that prefers specific compounds to others and thus removes them from effluent streams. When the surface has adsorbed as much as it can, the adsorbent is replaced or the adsorbed content is desorbed as part of the regeneration of the adsorbent. When desorbed, the contaminants are usually at a higher concentration and can either be recovered or disposed of. The most common adsorbent is granular activated carbon.

Biofilter

Ammonia, hydrogen sulphide, volatile organic compounds, odorous compounds

The waste gas stream is passed through a bed of organic material (such as peat, heather, compost, root, tree bark, softwood and different combinations) or some inert material (such as clay, activated carbon, and polyurethane), where it is biologically oxidised by naturally occurring microorganisms into carbon dioxide, water, inorganic salts and biomass.

A biofilter is designed considering the type(s) of waste input. An appropriate bed material, e.g. in terms of water retention capacity, bulk density, porosity, structural integrity, is selected. Also important are an appropriate height and surface area of the filter bed. The biofilter is connected to a suitable ventilation and air circulation system in order to ensure a uniform air distribution through the bed and a sufficient residence time of the waste gas inside the bed.

Condensation and cryogenic condensation

Volatile organic compounds

Condensation is a technique that eliminates solvent vapours from a waste gas stream by reducing its temperature below its dew point. For cryogenic condensation, the operating temperature can be down to – 120 °C, but in practice it is often between – 40 °C and – 80 °C in the condensation device. Cryogenic condensation can cope with all VOCs and volatile inorganic pollutants, irrespective of their individual vapour pressures. The low temperatures applied allow for very high condensation efficiencies which make it well-suited as a final VOC emission control technique.

Cyclone

Dust

Cyclone filters are used to remove heavier particulates, which ‘fall out’ as the waste gases are forced into a rotating motion before they leave the separator.

Cyclones are used to control particulate material, primarily PM10.

Electrostatic precipitator (ESP)

Dust

Electrostatic precipitators operate such that particles are charged and separated under the influence of an electrical field. Electrostatic precipitators are capable of operating under a wide range of conditions. In a dry ESP, the collected material is mechanically removed (e.g. by shaking, vibration, compressed air), while in a wet ESP it is flushed with a suitable liquid, usually water.

Fabric filter

Dust

Fabric filters, often referred to as bag filters, are constructed from porous woven or felted fabric through which gases are passed to remove particles. The use of a fabric filter requires the selection of a fabric suitable for the characteristics of the waste gas and the maximum operating temperature.

HEPA filter

Dust

HEPA filters (high-efficiency particle air filters) are absolute filters. The filter medium consists of paper or matted glass fibre with a high packing density. The waste gas stream is passed through the filter medium, where particulate matter is collected.

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.

Wet scrubbing

Dust, volatile organic compounds, gaseous acidic compounds (alkaline scrubber), gaseous alkaline compounds (acid scrubber)

The removal of gaseous or particulate pollutants from a gas stream via mass transfer to a liquid solvent, often water or an aqueous solution. It may involve a chemical reaction (e.g. in an acid or alkaline scrubber). In some cases, the compounds may be recovered from the solvent.

6.2. Diffuse emissions of organic compounds to air

NO MEANINGFUL DIFFUSION OF EMISSIONS OF ORGANIC COMPOUNDS TO AIR ON SITE. ANY STORED MATERIALS ARE SEALED. ALSO QUANTITIES STORED ARE SMALL IN NUMBER AND WEIGHT

Leak detection and repair (LDAR) programme

Volatile organic compounds

A structured approach to reduce fugitive emissions of organic compounds by detection and subsequent repair or replacement of leaking components. Currently, sniffing (described by EN 15446) and optical gas imaging methods are available for the identification of leaks.

Sniffing method: The first step is the detection using hand-held organic compound analysers measuring the concentration adjacent to the equipment (e.g. using flame ionisation or photo-ionisation). The second step consists of enclosing the component in an impermeable bag to carry out a direct measurement at the source of the emission. This second step is sometimes replaced by mathematical correlation curves derived from statistical results obtained from a large number of previous measurements made on similar components.

Optical gas imaging methods: Optical imaging uses small lightweight hand-held cameras which enable the visualisation of gas leaks in real time, so that they appear as 'smoke' on a video recorder together with the normal image of the component concerned, to easily and rapidly locate significant organic compound leaks. Active systems produce an image with a back-scattered infrared laser light reflected on the component and its surroundings. Passive systems are based on the natural infrared radiation of the equipment and its surroundings.

Measurement of diffuse VOC emissions

Volatile organic compounds

Sniffing and optical gas imaging methods are described under leak detection and repair programme.

Full screening and quantification of emissions from the installation can be undertaken with an appropriate combination of complementary methods, e.g. Solar occultation flux (SOF) or Differential absorption LIDAR (DIAL) campaigns. These results can be used for trend evaluation over time, cross-checking and updating/validation of the ongoing LDAR programme.

