BAT in the BAT Waste Treatment Industries

General BAT Conclusions

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:	
1.i commitment of the management, including senior management;	*The operator has in place an Environment Management System (EMS) that is aligned to the requirements of ISO14001:2015. The EMS includes documented procedures setting out roles and responsibilities including that of senior management.*
1.ii definition, by the management, of an environmental policy that includes the continuous improvement of the environmental performance of the installation;	*The operator has an Environmental Policy in place which commits the site to legal compliance and continuous improvement.*
1.iii planning and establishing the necessary procedures, objectives and targets, in conjunction with financial planning and investment;	*SOP's are in place for all manufacturing processes and cleaning tasks. The operator has a comprehensive Continuous Improvement (CI) governance structure in place which covers all manufacturing and allied activities at the site. Opportunities are identified and assessed for added value, and against ability to impact on key site KPI's including environmental impacts such as water usage and other business/production KPI's. The tracker is reviewed on a period basis.*
1.iv implementation of procedures paying particular attention to: (a) structure and responsibility, (b) recruitment, training, awareness and competence, (c) communication, (d) employee involvement, (e) documentation, (f) effective process control, (g) maintenance programmes, (h) emergency preparedness and response, (i) safeguarding compliance with environmental legislation;	*The EMS includes documented management procedures and arrangements covering:* *a. Management System includes a manual and documented procedures setting out roles and responsibilities.* *b. All employees receive an induction which includes awareness of the environmental permit and the EMS. All new starters have an individual learning plan which includes all relevant SOP's to support their competence framework which will include any relevant to the management of environmental impacts.* *c. The management system manual contains procedures relating to internal and external communications processes.* *d. See point (1.b)* *e. The management system includes a manual, documented procedures and signposting to relevant records.* *f. SOP's are in place for all processes and cleaning tasks.* *g. The site operates a computerised PPM system.* *h. Contingency plans in the event of breakdowns of key plant and equipment or unplanned events. An accident plan is present on site which includes any emergency procedures for environmental matters e.g. spillage.* *i. A legal register utilised to identify all compliance requirements and the controls required. Records to demonstrate legal compliance are periodically audited by Group as part corporate governance programme.*
1.v checking performance and taking corrective action, paying particular attention to: (a) monitoring and measurement (b) corrective and preventive action, (c) maintenance of records,	*(a) EMS includes a manual and documented procedures setting out the monitoring and measurement programme. KPI's including utilities and waste are tracked.* *(b) Corrective and preventive action procedures are in place as part of the EMS covering audits, incidents and action reporting. Progress with close out of actions is tracked and reviewed by the senior leadership team.*

(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;	*(c) The EMS includes procedures for the identification, maintenance and retention of applicable records* *(d) The EMS includes a manual and documented procedures setting out the internal/external audit process. The site receives external environmental audits from Group.*
1.vi review, by senior management, of the EMS and its continuing suitability, adequacy and effectiveness;;	*The EMS includes a manual and documented procedures setting out the management review process. The EMS is reviewed at least annually.*
1.vii following the development of cleaner technologies;	*The site is benchmarked against other Tulip businesses, and sometimes do visits to other companies or take part in industry forums which help identify best practises which could be brought to the site.*
1.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;	*The site has in place a generic closure plan which is periodically reviewed. New equipment goes through a capex process which includes siting and assessment of efficiency including energy, water use and would, where relevant, include decommissioning considerations.*
1.ix application of sectoral benchmarking on a regular basis;	*The site is benchmarked against other Tulip businesses in terms of energy, water and food waste, in addition to the review of environmental performance relative to production tonnages. Tulip take part in industry forums which help identify best practises which could be brought to the site and shared with others in the sector.*
1.x waste stream management (see BAT 2);	*See BAT 2*
1.xi an inventory of waste water and waste gas streams (see BAT 3);	*See BAT 3*
1.xii residues management plan (see description in Section 6.6.5)	*The site applies the waste hierarchy to all waste residues which is periodically reviewed as part of the EMS. Specific measures are in place to avoid the generation of waste and minimise the generation of residues arising from the treatment of waste. The operation of the ETP is optimised and the site supported by 3rd party specialist.*
1.xiii accident management plan (see description in Section 6.6.5);	*The accident management plan is part of the site's EMS and has assessed the specific hazards posed by the plant and the associated risks and consequences. The plan identifies the control measures in place to address these risks and associated procedures to be followed in the event of an incident.*
1.xiv odour management plan (see BAT 12);	*See Bat 12*
1.xv noise and vibration management plan (see BAT 17)	*See Bat 17*

The following applies to the waste treatment activity only at the installation.

