Annex I: Comparison of the processes at the Installation with the BREF for Waste Treatments Industries (published August 2006).

Part 1: Generic BAT

Aspect of BAT	BAT	Status at Installation	Mepa Comments 16.07.2015
Environmental management system (EMS)	BAT is to implement and adhere to an Environmental Management System (EMS) that incorporates, as appropriate to individual circumstances, the following features: (see Chapter 4.1.2.8 of BREF) • definition of an environmental policy for the installation by top management (commitment of the top management is regarded as a precondition for a successful application of other features of the EMS) • planning and establishing the necessary procedures • implementation of the procedures, paying particular attention to - structure and responsibility - training, awareness and competence - communication - employee involvement - documentation - efficient process control - maintenance programme - emergency preparedness and response - safeguarding compliance with environmental legislation.	The Scheme's EMS documentation has been submitted as part of the IPPC application (section B2.1). The Scheme's Environmental Policy is included as **Appendix 1**.	Noted.

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	• checking performance and taking corrective action, paying particular attention to - monitoring and measurement (see also the Reference document on General Principles of Monitoring) - corrective and preventive action - maintenance of records - independent (where practicable) internal auditing in order to determine whether or not the environmental management system conforms to planned arrangements and has been properly implemented and maintained. • review by top management.		
	Three further features, which can complement the above stepwise, are considered as supporting measures. However, their absence is generally not inconsistent with BAT. These three additional steps are: • having the management system and audit procedure examined and validated by an accredited certification body or an external EMS verifier • preparation and publication (and possibly external validation) of a regular environmental statement describing all the significant environmental aspects of the	The EMS is not externally validated; however, following the issue of the IPPC permit, an Environmental Management Programme (EMP) report (for the previous year) and proposal (for the following year) will be submitted annually to MEPA as part of the Annual Environmental Report. MEPA normally publishes these reports on its	Noted

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	installation, allowing for year-by-year comparison against environmental objectives and targets as well as with sector benchmarks as appropriate • implementation and adherence to an internationally accepted voluntary system such as EMAS and EN ISO 14001:1996. This voluntary step could give higher credibility to the EMS. In particular EMAS, which embodies all the above-mentioned features, gives higher credibility. However, non-standardised systems can in principle be equally effective provided that they are properly designed and implemented.	website.	
	Specifically for this industry sector, it is also important to consider the following potential features of the EMS: • giving consideration to the environmental impact from the eventual decommissioning of the unit at the stage of designing a new plant • giving consideration to the development of cleaner technologies • where practicable, sectoral benchmarking on a regular basis, including energy efficiency and energy conservation activities, choice of input materials, emissions to air, discharges to water,	The Scheme design minimises the risk of land / groundwater contamination through the installation of a hardstanding surface and surface water management, which facilitate the eventual decommissioning. An outline decommissioning plan is also included in the application – please refer to section B2.9.	Noted.

Aspect of BAT	BAT	Status at Installation	Mepa Comments 16.07.2015
	consumption of water and generation of waste		
Activities carried out	Ensure the provision of full details of the activities carried out on-site. A good detail of that is contained in the following documentation (see Section 4.1.2.7 and related to the previous aspect (preparation and publication). • descriptions of the waste treatment methods and procedures in place in the installation • diagrams of the main plant items where they have some environmental relevance, together with process flow diagrams (schematics) • details of the chemical reactions and their reaction kinetics/energy balance • details on the control system philosophy and how the control system incorporates the environmental monitoring information • details on how protection is provided during abnormal operating conditions such as momentary stoppages, start-ups, and shutdowns • an instruction manual • an operational diary (related to the next aspect) • an annual survey of the activities carried out and the waste treated. The annual survey should also contain a quarterly balance		Ok

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	sheet of the waste and residue streams, including the auxiliary materials used for each site (related to the EMS aspect).		
Housekeeping procedure	Have a good housekeeping procedure in place, which will also cover the maintenance procedure, and an adequate training programme, covering the preventive actions that workers need to take on health and safety issues and environmental risks (see Sections 4.1.1.4, 4.1.1.5, 4.1.2.5, 4.1.2.10, 4.1.4.8 and 4.1.4.3).		Ok
Relationship with waste producer/holder	Try to have a close relationship with the waste producer/holder in order that the customers sites implement measures to produce the required quality of waste necessary for the waste treatment process to be carried out (see Section 4.1.2.9).		Ok
Staff	Have sufficient staff available and on duty with the requisite qualifications at all times. All personnel should undergo specific job training and further education (see Section 4.1.2.10. This is also related to the Housekeeping procedure aspect).		Ok
Waste IN Knowledge	Have a concrete knowledge of the waste IN. Such knowledge needs to take into account the waste OUT, the treatment to be carried out, the type of waste, the procedure under consideration (see next aspects) and the risk (related to waste OUT and the		

Aspect of BAT	BAT	Status at Installation	Mepa Comments 16.07.2015
	treatment) (see Section 4.1.1.1). Guidance on some of these issues is provided in Sections 4.2.3, 4.3.2.2 and 4.4.1.2.		
Waste IN **Pre-acceptance procedure**	Implement a pre-acceptance procedure containing at least the following items (see Section 4.1.1.2): • tests for the incoming waste with respect to the planned treatment • making sure that all necessary information is received on the nature of the process(es) producing the waste, including the variability of the process. The personnel having to deal with the pre-acceptance procedure need to be able due to his profession and/or experience to deal with all necessary questions relevant for the treatment of the wastes in the WT facility • a system for providing and analysing a representative sample(s) of the waste from the production process producing such waste from the current holder. • a system for carefully verifying, if not dealing directly with the waste producer, the information received at the pre-acceptance stage, including the contact details for the waste producer and an appropriate description of the waste regarding its composition and hazardousness • making sure that the waste code according		