Solar occultation flux (SOF): The technique is based on the recording and spectrometric Fourier Transform analysis of a broadband infrared or ultraviolet/visible sunlight spectrum along a given geographical itinerary, crossing the wind direction and cutting through VOC plumes.

Differential absorption LIDAR (DIAL): This is a laser-based technique using differential absorption LIDAR (light detection and ranging), which is the optical analogue of radio wave-based RADAR. The technique relies on the backscattering of laser beam pulses by atmospheric aerosols, and the analysis of the spectral properties of the returned light collected with a telescope.

6.3. Emissions to water

NO PROCESSES WHICH PRODUCE MEANINGFUL EMISSIONS TO WATER.

Technique

Typical pollutant(s) targeted

Description

Activated sludge process

Biodegradable organic compounds

The biological oxidation of dissolved organic pollutants with oxygen using the metabolism of microorganisms. In the presence of dissolved oxygen (injected as air or pure oxygen), the organic components are transformed into carbon dioxide, water or other metabolites and biomass (i.e. the activated sludge). The microorganisms are maintained in suspension in the waste water and the whole mixture is mechanically aerated. The activated sludge mixture is sent to a separation facility from where the sludge is recycled to the aeration tank.

Adsorption

Adsorbable dissolved non-biodegradable or inhibitory pollutants, e.g. hydrocarbons, mercury, AOX

Separation method in which compounds (i.e. pollutants) in a fluid (i.e. waste water) are retained on a solid surface (typically activated carbon).

Chemical oxidation

Oxidisable dissolved non-biodegradable or inhibitory pollutants, e.g. nitrite, cyanide

Organic compounds are oxidised to less harmful and more easily biodegradable compounds. Techniques include wet oxidation or oxidation with ozone or hydrogen peroxide, optionally supported by catalysts or UV radiation. Chemical oxidation is also used to degrade organic compounds causing odour, taste and colour and for disinfection purposes.

Chemical reduction

Reducible dissolved non-biodegradable or inhibitory pollutants, e.g. hexavalent chromium (Cr(VI))

Chemical reduction is the conversion of pollutants by chemical reducing agents into similar but less harmful or hazardous compounds.

Coagulation and flocculation

Suspended solids and particulate-bound metals

Coagulation and flocculation are used to separate suspended solids from waste water and are often carried out in successive steps. Coagulation is carried out by adding coagulants with charges opposite to those of the suspended solids. Flocculation is carried out by adding polymers, so that collisions of microfloc particles cause them to bond to produce larger flocs. The flocs formed are subsequently separated by sedimentation, air flotation or filtration.

Distillation/rectification

Dissolved non-biodegradable or inhibitory pollutants that can be distilled, e.g. some solvents

Distillation is a technique to separate compounds with different boiling points by partial evaporation and recondensation.

Waste water distillation is the removal of low-boiling contaminants from waste water by transferring them into the vapour phase. Distillation is carried out in columns, equipped with plates or packing material, and a downstream condenser.

Equalisation

All pollutants

Balancing of flows and pollutant loads by using tanks or other management techniques.

Evaporation

Soluble pollutants

The use of distillation (see above) to concentrate aqueous solutions of high-boiling substances for further use, processing or disposal (e.g. waste water incineration) by transferring water to the vapour phase. It is typically carried out in multistage units with increasing vacuum, to reduce the energy demand. The water vapours are condensed, to be reused or discharged as waste water.

Filtration

Suspended solids and particulate-bound metals

The separation of solids from waste water by passing them through a porous medium, e.g. sand filtration, microfiltration and ultrafiltration.

Flotation

The separation of solid or liquid particles from waste water by attaching them to fine gas bubbles, usually air. The buoyant particles accumulate at the water surface and are collected with skimmers.

Ion exchange

Ionic dissolved non-biodegradable or inhibitory pollutants, e.g. metals

The retention of undesired or hazardous ionic constituents of waste water and their replacement by more acceptable ions using an ion exchange resin. The pollutants are temporarily retained and afterwards released into a regeneration or backwashing liquid.

Membrane bioreactor

Biodegradable organic compounds

A combination of activated sludge treatment and membrane filtration. Two variants are used: a) an external recirculation loop between the activated sludge tank and the membrane module; and b) immersion of the membrane module in the aerated activated sludge tank, where the effluent is filtered through a hollow fibre membrane, the biomass remaining in the tank.

Membrane filtration

Suspended solids and particulate-bound metals

Microfiltration (MF) and ultrafiltration (UF) are membrane filtration processes that retain and concentrate, on one side of the membrane, pollutants such as suspended particles and colloidal particles contained in waste waters.