BAT 2. In order to improve the overall environmental performance of the plant, BAT is to use all of the techniques given below	
2.a Set up and implement waste characterisation and preacceptance procedures	*Not applicable – the site does not accept 3rd party waste. The activity is restricted to the treatment effluent generated by the permitted installation only covering physical screening, settlement and off site sludge removal to discharge to sewer.*
2.b Set up and implement waste acceptance procedures.	*Not applicable – see above.*

2.c Set up and implement a waste tracking system and inventory	*Not applicable – see above.*
2.d Set up and implement an output quality management system	*Flow and pH of effluent discharge is constantly monitored. Effluent sampling in place to generate composite samples that is used by South West Water for analysis to ensure compliance with discharge consent. This includes suspended solids, chemical oxygen demand, fats, oils and grease.*
2.e Ensure waste segregation	*Screenings are collected and further drained prior to removal for disposal. Solids are removed from the effluent stream via the DAF unit to a conical agitated tank.*
2.f Ensure waste compatibility prior to mixing or blending of waste	*All liquid effluent generated by the installation are compatible. The balance tank receives screened effluent and allows for stabilisation of the mixed sources of effluent from across the facility prior to discharge to the effluent DAF system.*
2.g Sort incoming solid waste	*A stainless-steel wedge wire rotary separates gross solids from liquid effluent. The screenings are collected and further drained prior to removal for disposal under Animal By-Products Regulations*

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: (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;	*The design specification of the DAF plant identified the typical characteristics and volume of the effluent generated by the site from historical data and analysis. O&M documentation for the treatment plant was an integral part of the hand over and commissioning plan from the designers and installers.*
(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 (c) data on bioeliminability (see BAT 52);	*The characteristics of the influent wastewater stream is understood in addition to the variability of the volume and concentration by shift (production/hygiene operations).*
(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);	*There are no waste gas streams produced by the treatment process.*

(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).	

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.	
4.a Optimised storage location	*The DAF cell is fully enclosed and its location is as far as technically and economically possible from sensitive receptors as the existing site infrastructure allows.* *The majority of conveying of the effluent automated. There is no unnecessary handling of the waste streams as a result of the location of the plant.*
4.b Adequate storage capacity	*The balance tank provides sufficient contingency to allow retention of out of specification wastewater (at least 3 hours of peak waste water flow). The level in the balance and sludge tanks is controlled by level probes, alarmed and maintained to ensure the treatment process is optimised. Out of spec effluent is automatically recirculated back through the treatment process.*
4.c Safe storage operation	*All equipment used for loading, unloading and storing waste is fit for purpose, clearly documented and labelled. All materials are securely stored internally within dedicated facilities.*
4.d Separate area for storage and handling of packaged hazardous waste	*Not Applicable – there is no handling or packing of hazardous waste within the treatment facility.*

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.	
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).	*The waste handled by the treatment facility is from a single source (factory effluent). The pumped conveying of all waste streams is automated. All effluent plant operatives are trained and competent.* *Other than the reception and balance tank there is no blending or mixing of waste.* *Effluent drainage systems and flooring are installed around the DAF plant to allow the washdown of equipment and ensure that any spillage is captured and directed back through the treatment process.* *The site has formal spillage control standard operating procedures covering the handling and spill response requirements for materials with the potential to pollute. The SOPs are trained out to operators and require response measures (including the deployment of spill control materials) to prevent the loading of spills to site drains.*

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).
Spot samples are taken from an agreed sampling point (as per South West Water consent after the DAF). These samples are used by the sewage undertaker for monitoring purposes. An inline turbidity monitor is used for checking the clarity of the effluent. This monitor has alarm set points and is used to alert operators to issues before discharge to sewer. Effluent flow and pH is measured prior to discharge. The system can log flow volumes for ease of fault diagnosis and monitoring.

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.
Discharge to sewer is monitored (see above) in line with the discharge consent from South West Water South West Water. Compliance monitoring is undertaken by South West Water using the relevant test methodology and accredited laboratories.

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.
There are no emissions to atmosphere from the effluent plant.