Aspect of BAT	BAT	Status at Installation	Mepa Comments 16.07.2015
	to the European Waste List (EWL) is provided • identifying the appropriate treatment for each waste to be received at the installation (see Section 4.1.2.1) by identifying a suitable treatment method for each new waste enquiry and having a clear methodology in place to assess the treatment of waste, that considers the physico-chemical properties of the individual waste and the specifications for the treated waste.		
Waste IN **Acceptance procedure**	Implement an acceptance procedure containing at least the following items (see Section 4.1.1.3): • a clear and specified system allowing the operator to accept wastes at the receiving plant only if a defined treatment method and disposal/recovery route for the output of the treatment is determined (see pre-acceptance in the previous aspect). Regarding the planning for the acceptance, it needs to be guaranteed that the necessary storage (see Section 4.1.4.1), treatment capacity and dispatch conditions (e.g. acceptance criteria of the output by the other installation) are also respected • measures in place to fully document and deal with acceptable wastes arriving at the		

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	site, such as a pre-booking system, to ensure e.g. that sufficient capacity is available • clear and unambiguous criteria for the rejection of wastes and the reporting of all non conformances • a system for identifying the maximum capacity limit of waste that can be stored at the facility • visually inspect the waste IN to check compliance with the description received during the pre-acceptance procedure. *For some liquid and hazardous waste, this BAT is not applicable* (see Section 4.1.1.3).		
Waste IN **Sampling procedures**	Implement different sampling procedures for all different incoming waste vessels delivered in bulk and/or containers. These sample procedures may contain the following items (see Section 4.1.1.4): • sampling procedures based on a risk approach. Some elements to consider are the type of waste (e.g. *hazardous* or non-hazardous) and the knowledge of the customer (e.g. waste producer) • check on the relevant physico-chemical parameters. The relevant parameters are related to the knowledge of the waste needed in each case • registration of all waste materials • have different sampling procedures for bulk		Ok

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	(liquid and solids), large and small containers and laboratory smalls. The number of samples taken should increase with the number of containers. In extreme situations, small containers must all be checked against the accompanying paperwork. The procedure should contain a system for recording the number of samples and degree of consolidation • details of the sampling of wastes in drums within designated storage, e.g. the time-scale after receipt • sample prior to acceptance • maintenance of a record at the installation of the sampling regime for each load, together with a record of the justification for the selection of each option • a system for determining and recording: - a suitable location for the sampling points - the capacity of the vessel sampled (for samples from drums, an additional parameter would be the total number of drums) - the number of samples and degree of consolidation - the operating conditions at the time of sampling • a system to ensure that the waste samples are analysed (see Section 4.1.1.5)		

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	• in the case of cold ambient temperatures, a temporary storage may be needed in order to allow sampling after defrosting. This may affect the applicability of some of the above items in this BAT (see Section 4.1.1.5).		
Waste IN **Reception facility**	Have a reception facility covering at least the following issues (see Section 4.1.1.5): • have a laboratory to analyse all the samples at the speed required by BAT. Typically this requires having a robust quality assurance system, quality control methods and maintaining suitable records for storing the analyses results. *Particularly for hazardous wastes, this often means that the laboratory needs to be on-site* • have a dedicated quarantine waste storage area as well as written procedures to manage non-accepted waste. If the inspection or analysis indicates that the wastes fail to meet the acceptance criteria (including, e.g. damaged, corroded or unlabelled drums) then the wastes can be temporarily stored there safely. Such storage and procedures should be designed and managed to promote the rapid management (typically a matter of days or less) to find a solution for that waste • have a clear procedure dealing with wastes	GSS utilises the final facility laboratory, in Italy or France, to analyse waste since GSS is not the final facility for the hazardous waste, except for WEEE. The Procedures refer to all others	

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	where inspection and/or analysis prove that they do not fulfil the acceptance criteria of the plant or do not fit with the waste description received during the pre-acceptance procedure. The procedure should include all measures as required by the permit or national/international legislation to inform competent authorities, to safely store the delivery for any transition period or to reject the waste and send it back to the waste producer or to any other authorised destination • move waste to the storage area only after acceptance of the waste • mark the inspection, unloading and sampling areas on a site plan • have a sealed drainage system • a system to ensure that the installation personnel who are involved in the sampling, checking and analysis procedures are suitably qualified and adequately trained, and that the training is updated on a regular basis • the application of a waste tracking system unique identifier (label/code) to each container at this stage. The identifier will contain at least the date of arrival on-site and the waste code.		

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Waste OUT **Analysing**	Analyse the waste OUT according to the relevant parameters important for the receiving facility (e.g. landfill, incinerator) (see Section 4.1.1.1).		
Management systems **Traceability**	Have a system in place to guarantee the traceability of waste treatment. Different procedures may be needed to take into account the physico-chemical properties of the waste (e.g. liquid, solid), type of WT process (e.g. continuous, batch) as well as the changes that may occur to the physico-chemical properties of the wastes when the WT is carried out. A good traceability system contains the following items (see Section 4.1.2.3): • documenting the treatments by flow charts and mass balances (see Section 4.1.2.4) • carrying out data traceability through several operational steps (e.g pre-acceptance/acceptance/ storage/treatment/dispatch). Records can be made and kept up-to-date on an ongoing basis to reflect deliveries, on-site treatment and dispatches. Records are typically held for a minimum of six months after the waste has been dispatched • recording and referencing the information on waste characteristics and the source of the waste stream, so that it is available at all times. A reference number needs to be given to the waste and needs to be	CPs and CNs together with GSS documentation, Site Diary and data collection and reporting to ERA, Export documents and final certificates , give full traceability of the waste.	