Neutralisation

Acids, alkalis

The adjustment of the pH of waste water to a neutral level (approximately 7) by the addition of chemicals. Sodium hydroxide (NaOH) or calcium hydroxide ($Ca(OH)_2$) may be used to increase the pH, whereas sulphuric acid (H_2SO_4), hydrochloric acid (HCl) or carbon dioxide (CO_2) may be used to decrease the pH. The precipitation of some pollutants may occur during neutralisation.

Nitrification/denitrification

Total nitrogen, ammonia

A two-step process that is typically incorporated into biological waste water treatment plants. The first step is aerobic nitrification where microorganisms oxidise ammonium (NH_4^+) to the intermediate nitrite (NO_2^-), which is then further oxidised to nitrate (NO_3^-). In the subsequent anoxic denitrification step, microorganisms chemically reduce nitrate to nitrogen gas.

Oil-water separation

Oil/grease

The separation of oil and water and subsequent oil removal by gravity separation of free oil, using separation equipment or emulsion breaking (using emulsion breaking chemicals such as metal salts, mineral acids, adsorbents and organic polymers).

Sedimentation

Suspended solids and particulate-bound metals

The separation of suspended particles by gravitational settling.

Precipitation

Precipitable dissolved non-biodegradable or inhibitory pollutants, e.g. metals, phosphorus

The conversion of dissolved pollutants into insoluble compounds by adding precipitants. The solid precipitates formed are subsequently separated by sedimentation, air flotation or filtration.

Stripping

Purgeable pollutants, e.g. hydrogen sulphide (H_2S), ammonia (NH_3), some adsorbable organically bound halogens (AOX), hydrocarbons

The removal of purgeable pollutants from the aqueous phase by a gaseous phase (e.g. steam, nitrogen or air) that is passed through the liquid. They are subsequently recovered (e.g. by condensation) for further use or disposal. The removal efficiency may be enhanced by increasing the temperature or reducing the pressure.

6.4. Sorting techniques

ONLY MANUAL TECHNIQUE ADOPTED SINCE VOLUMES OF WASTE IS RELATIVELY INSIGNIFICANT AND PERTAINS TO NON-HAZARDOUS WASTE (TYPICALLY PACKAGING)

Technique

Description

Air classification

Air classification (or air separation, or aeraulic separation) is a process of approximate sizing of dry mixtures of different particle sizes into groups or grades at cut points ranging from 10 mesh to sub-mesh sizes. Air classifiers (also called windsifters) complement screens in applications requiring cut points below commercial screen sizes, and supplement sieves and screens for coarser cuts where the special advantages of air classification warrant it.

All-metal separator

Metals (ferrous and non-ferrous) are sorted by means of a detection coil, in which the magnetic field is influenced by metal particles, linked to a processor that controls the air jet for ejecting the materials that have been detected.

Electromagnetic separation of non-ferrous metals

Non-ferrous metals are sorted by means of eddy current separators. An eddy current is induced by a series of rare earth magnetic or ceramic rotors at the head of a conveyor that spins at high speed independently of the conveyor. This process induces temporary magnetic forces in non-magnetic metals of the same polarity as the rotor, causing the metals to be repelled away and then separated from the other feedstock.

Manual separation

Material is manually separated by means of visual examination by staff on a picking line or on the floor, either to selectively remove a target material from a general waste stream or to remove contamination from an output stream to increase purity. This technique generally targets recyclables (glass, plastic, etc.) and any contaminants, hazardous materials and oversized materials such as WEEE.

Magnetic separation

Ferrous metals are sorted by means of a magnet which attracts ferrous metal materials. This can be carried out, for example, by an overband magnetic separator or a magnetic drum.

Near-infrared spectroscopy (NIRS)

Materials are sorted by means of a near-infrared sensor which scans the whole width of the belt conveyor and transmits the characteristic spectra of the different materials to a data processor which controls an air jet for ejecting the materials that have been detected. Generally NIRS is not suitable for sorting black materials.

Sink-float tanks

Solid materials are separated into two flows by exploiting the different material densities.

Size separation

Materials are sorted according to their particle size. This can be carried out by drum screens, linear and circular oscillating screens, flip-flop screens, flat screens, tumbler screens and moving grates.

Vibration table

Materials are separated according to their density and size, moving (in slurry in the case of wet tables or wet density separators) across an inclined table, which oscillates backwards and forwards.

X-ray systems

Material composites are sorted according to various material densities, halogen components, or organic components, with the aid of X-rays. The characteristics of the different materials are transmitted to a data processor which controls an air jet for ejecting the materials that have been detected.

6.5. Management techniques

Accident management plan

The accident management plan is part of the EMS (see BAT 1) and identifies hazards posed by the plant and the associated risks and defines measures to address these risks. It considers the inventory of pollutants present or likely to be present which could have environmental consequences if they escape.

YES-IN PLACE

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, regeneration, recycling and/or recovery of energy of the residues, and (3) ensure the proper disposal of residues.

LIMITED SCOPE BUT IN PLACE