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.	
9.a Measurement	*Not applicable. See BAT 10*
9.b Emissions factor	
9.c Mass Balance	

BAT 10. BAT is to periodically monitor odour emissions	
Odour emissions can be monitored using: EN standards (e.g. dynamic olfactometry according to EN 13725 in order to determine the odour concentration or EN 16841-1 or -2 in order to determine the odour exposure); when applying alternative methods for which no EN standards are available (e.g. estimation of odour impact), ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality. The monitoring frequency is determined in the odour management plan (see BAT 12).	*There is no history of odour nuisance complaint at the site and odour has not previously been monitored quantitatively.*

BAT 11. BAT is to periodically monitor 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.	
Monitoring includes direct measurements, calculation or recording. 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.	*The operator directly measures utility use across its installation at Redruth. Area flow and energy meters monitor usage is recorded and reported daily. Utilities are tightly controlled and monitored. Chemical dosing utilisation is recorded.*

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	*As part of the EMS the operator has in place all the components of an odour management plan which includes a protocol for actions and timelines in the event of an incident, monitoring and responding to odour incidents, inventory of odour sources, risk assessment and operational controls aimed at preventative maintenance, management, monitoring and inspection of all potential sources.*

Emissions to Air

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.	
13.a Minimising residence times	*For materials with the potential to give rise to malodour residence times are minimised in line with technical and ABP requirements e.g. ABP materials storage, sludge collection frequencies.*
13.b Using chemical treatment	*Chemical treatment of odour compounds or use of masking agents is not employed by the site.*
13.c Optimising aerobic treatment	*Not applicable*

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.	
14.a Minimising the number of potential diffuse emission sources	*Good design principles are employed in the specification of the new treatment works including:* - *optimising the use of welded fittings and pipes* - *use of gravity transfer* - *limiting the height of drop (rotary screen and sludge conveying* - *control of vehicle movements* - *Sealed and closed-door operation of treatment building*

14.b Selection and use of high-integrity equipment	*Good design principles are used in the specification of the new treatment works including:* - *valves with double packing seals;* - *high-integrity gaskets for critical applications;* - *pumps/compressors/agitators fitted with mechanical seals* - *magnetically driven pumps/ compressors/agitators*
14.c Corrosion prevention	*Good design principles are used in the specification of the new treatment works including:* - *appropriate selection of construction materials;* - *lining or coating of equipment and painting of pipes with corrosion inhibitors*
14.d Containment, collection and treatment of diffuse emissions	*The DAF cell plant is contained within a fully enclosed building. The site operates a closed door policy. The screen and sludge tank are located externally.*
14.e Dampening	*The process produces a wet sludge which is tanked directly from the sludge tank. All vehicle movements take place on hard standing. There is no potential for dust emissions.*
14.f Maintenance	*All equipment is subject to planned inspection and preventative maintenance in line with the suppliers O&M manual. Additional housekeeping and area inspections are carried out as part of the daily walk round and GMP audits.*
14.g Cleaning of waste treatment and storage areas	*To meet strict food hygiene standards all areas, including the effluent plant are subject to a daily cleaning schedule and separate food hygiene and housekeeping inspections. This is in addition to all operators trained to employ a 'clean as you go' approach to good housekeeping.*
14.h Leak detection and repair (LDAR) programme	*All plant, equipment and infrastructure associated with the effluent treatment plant and drainage is subject to periodic cleaning and visual inspection. This planned risk-based approach will determine what additional intrusive inspection works may be required. Any detected leaks will be undertaken on a reactive basis. No direct monitoring for leaks is undertaken.*

BAT 15 & 16 – only applicable to flaring

Noise and vibrations

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:	
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	*i) Noise not considered a significant risk; measures in place include planned preventive maintenance, transport management.* *ii) Noise monitoring is routinely undertaken from an occupational health exposure perspective* *iii) Complaints process is in place as part of the EMS.* *iv) There are no current identified issues of concern.*

prevention and/or reduction measures.	

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.	
18.a Appropriate location of equipment and buildings	*All potentially noisy equipment is located appropriately either within the building or away from sensitive boundaries. The effluent treatment plant and associated assets are entirely located internally.*
18.b Operational measures	*New equipment is procured through a capex process which includes SHE sign off to ensure no negative impact on noise exposure for operators.* *Potentially noisy equipment is located within the building e.g. compressors.* *All equipment is on the site PPM system.* *Vehicle movements are controlled, with raw material deliveries generally taking place between 6a..m and 4p.m. Vehicles switch off engines during loading and unloading.*
18.c Low-noise equipment	*Selection of low noise equipment is a consideration at the procurement stage.*
18.d Noise and vibration control equipment	*Potentially noisy equipment is located within the effluent treatment building that provides sufficient additional noise and vibration attenuation in line with planning and building control. No additional noise control equipment is necessary.*
18.e Noise attenuation	*See above.*