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	obtainable at any time in the process to enable the • operator to identify where a specific waste is in the installation, the length of time it has been there and the proposed or actual treatment route • having a computer database/series of databases, which are regularly backed up. The tracking system operates as a waste inventory/stock control system and includes: date of arrival on-site, waste producer details, details on all previous holders, an unique identifier, pre-acceptance and acceptance analysis results, package type and size, intended treatment/ disposal route, an accurate record of the nature and quantity of wastes held on-site including all hazards details on where the waste is physically located in relation to a site plan, at which point in the designated disposal route the waste is currently positioned • only moving drums and other mobile containers between different locations (or loaded for removal off site) under instructions from the appropriate manager, ensuring that the waste tracking system is amended to record these changes (see Section 4.1.4.8).		

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Management systems **Mixing and blending rules**	Have and apply mixing/blending rules oriented to restrict the types of wastes that can be mixed/blended together in order to avoid increasing pollution emission of down-stream waste treatments. These rules need to consider the type of waste (e.g. *hazardous*, non-hazardous), waste treatment to be applied as well as the following steps that will be carried out to the waste OUT (see Section 4.1.5).		
Management systems **Segregation and compatibility procedure**	Have a segregation and compatibility procedure in place (see Section 4.1.5), including: • keeping records of the testing, including any reaction giving rise to safety parameters (increase in temperature, generation of gases or raising of pressure); a record of the operating parameters (viscosity change and separation or precipitation of solids) and any other relevant parameters, such as generation of odours (see Sections 4.1.4.13 and 4.1.4.14) • packing containers of chemicals into separate drums based on their hazard classification. Chemicals which are incompatible (e.g. oxidisers and flammable liquids should not be stored in the same drum (see Section 4.1.4.6).	See above. TGSS has its own Dangerous Goods Advisor and ADR trained personnel and drivers ensuring knowledgeable personnel.	
Management	Have an approach for improving waste treatment		

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systems **Efficiency**	efficiency. This typically includes the finding of suitable indicators to report WT efficiency and a monitoring programme (see Section 4.1.2.4).		
Management systems **Accident Management Plan**	Produce a structured accident management plan (see Section 4.1.7).	In place	
Management systems **Incident diary**	Have and properly using an incident diary (see Section 4.1.7).		
Management systems **Noise and vibration management plant**	Have a noise and vibration management plant in place as part of the EMS (see Section 4.1.8). For some WT installations, noise and vibration may not be an environmental problem.		
Management systems **Decommissioning**	Consider any future decommissioning at the design stage. For existing installations and where decommissioning problems are identified, put a programme to minimise these problems in place (see Section 4.1.9).		
Utilities and raw material management **Raw material consumption and generation**	Provide a breakdown of the energy consumption and generation (including exporting) by the type of source (i.e. electricity, gas, liquid conventional fuels, solid conventional fuels and waste) (see Section 4.1.3.1). This involves: • reporting the energy consumption		

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	information in terms of delivered energy • reporting the energy exported from the installation • providing energy flow information (for example, diagrams or energy balances) showing how the energy is used throughout the process.		
Utilities and raw material management **Energy efficiency**	Continuously increase the energy efficiency of the installation, by (see Section 4.1.3.4): • developing an energy efficiency plan • using techniques that reduce energy consumption and thereby reduce both direct (heat and emissions from on-site generation) and indirect (emissions from a remote power station) emissions • defining and calculating the specific energy consumption of the activity (or activities), setting key performance indicators on an annual basis (e.g. MWh/tonne of waste processed).		
Utilities and raw material management **Internal benchmarking**	Carry out an internal benchmarking (e.g. on an annual basis) of raw materials consumption. Some applicability limitations have been identified and these are mentioned in Section 4.1.3.5.		
Utilities and raw material	Explore the options for the use of waste as a raw material for the treatment of other wastes (see		

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management **Waste as a raw material**	Section 4.1.3.5). If waste is used to treat other wastes, then to have a system in place to guarantee that the waste supply is available. If this cannot be guaranteed, a secondary treatment or other raw materials should be in place in order to avoid any unnecessary waiting treatment time (see Section 4.1.2.2).		
Storage and handling **Storage**	Apply the following techniques related to storage (see Section 4.1.4.1): • locating storage areas: - away from watercourses and sensitive perimeters, and - in such a way so as to eliminate or minimise the double handling of wastes within the installation • ensuring that the storage area drainage infrastructure can contain all possible contaminated run-off and that drainage from incompatible wastes cannot come into contact with each other • using a dedicated area/store which is equipped with all necessary measures related to the specific risk of the wastes for sorting and repackaging laboratory smalls or similar waste. These wastes are sorted according to their hazard classification, with due consideration for any potential incompatibility problems and then repackaged. After that, they are removed to		

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	the appropriate storage area • handling odorous materials in fully enclosed or suitably abated vessels and storing them in enclosed buildings connected to abatement • ensuring that all connections between the vessels are capable of being closed via valves. Overflow pipes need to be directed to a contained drainage system (i.e. the relevant bunded area or another vessel) • having measures available to prevent the building up of sludges higher than a certain level and the emergence of foams that may affect such measures in liquid tanks, e.g. by regularly controlling the tanks, sucking out the sludges for appropriate further treatment and using anti-foaming agents • equipping tanks and vessels with suitable abatement systems when volatile emissions may be generated, together with level meters and alarms. These systems need to be sufficiently robust (able to work if sludge and foam is present) and regularly maintained • storing organic waste liquid with a low flashpoint under a nitrogen atmosphere to keep it inertised. Each storage tank is put in a waterproof retention area. Gas effluents are collected and treated.		

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Storage and handling **Bunding**	Separately bund the liquid decanting and storage areas using bunds which are impermeable and resistant to the stored materials (see Section 4.1.4.4).		
Storage and handling **Tank and process pipework**	Apply the following techniques concerning tank and process pipework labelling (see Section 4.1.4.12): • clearly labelling all vessels with regard to their contents and capacity, and applying an unique identifier. Tanks need to have an appropriately labelled system depending on their use and contents • ensuring that the label differentiates between waste water and process water, combustible liquid and combustible vapour and the direction of flow (i.e. in or outflow) • keeping records for all tanks, detailing the unique identifier; capacity; its construction, including materials; maintenance schedules and inspection results; fittings; and the waste types which may be stored/treated in the vessel, including flashpoint limits.		
Storage and handling **Accumulation**	Take measures to avoid problems that may be generated from the storage/accumulation of waste. This may conflict with BAT on "Utilities and raw material management:		

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	Waste as a raw material" when waste is used as a reactant (see Section 4.1.4.10).		
Storage and handling **Handling**	Apply the following techniques when handling waste (see Section 4.1.4.6): • having systems and procedures in place to ensure that wastes are transferred to the appropriate storage safely • having in place a management system for the loading and unloading of waste in the installation, which also takes into consideration any risks that these activities may incur. Some options for this include ticketing systems, supervision by site staff, keys or colour-coded points/hoses or fittings of a specific size • ensuring that a qualified person attends the waste holder site to check the laboratory smalls, the old original waste, waste from an unclear origin or undefined waste (especially if drummed), to classify the substances accordingly and to package into specific containers. In some cases, the individual packages may need to be protected from mechanical damage in the drum with fillers adapted to the packaged waste properties • ensuring that damaged hoses, valves and connections are not used		

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	• collecting the exhaust gas from vessels and tanks when handling liquid waste • unloading solids and sludge in closed areas which are fitted with extractive vent systems linked to abatement equipment when the handled waste can potentially generate emission to air (e.g. odours, dust, VOCs) (see Section 4.1.4.7) • using a system to ensure the bulking of different batches only takes place with compatibility testing (see Section 4.1.4.7 and 4.1.5).		
Storage and handling **Bulking and mixing**	Ensure that the bulking/mixing to or from packaged waste only takes place under instruction and supervision and is carried out by trained personnel. For certain types of wastes, such a bulking/mixing needs to be carried out under local exhaust ventilation (see Section 4.1.4.8).		
Storage and handling **Chemical incompatibilities**	Ensure that chemical incompatibilities guide the segregation required during storage (see Section 4.1.4.13 and 4.1.4.14).		
Storage and handling **Containerised wastes**	Apply the following techniques when containerised wastes are handled (see Section 4.1.4.2): • storing of containerised wastes under cover. This can also be applied to any container that is held in storage pending sampling and		

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	emptying. Some exceptions on the applicability of this technique related to containers or waste not affected by ambient conditions (e.g. sunlight, temperature, water) have been identified (see Section 4.1.4.2). Covered areas need to have adequate provision for ventilation • maintaining the availability and access to storage areas for containers holding substances that are known to be sensitive to heat, light and water, under cover and protected from heat and direct sunlight.		
Extractive vent systems	Perform crushing, shredding and sieving operations in areas fitted with extractive vent systems linked to abatement equipment (see Section 4.1.6.1) when handling materials that can generate emission to air (e.g. odours, dust, VOCs).		
Full encapsulation / Inert atmosphere	Perform crushing/shredding operations (see Sections 4.1.6.1 and 4.6) under full encapsulation and under an inert atmosphere for drums/containers containing flammable or highly volatile substances. This will avoid ignition. The inert atmosphere is to be abated.		
Washing processes	Perform washing processes considering (see Section 4.1.6.2): • identifying the washed components that		

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	may be present in the items to be washed (e.g. solvents) • transferring washings to appropriate storage and then treating them in the same way as the waste from which they were derived • using treated waste water from the WT plant for washing instead of fresh water. The resultant waste water can then be treated in the WWTP or re-used in the installation.		
Air emission treatments	Restrict the use of open topped tanks, vessels and pits by: • not allowing direct venting or discharges to air by linking all the vents to suitable abatement systems when storing materials that can generate emissions to the air (e.g. odours, dust, VOCs) (see Section 4.1.4.5) • keeping the waste or raw materials under cover or in waterproof packaging (see Section 4.1.4.5) • connecting the head space above the settlement tanks (e.g. where oil treatment is a pre-treatment process within a chemical treatment plant) to the overall site exhaust and scrubber units (see Section 4.1.4.1).		
	The use of an enclosed system with extraction, or under depression, to a suitable abatement plant.		