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.	
19.a Water management	*The operator directly measures water use across its installation by area. The site targets water efficiency and improvement plans by areas utilising water flow diagrams and mass balances.* *Dry cleaning methods are used as primary 'clean as you go' measure for all routine hygiene tasks. Trigger controls are used on all hoses.*
19.b Water recirculation	*Water and waste water streams are recirculated and optimised as far as food safety allows.*
19.c Impermeable surface	*The waste water treatment train and associated equipment are made of high integrity materials impermeable to the liquids/solids they are in contact with. All roadways and service areas of the site are of hard standing.*
19.d Techniques to reduce the likelihood and impact of overflows and failures from tanks and vessels	*All tanks (balance, sludge and water treatment chemicals) have level probes and overflow detectors and all overflow pipes are directed to contained drainage system that drains back to the effluent plant.* *Bulk tanks and IBCs containing liquids with the potential to pollute are either within enclosed buildings and/or provided with suitable secondary containment (the volume sized to accommodate the loss of containment of the largest tank within the secondary containment) and all tanks/vessels can be independently isolated if required.*

19.e Roofing of waste storage and treatment areas	*The DAF cell is entirely enclosed.*
19.f Segregation of water streams	*Surface run-off water and process effluent is collected and treated separately. Uncontaminated surface water is discharged to controlled water. All water that has come into contact with the process is treated prior to discharge under a consent from South West Water.*
19.g Design and maintenance provisions to allow detection and repair of leaks	*The DAF cell is located entirely above ground and can be readily visually inspected and isolated form the process for repair. All bulk tanks are provided with secondary containment. The reception tank is periodically cleaned and visually inspected.*
19.h Appropriate buffer storage capacity	*Buffer storage capacity is provided by the replacement balance tank. The balance tank provides for the retention of out of specification wastewater that can be further treated on site or tankered off site if required in line with the site's documented contingency measures.*

BAT 20. In order to reduce emissions to water, BAT is to treat wastewater using an appropriate combination of the techniques
The site uses primary physical screening and secondary Dissolved Air Floatation (DAF) technology which are recognised as BAT within Food, Drink and Milk Industries BREF, 2018.

Emissions from accidents and incidents

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)	
21.a Protection measures	*The site is fenced to prevent unauthorised access and operates manned 24 hour security together with CCTV covering the facility.* *The site assesses fire and explosion risk as a part of its response to DSEAR, asset and fire protection. Fire prevention measures are employed to reduce risk to life and infrastructure to as low as is reasonably practicable. An accident plan is present on site which includes emergency procedures including environmental matters that is trained out to relevant personnel. Emergency response plans are subject to periodic testing and all critical response equipment are identified and inspected as part of a planned schedule. Contingency measures include access to key replacement plant and equipment in the event of breakdowns or unplanned events.*
21.b Management of incidental/accidental emissions	*As above. Procedures are in place to manage and contain emissions from accidents and incidents including emissions from spillages, firefighting water and prevention of contamination of controlled water in the event of a catastrophic tank failure. .*
21.c Incident/accident registration and assessment system	*The accident/incident response procedure requires that all accidents and incidents are logged investigated and changes to procedures where necessary.*

Material Efficiency

BAT 21. In order to use materials efficiently, BAT is to substitute materials with waste.	
Waste is used instead of other materials for the treatment of wastes	*The balance tank allows for stabilisation of mixed sources of effluent from across the facility prior to discharge to the effluent DAF system allowing treatment to be optimised and potentially reducing the loading requirement of treatment chemicals.*

Energy Efficiency

BAT 23 In order to use energy efficiently, BAT is to use both of the techniques given below.	
23.a Energy Efficiency Plan	*The site is subject to a Climate Change Agreement and has reduction targets in place as part of this scheme, and its own internal management system targets. Energy use is regularly monitored, measured and tracked using the in-house weekly tool for data recording. Where feasible, these are reviewed and implemented by the site.*
23.b Energy Balance record	*The consumption of energy by source and by area is understood, monitored, reported and reviewed regularly. Energy and effluent volumes treated by production tonnage for the installation is tracked on a period basis.*

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).	
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)	*All consumables (treatment chemicals etc) are received in and on packaging (IBC/drums, pallets etc) that are either returned to the supplier for reuse or disposed off site for further recovery.*

BAT 25 – 53– cover technologies not applicable to the installation or addressed elsewhere in this assessment.