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	This technique is especially relevant to processes which involve the transfer of volatile liquids, including during tanker charging/discharging (see Section 4.6.1).		
	Apply a suitably sized extraction system which can cover the holding tanks, pre-treatment areas, storage tanks, mixing/reaction tanks and the filter press areas, or to have in place a separate system to treat the vent gases from specific tanks (for example, activated carbon filters from tanks holding waste contaminated with solvents) (see Section 4.6.1).		
	Correctly operate and maintain the abatement equipment, including the handling and treatment/disposal of spent scrubber media (see Section 4.6.11).		
	Have a scrubber system in place for the major inorganic gaseous releases from those unit operations which have a point discharge for process emissions. Install a secondary scrubber unit to certain pre-treatment systems if the discharge is incompatible or too concentrated for the main scrubbers (see Section 4.6.11).		
	Have leak detection and repair procedures in place in installations		

<table>
<tr><th>Aspect of BAT</th><th>BAT</th><th>Status at Installation</th><th>Mepa Comments
16.07.2015</th></tr>
<tr><td></td><td>• handling a large number of piping components and storage and
• compounds that may leak easily and create an environmental problem (e.g. fugitive emissions, soil contamination) (see Section 4.6.2).
This may be seen as an element of the EMS.</td><td></td><td></td></tr>
<tr><td>Air emission levels</td><td>Reduce air emission to the following levels
<table>
<tr><th>Air parameter</th><th>Emission levels associated t
use of BAT (mg/Nm^3)</th></tr>
<tr><td>VOC</td><td>7 – 20[1]</td></tr>
<tr><td>PM</td><td>5 – 20</td></tr>
<tr><td colspan="2">[1] For low VOC loads, the higher end of the range can be extended</td></tr>
</table>
by using a suitable combination of preventive and/or abatement techniques (see Section 4.6). The techniques mentioned above in the BAT ‘Air emission treatments’ section also contribute to achieve these values.</td><td></td><td></td></tr>
<tr><td>Waste water management</td><td>Reduce the water use and the contamination of water by (see Sections 4.1.3.6 and 4.7.1):
• applying site waterproofing and storage retention methods
• carrying out regular checks of the tanks and pits especially when they are underground
• applying separated water drainage according to the pollution load (roof water, road water, process water)</td><td></td><td></td></tr>
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	• applying a security collection basin • performing regular water audits, with the aim of reducing water consumption and preventing water contamination • segregating process water from rainwater (see Section 4.7.2).		
	Have procedures in place to ensure that the effluent specification is suitable for the on-site effluent treatment system or discharge (see Section 4.7.1).		
	Avoid the effluent by-passing the treatment plant systems (see Section 4.7.1).		
	Have in place and operate an enclosure system whereby rainwater falling on the processing areas is collected along with tanker washings, occasional spillages, drum washings, etc. and returned to the processing plant or collected in a combined interceptor (see Section 4.7.1).		
	Segregate the water collecting systems for potentially more contaminated waters from less contaminated water (see Section 4.7.2).		
	Have a full concrete base in the whole treatment area that falls to internal site drainage systems which lead to storage tanks or to interceptors that can collect rainwater and any spillage. Interceptors		

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	with an overflow to sewer usually need automatic monitoring systems, such as pH checks, which can shut down the overflow (see Section 4.1.3.6).		
Rainwater collecting	Collect the rainwater in a special basin for checking, treatment if contaminated and further use (see Section 4.7.1).		
Re-use	Maximise the re-use of treated waste waters and use of rainwater in the installation (see Section 4.7.1).		
Daily checks	Conduct daily checks on the effluent management system and to maintain a log of all checks carried out, by having a system for monitoring the effluent discharge and sludge quality in place (see Section 4.7.1).		
	Firstly identify waste waters that may contain hazardous compounds (e.g. adsorbable organically bound halogens (AOX); cyanides; sulphides; aromatic compounds; benzene or hydrocarbons (dissolved, emulsified or undissolved); and metals, such as mercury, cadmium, lead, copper, nickel, chromium, arsenic and zinc) (see Section 4.7.2). Secondly, segregate the previously identified waste water streams on-site and thirdly, specifically treat waste water on-site or off-site.		

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	Ultimately after the application of "the water use and the contamination of water reduction", select and carry out the appropriate treatment technique for each type of waste water (see Section 4.7.1).		
	Implement measures to increase the reliability with which the required control and abatement performance can be carried out (for example, optimising the precipitation of metals) (see Section 4.7.1).		
	Identify the main chemical constituents of the treated effluent (including the make-up of the COD) and to then make an informed assessment of the fate of these chemicals in the environment (see Section 4.7.1 and their applicability restrictions identified).		
	Only discharge the waste water from its storage after the conclusion of all the treatment measures and a subsequent final inspection (see Section 4.7.1).		
Water emission levels	Achieve the following water emission values before discharge:		

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Water parameter	Emission values associated with the use of BAT (ppm)
COD	20 – 120
BOD	2 – 20
Heavy metals (Cr, Cu, Ni, Pb, Zn)	0.1 – 1
Highly toxic heavy metals:	
As	<0.1
Hg	0.01 – 0.05
Cd	<0.1 – 0.2
Cr(VI)	<0.1 – 0.4

	by applying a suitable combination of techniques mentioned in Sections 4.4.2.3 and 4.7. The techniques mentioned above in this section on 'waste water management' (also contribute to reach these values.		
Management of the process generated residues	BAT is to have a residue management plan (see Section 4.8.1) as part of the EMS including: • basic housekeeping techniques • internal benchmarking techniques (see Section 4.1.2.8).		
	Maximise the use of re-usable packaging (drums, containers, IBCs, palettes, etc.) (see Section 4.8.1).		
	Re-use drums when they are in a good working state. In other cases, they are to be sent for appropriate treatment (see Section 4.8.1).		
	Keep a monitoring inventory of the waste on-site by using records of the amount of wastes received on-site and records of the wastes processed (see Section 4.8.3).		

Aspect of BAT	BAT	Status at Installation	Mepa Comments 16.07.2015
	Re-use the waste from one activity/treatment possibly as a feedstock for another (see Section 4.1.2.6).		
Soil contamination	BAT is to provide and then maintain the surfaces of operational areas, including applying measures to prevent or quickly clear away leaks and spillages, and ensuring that maintenance of drainage systems and other subsurface structures is carried out (see Section 4.8.2).		
	Utilise impermeable base and internal site drainage (see Section 4.1.4.6, 4.7.1 and 4.8.2).		
	Reduce the installation site and minimise the use of underground vessels and pipework (see Section 4.8.2).		

Part 2: BAT for specific types of waste treatments

Aspect of BAT	BAT	Status at Installation
Biological treatments	BAT is to use the following techniques for storage and handling in biological systems (see Section 4.2.2): • for less odour-intensive wastes, use automated and rapid action doors (opening times of the doors being	

kept to a minimum) in combination with an appropriate exhaust air collection device resulting in an under pressure in the hall

- for highly odour-intensive wastes, use closed feed bunkers constructed with a vehicle sluice
- house and equip the bunker area with an exhaust air collection device.

Adjust the admissible waste types and separation processes according to the type of process carried out and the abatement technique applicable (e.g. depending on the content of non-biodegradable components) (see Section 4.2.3).

Use the following techniques when applying anaerobic digestion (see Sections 4.2.4 and 4.2.5):

- application of a close integration between the process with the water management
- a recycling of the maximum amount of waste water to the reactor. See some operational issues that may appear when applying this technique in Section 4.2.4
- operate the system under thermophilic digestion conditions. For certain types of wastes, thermophilic conditions cannot to be reached (see Section 4.2.4)
- measure TOC, COD, N, P and Cl levels in the inlet and outlet flows. When a better control of the process is required, or a better quality of the waste OUT, more parameters are necessary for measuring and controlling
- maximise the production of biogas. This technique needs to consider the effect on the digestate and

biogas quality.

Reduce the air emissions of the exhaust gas when using biogas as a fuel by restricting the emissions of dust, NOx, SOx, CO, H2S and VOC by using an appropriate combination of the following techniques (see Section 4.2.6):

- scrubbing the biogas with iron salts
- using de-NOx techniques such as SCR
- using a thermal oxidation unit
- using activated carbon filtration.

Improve the mechanical biological treatments (MBT) by (see Sections 4.2.2, 4.2.3, 4.2.8, 4.2.10, 4.6.23):

- using fully enclosed bioreactors
- avoiding anaerobic conditions during aerobic treatment by controlling the digestion and the air supply (by using a stabilised air circuit) and by adapting the aeration to the actual biodegradation activity
- using water efficiently
- thermally insulating the ceiling of the biological degradation hall in aerobic processes
- minimising the exhaust gas production to levels of 2500 to 8000 Nm3 per tonne. Levels below 2500 Nm3 per tonne do not have been reported
- guaranteeing a uniform feed
- recycling process waters or muddy residues within the aerobic treatment process to completely avoid water emissions. If waste water is generated, then this should be treated to reach the water emissions values mentioned previously

- continuously learning of the connection between the controlled variables of biological degradation and the measured (gaseous) emissions
- reducing emissions of nitrogen compounds by optimising the C:N ratio

Emission levels for mechanical biological treatments

Reduce the emissions from mechanical biological treatments to the following levels (see Section 4.2.12):

Parameter	Treated exhaust gas
Odour (ouE/m^3)	<500 – 6000
NH_3 (mg/Nm^3)	<1 – 20
For VOC and PM, see the generic BAT 41 The TWG recognised that N_2O (see Section 4.6.10) and Hg also needed to be added to this table, however not enough data were provided to validate values on these issues.	

by using an appropriate combination of the following techniques (see Section 4.6):

- maintaining good housekeeping (related to BAT number 3)
- regenerative thermal oxidiser
- dust removal.

Reduce the emissions to water to the levels mentioned in “the water emissions values”. In addition, restrict the emissions to water of total nitrogen, ammonia, nitrate and nitrite as well (see Section 4.7.7 and the concluding remarks Chapter 7).

Physico-chemical treatments

BAT is to apply the following techniques in physico-chemical reactors (see Section 4.3.1.2):

- clearly defining the objectives and the expected reaction chemistry for each treatment process

- assessing each new set of reactions and proposed mixes of wastes and reagents in a laboratory-scale test prior to waste treatment
- specifically designing and operating the reactor vessel so that it is fit for its intended purpose
- enclosing all treatment/reaction vessels and ensuring that they are vented to the air via an appropriate scrubbing and abatement system
- monitoring the reaction to ensure that it is under control and proceeding towards the anticipated result
- preventing the mixing of wastes or other streams that contain metals and complexing agents at the same time (see Section 4.3.1.3).

In addition to the generic parameters identified previously for waste water, additional parameters need to be identified for the physico-chemical treatment of waste waters. Some reference is given on this issue in the concluding remark Chapter 7.

Apply the following techniques for the neutralisation process (see Section 4.3.1.3)

- ensuring that the customary measurement methods are used
- separately storing the neutralised waste water
- performing a final inspection of the neutralised waste water after a sufficient storage time has elapsed.

Apply the following techniques to aid precipitation of the metals in treatment processes (see Section 4.3.1.4):

- adjusting the pH to the point of minimum solubility where the metals will precipitate
- avoiding the input of complexing agents, chromates and cyanides
- avoiding organic materials that may interfere with precipitation from entering the process
- allowing the resulting treated waste to clarify by decantation when possible, and/or by the addition of other dewatering equipment
- using sulphidic precipitation if complex agents are present. This technique may increase the sulphide concentration in the treated waste water.

Apply the following techniques to break-up emulsions (see Section 4.3.1.5):

- testing for the presence of cyanides in the emulsions to be treated. If cyanides are present, the emulsions need a special pre-treatment first
- setting up simulated laboratory tests.

Apply the following techniques to oxidation/reduction (see Section 4.3.1.6):

- abating the air emissions generated during the oxidation/reduction
- having safety measures and gas detectors in place (e.g. suitable for detecting HCN, H2S, NOx).

Apply the following techniques to waste waters containing cyanides (see Section 4.3.1.7):

- destroying the cyanides by oxidation
- adding caustic soda in excess to prevent a decrease

in pH
- avoiding the mixing of cyanide wastes with acidic compounds
- monitoring the progress of the reaction using electropotentials.

Apply the following techniques to waste waters containing chromium (VI) compounds (see Section 4.3.1.8):
- avoiding the mixing of Cr(VI) wastes with other wastes
- reducing Cr(VI) to Cr(III)
- precipitating the trivalent metal.

Apply the following techniques to waste waters containing nitrites (see Section 4.3.1.9):
- avoiding mixing nitrite wastes with other wastes
- checking and avoiding nitrous fumes during the oxidation/acidification treatment of nitrites.

Apply the following techniques to waste waters containing ammonia (see Section 4.3.1.11):
- using a dual column air stripping system with an acidic scrubber for waste with ammonia solutions up to 20 w/w-%
- recovering the ammonia in the scrubbers and returning it to the process prior to the settlement stage
- removing the ammonia removed in the gas phase by scrubbing the waste with sulphuric acid to produce ammonium sulphate
- extending any air sampling for ammonia in exhaust

	stacks or filter press areas to cover the VOCs in filtration and dewatering (see Section 4.3.1.12).	
	Link the air space above filtration and dewatering processes to the main abatement system of the plant (see Section 4.3.1.12).	
	Add flocculation agents to the sludge and waste water to be treated, to accelerate the sedimentation process and to facilitate the further separation of solids (see Section 4.3.1.16 for some applicability restrictions identified). To avoid use of flocculation agents, evaporation is better in those cases where it is economically viable (see Section 4.7.6.1).	
	Apply rapid cleaning and steam- or high pressure water jet cleaning of the filter apertures of the sieving processes (see Section 4.3.1.17).	
Physico-chemical treatment of solid wastes	BAT is to promote the insolubilisation of amphoteric metals, and to reduce the leaching of toxic soluble salts by a suitable combination of water washing, evaporation, recrystallisation and acid extraction (see Section 4.3.2.1, 4.3.2.8, 4.3.2.9) when inmobilisation is used to treat solid waste containing hazardous compounds for land filling.	
	Test the leachability of inorganic compounds, by using the standardised CEN leaching procedures and by applying the appropriate testing level: basic characterisation, compliance testing or on-site verification (see Section 4.3.2.2).	
	Restrict the acceptance of wastes to be treated by	

	solidification/immobilisation treatment to those not containing high levels of VOCs, odorous components, solid cyanides, oxidising agents, chelating agents, high TOC wastes and gas cylinders (see Section 4.3.2.3).	
	Apply control and enclosure techniques for loading/unloading and enclosed conveyor systems (see Section 4.3.2.3).	
	Have an abatement system(s) in place to handle the flow of air, as well as the peak loadings associated with charging and unloading (see Section 4.3.2.3).	
	Use at least a solidification, vitrification, melting or fusion process before landfilling solid waste according to techniques in Sections from 4.3.2.4 to 4.3.2.7.	
Physico-chemical treatment of contaminated soil	BAT is to control the rate of excavation, the amount of contaminated soil area that is exposed, and the duration that soil piles are left uncovered during the excavation and removal of contaminated soil (see Section 4.3.2.10).	
	Use a bench-scale test to determine the suitability of the process to be applied and the best operational conditions for its use (see Section 4.3.2.11).	
	Have collection and control equipment in place such as afterburners, thermal oxidisers, fabric filters, activated carbon, or condensers for the treatment of the gases from thermal treatments (see Section 4.3.2.11).	
	Report the efficiency achieved during the processes for the	

	different components reduced and also for those that have not been affected by the process (see Section 4.3.2.3).	
Re-refining of waste oils	BAT is to operate a careful control of the incoming materials supported by analytical equipment (viscometry, infrared, chromatography and mass spectrometry as appropriate), laboratories and resources (see Section 4.1.1.1).	
	Check at least for chlorinated solvents and PCBs (see Sections 4.1.1.1 and 4.4.1.2).	
	Use condensation as a treatment for the gas phase of the flash distillation unit (see Section 4.6.8).	
	Have vapour return lines for loading and unloading vehicles, routing all vents to a thermal oxidiser/incinerator or an activated carbon adsorption installation (see Sections 4.1.4.6, 4.6.7 and 4.6.14).	
	Direct vent streams to a thermal oxidiser with waste gas treatment if chlorinated species are present in the vent stream. If high levels of chlorinated species are present then condensation followed by caustic scrubbing and an activated carbon guard bed is the preferred treatment path (see Section 4.6).	
	Utilise a thermal oxidation at 850 °C with a two seconds residence time for the vacuum distillation vent of vacuum generators or for the air from process heaters (see Section 4.6).	

<table>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>Use a highly efficient vacuum system (see Section 4.4.1.1).</td><td></td></tr>
<tr><td></td><td>Use the residues from vacuum distillation or thin film evaporators as asphalt products (see Section 4.4.1.15).</td><td></td></tr>
<tr><td></td><td>Use a re-refining process of waste oil which can achieve a yield higher than 65 % on a dry basis (see Sections from 4.4.1.1 to 4.4.1.12).</td><td></td></tr>
<tr><td>Emission levels for re-refining of waste oils</td><td>Achieve the following values in the discharged waste water from the re-refining unit (see Section 4.4.1.14):
<table>
<tr><th>Waste water parameter</th><th>Concentration (ppm)</th></tr>
<tr><td>Hydrocarbons</td><td><0.01 – 5</td></tr>
<tr><td>Phenols</td><td>0.15 – 0.45</td></tr>
<tr><td colspan="2">For other water parameters, refer to BAT number 56 in the Generic BAT section</td></tr>
</table>
by using a suitable combination of process-integrated techniques and/or primary, secondary, biological and finishing treatments (see Sections 4.4.1.14 and 4.7).</td><td></td></tr>
<tr><td>Treatment of waste solvent</td><td>BAT is to operate a careful control of the incoming materials as supported by analytical equipment, laboratories and resources (see Section 4.1.1.1).</td><td></td></tr>
<tr><td></td><td>Evaporate the residue from the distillation columns and to recuperate the solvents (see Section 4.4.2.4).</td><td></td></tr>
<tr><td>Regeneration of waste catalyst</td><td>BAT is to use bag filters to abate particulates from the fumes generated during the regeneration process (see Sections 4.4.3 and 4.6.5).</td><td></td></tr>
<tr><td></td><td>Use a SOx abatement system (see Section 4.4.3.3).</td><td></td></tr>
</table>

Regeneration of waste activated carbon	BAT is to have an effective quality control procedure in place to ensure that the operator can differentiate between the carbon used for potable water or food grade carbon and the rest of spent carbons (the so-called ‘industrial carbons’) (see Section 4.4.4.2).	
	Require a written undertaking from customers indicating what the activated carbon has been used for (see Section 4.1.2.3).	
	Utilise an indirect fired kiln for industrial carbons –it may be argued that this could equally be applied to potable water carbons. However, limits on capacity and corrosion may deem that only multiple hearth or direct fired rotary kilns may be used (see Section 4.4.4.1).	
	Utilise an afterburner with a minimum of 1100 °C, two seconds residence time and 6 % excess oxygen for the regeneration of industrial carbons where refractory halogenated or other thermally resistant substances are likely to be present. In other cases, less stringent thermal conditions are sufficient (see Section 4.4.4.2).	
	Utilise an afterburner with a minimum heating temperature of 850 °C, two seconds residence time and 6 % excess oxygen for potable water and food grade active carbons (see Section 4.4.4.2).	
	Apply a flue-gas treatment train consisting of quench and/or venturi and aqueous scrubbing sections, followed by an	

	induced draft fan (see Section 4.4.4.2).	
	Utilise a caustic or soda ash scrubbing solutions to neutralise acid gases for industrial carbon plants (see Section 4.4.4.2).	
	Have a WWTP containing an appropriate combination of flocculation, settlement, filtration and pH adjustment for the treatment of potable water carbons. For effluents of industrial carbons, applying additional treatments (e.g. metal hydroxide precipitation, sulphide precipitation) are also considered BAT (see Section 4.4.4.3).	
Preparation of waste to be used as fuel	BAT is to try to have a close relationship with the waste fuel user in order that a proper transfer of the knowledge of the waste fuel composition is carried out (see Section 4.5.1).	
	Have a quality assurance system to guarantee the characteristics of the waste fuel produced (see Section 4.5.1).	
	Manufacture different type of waste fuels according to the type of user (e.g. cement kilns, different power plants), to the type of furnace (e.g. grate firing, blow feeding) and to the type of waste used to manufacture the waste (e.g. hazardous waste, municipal solid waste) (see Section 4.5.2).	
	When producing waste fuel from hazardous waste, use activated carbon treatment for low contaminated water and thermal treatment for highly polluted water (see Sections 4.5.6 and 4.7). In this context, thermal treatment relates to	

	any thermal treatment in Section 4.7.6 or incineration which is not covered in this document.	
	When producing waste fuel from hazardous waste, ensure correct follow-up of the rules concerning electrostatic and flammability hazards for safety reasons (see Sections 4.1.2.7 and 4.1.7).	
Preparation of solid waste fuels from non-hazardous waste	BAT is to visually inspect the incoming waste to sort out the bulky metallic or non-metallic parts. The purpose is to protect the plant against mechanical destruction (see Section 4.1.1.3 and this is also related to BAT 8.e).	
	Use magnetic ferrous and non-ferrous metal separators. The purpose is to protect the pelletisers as well as fulfill the requirements of the final users (see Sections 4.5.3.3 and 4.5.3.4).	
	Make use of the NIR technique for the sorting out of plastics. The purpose is the reduction of organic chlorine and some metals which are part of the plastics (see Section 4.5.3.10).	
	Use a combination of shredder systems and pelletisers suitable for the preparation of the specified size waste fuel (see Sections 4.5.3.1 and 4.5.3.12).	
	For some installations preparing solid waste fuels from source-separated waste streams, the use of some or all of the above-mentioned techniques may not be necessary to comply with BAT (see Section 4.5.3.1).	

Preparation of solid waste fuel from hazardous waste	*BAT is to consider emissions and flammability hazards in case a drying or heating operation is required (see Sections 4.1.2.7 and 4.5.4.1).*
	Consider carrying out the mixing and blending operations in closed areas with appropriate atmosphere control systems (see Sections 4.1.4.5, 4.5.4.1 and 4.6).
	Use bags filters for the abatement of particulates (see Section 4.6.26).
Preparation of liquid waste fuels from hazardous waste	*BAT is to use heat-exchange units external to the vessel if heating of the liquid fuel is required (Section 4.5.4.1).*
	Adapt the suspended solid content to ensure the homogeneity of the liquid fuel (see Section 4.5.4.1).